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MAPS IN VOL. VIII.

POLITICAL.

CITIES.

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.

č: 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, partieularly 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 (ef. *ch*).

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

ɜ: 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*.

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

ḥ: 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 wlhich 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*).

ɬ: the guttural ("thiek" 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.

n̥: 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.

r̥: 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: voieed 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.

ã..... 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 *fire*, *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*.

o͝o..... 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 *sũd*, and as *u* in French *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, eongest).

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

kh..... 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 French *nom*, Portuguese *Sam*.

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

l or y.... French *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*.

zh..... 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, *ch*, *kh*, ñ, and *v*, which 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.

ch and *kh*. These are both rough breathings or spirants made with considerable force, *ch* being made between the flat of the tongue and the hard palate, and *kh* between the tongue and the soft palate. *ch* approaches in sound to English sh, but is less sibilant and is made further back in the mouth; *kh* 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, which 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-.

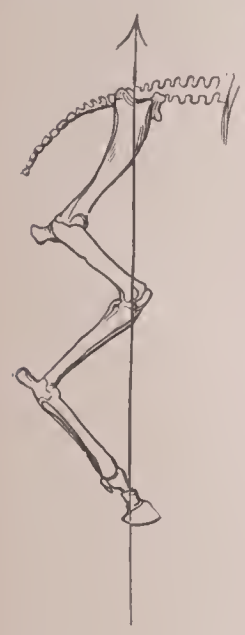
ñ or n-y. The consonants represented by ñ (Spanish ñ, French and Italian gn, etc.) are practically equivalent to English -ni- or -ny- in bunion, bunyon, onion, etc., and, except when final, are represented by n-y. Final ñ, as French -gn(e), may be produced by omitting the sound of -on in the pronunciation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

Mechanics, Animal: that branch of mechanics which treats of the muscular force of animals as exerted in locomotion. The muscular force is utilized either through one of the elementary machines or mechanical powers (see MECHANICAL POWERS), or through a simple combination of two or more of them. In walking or leaping on the ground the "jointed links" or "knee-joint" is the simple machine employed when the body is raised from the ground, and the lever when a limb only is raised or moved, the earth furnishing the resistance in the first case, and the body in the second. The application of the principle of the lever involves the consequence that the bones of the limbs in these efforts sustain great cross-strains, which from their structure they are not calculated to bear. The bones of the hind leg of the horse, for instance, are arranged as in the engraving, and whether in leaping or in hauling a load the action of the muscles of the hinder parts is to straighten out the links which form the hind legs. The ground gives a point of support, but not a fulcrum in the sense of the lever; and instead of the greatest effort being a cross-breaking effort, it is transmitted through the axes of the bones, in which direction, as short columns, they are capable of withstanding great pressure. When the limbs are raised from the ground the body acts as the point of resistance, and the bones act generally as levers; but when the ground forms the point of resistance, the principle of the lever does not furnish the means of calculating the effort necessary to elevate the weight of the body. The jointed construction shown in the sketch corresponds to the device known as "lazy tongs" in mechanics, and acts in the same manner, except that muscular force is applied at each joint. When this system of jointed links is extended to nearly a straight line, a very slight muscular effort at each joint transmits a powerful force through the axis of the extended system in the direction of motion. Swimming animals usually make use of the "inclined plane," combined with the lever or the jointed links, although some animals, like the cuttlefish, make use of an apparatus which involves the principle of the hydrostatic press; a quantity of water being drawn into the body by a large opening, and then ejected by a smaller opening with a greater velocity.



The kinematics of animal movements have been made the subject of extended experiments, and have been fully treated by various authors. (See GAITS.) The dynamics of animal movements have received less attention. The latter study is the more important, as the structure of nearly all animals is based, to some extent, on their mode of progression, and the conditions under which they are obliged to move from place to place, or the mode in which they procure food, defend themselves, or escape from their enemies.

The general law that in animal locomotion the same mechanical principles are applied as in artificial constructions furnishes the basis of the study of animal movements.

Mechanicsburg: borough. See the Appendix.

Mechanicsville: village. See the Appendix.

Mechanicville: village. See the Appendix.

Mechlin: See the Appendix.

Mecklenburg Declaration of Independence: a series of resolutions published in *The Register* at Raleigh, N. C., Apr. 30, 1819, purporting to have been adopted by the citizens of Mecklenburg in that State on May 20, 1775. The resolutions contained several phrases almost or quite identical with portions of the famous Declaration of July 4, 1776. Before the publication of 1819 the general public had never heard of the Mecklenburg resolutions, but now they were widely copied throughout the country, and everybody began to ask questions. Was it possible that such a series of resolutions had actually been passed thirteen months before the Declaration of July 4, 1776, and that the fact had been concealed from the patriots of the Revolution? John Adams, who first learned of the resolutions in 1819, declared in a letter to Jefferson that if he had known of them in 1776 he would have made the halls of Congress ring with them, and that they would have been published in every Whig newspaper in the colonies; and Jefferson in reply expressed his surprise that Adams should not have seen at a glance that the publication was fraudulent. From that day to this the question as to whether the resolutions were actually passed by the citizens of Mecklenburg has been in dispute. In 1831 a committee of the Legislature was instructed to investigate all the questions involved, and the results of these investigations convinced a large majority of the people of the State that the claim was established. In accordance with that popular belief, May 20 was made a State holiday in North Carolina. On the other hand, several historical scholars have investigated the subject with care, and have arrived at an opposite conclusion. President J. C. Welling, of the Columbian University of Washington, looked into the evidence with characteristic thoroughness, and published the results of his researches in *The North American Review* in 1874. The conclusion which he reached was that no such resolutions were passed in 1775. A similar conclusion was reached by an independent study of the most comprehensive nature carried on by Lyman C. Draper, long the secretary of the State Historical Society of Wisconsin. The results of his study have never been published, but they are embodied in a MS. of 474 pp. This monograph, with the accompanying documents mostly in MS., constitutes twelve folio volumes. It is the object of this article to set forth as judicially as possible the evidence for and against the genuineness of the resolutions. The resolutions are as follows:

"*Resolved*, 1. That whoever directly or indirectly abetted, or in any way, form, or manner, countenanced the unchartered and dangerous invasion of our rights, as claimed by Great Britain, is an enemy to this country—to America—and to the inherent and inalienable rights of man.

"*Resolved*, 2. That we, the citizens of Mecklenburg County, do hereby dissolve the political bands which have connected us to the mother-country, and hereby absolve ourselves from all allegiance to the British crown, and abjure

all political connection, contract, or association with that nation, who have wantonly trampled on our rights and liberties, and inhumanly shed the blood of American patriots at Lexington.

"*Resolved*, 3. That we do hereby declare ourselves a free and independent people; are, and of right ought to be, a sovereign and self-governing association, under the control of no power other than that of our God and the general government of the Congress; to the maintenance of which independence we solemnly pledge to each other our mutual co-operation, our lives, our fortunes, and our most sacred honor.

"*Resolved*, 4. That as we acknowledge the existence and control of no law or legal officer, civil or military, within this county, we do hereby ordain and adopt as a rule of life, all, each, and every of our former laws; wherein, nevertheless, the crown of Great Britain can never be considered as holding rights, privileges, immunities, or authority therein.

"*Resolved*, 5. That it is also further decreed that all, each, and every military officer in this county is hereby retained in his former command and authority, he acting conformably to these regulations. And that every member present of this delegation shall henceforth be a civil officer —viz., a justice of the peace in the character of a '*committeeman*,' to issue process, hear and determine all matters of controversy, according to said adopted laws, and to preserve peace and union and harmony in said county; and to use every exertion to spread the love of country and fire of freedom throughout America until a more general organized government be established in this province.

"Abraham Alexander, *Chairman*.

John McKnitt Alexander, *Secretary*."

Accompanying the publication of these resolutions in 1819 was a certificate, of which the following is a copy:

"The foregoing is a true copy of the papers on the above subject left in my hands by John McKnitt Alexander, deceased. I find it mentioned on file that the original book was burned April 1st, 1800; that a copy of the proceedings was sent to Hugh Williamson, in New York, then writing a history of North Carolina, and that a copy was sent to General W. R. Davie. J. McKnitt."

The signer of this certificate, J. McKnitt, is conceded to have been Joseph McKnitt Alexander, the son of John McKnitt Alexander referred to in the certificate. The Alexander family was very numerous in North Carolina, and it is known that J. McKnitt had acquired the habit of omitting his surname. Thus it appears that forty-four years after it purported to have been adopted this interesting series of resolutions first appeared in print, vouched for by a son of one of the secretaries of the meeting. On the appearance of the resolutions in 1819 they were at once republished in all parts of the country. The challenge of Jefferson made it necessary that proofs of their authenticity should be forthcoming, or that the claim in their behalf should be abandoned. The result of efforts extending over seventy years has been the collection of evidence sufficient to convince any unprejudiced mind of the following points—(1) that a meeting of citizens took place in Mecklenburg County; (2) that a series of resolutions was passed; and (3) that a special messenger, Capt. Jack, was sent with the resolutions to Congress; but none of this evidence establishes the identity of the resolutions in question. For several years it seems not to have been doubted that the testimony of the witnesses applied to the Declaration embodied in the five resolutions quoted, but on Dec. 18, 1838, Peter Force, the antiquary, announced the discovery of another set of resolutions, indorsed as adopted by the people of Mecklenburg County, not on May 20, but on May 31, 1775. These resolutions, twenty in number, contained no declaration of independence, but, after reciting in the preamble that the British Parliament had declared the American colonies in actual rebellion, made such provisions for the government of the colony as seemed necessary in view of the suspension of the regular authority. Among the many considerations which bear out the theory that this series of resolutions, and not the so-called Declaration, was what the witnesses really had in mind, may be mentioned the following: (1) The difference in date (May 20–31) is the exact difference between old style and new style, and both calendars were then in use in many localities. (2) The resolutions published on the 31st contained no reference to a previous Declaration of Independence; but, on the other hand, no other reason is given for the action taken at the meeting than the fact that Parliament had declared the colonies in rebellion. (3) The testimony of witnesses with regard to the Declaration applies far more pertinently to the twenty resolutions. (4) Contemporary evidence establishes the fact that these resolutions, and not those containing the Declaration, were taken to Congress by Capt. Jack. (5) The twenty resolutions were immediately published both in the North and in the South, while the Declaration, though of a more important and startling nature, did not appear till after the lapse of forty-four years. (6) The subsequent conduct of the men mentioned as prominent in passing the earlier resolutions was grossly inconsistent with such action, since they took the oath of loyalty to the king, and in the Provincial Congress expressly disclaimed the intention of shaking off connection with the parent state. (7) It was discovered in 1853 that the five resolutions containing the Declaration had been reproduced from memory five months after the burning of the records in 1800, nor is there anything to prove that J. McKnitt Alexander had ever refreshed his memory by consulting the original documents during the twenty-five years that had elapsed since their passage.

These facts represent but a small portion of the evidence against the genuineness of the alleged Declaration, and the conclusion is inevitable that, unless some new evidence of overwhelming importance is discovered, the opinion of impartial investigators must be adverse to the authenticity of that document. For a more complete discussion of the matter, see the following authorities: In addition to *The North American Review*, vol. cxviii., pp. 256–293, and *Magazine of American History*, vol. xxi., pp. 31–43 and 221–233, the subject is very fully presented in the following works: Frothingham's *Rise of the Republic*, p. 422; Randall's *Life of Jefferson*, iii., p. 570; Wheeler's *North Carolina*, ii., 255; Hawks, Swain, and Graham, *Revolutionary History of North Carolina*, pp. 47–98. The most exhaustive treatment of the subject is to be found in Draper's *Mecklenburg Declaration: its Origin, History, and Actors, with a Bibliography of its Literature and Explanatory Documents*; MSS., 3 vols. folio, Wisconsin Historical Society Collections (1876): of vol. iii., pp. 328–474 are devoted to a critical examination of the literature of the subject. The *Illustrative Documents*, printed and in MS., constitute nine volumes. C. K. Adams.

Mecklenburg-Schwerin, mek'len-boorch-shvā-reen': grand duchy of Northern Germany; bounded N. by the Baltic, and E., S., and W. by Prussia. Area, 5,135 sq. miles. Pop. (1900) 607,835, chiefly of Slavonian origin, of which they still retain marks in their features. The ground is low and level, dotted with small lakes, and covered with forests. Along the shore of the Baltic the soil is sandy or marshy, but farther inland it is fertile and well suited to agriculture and pasturage. The principal crops are rye, wheat, barley, oats, potatoes, and hay. Cattle and horses are reared, and, especially the latter, are much valued. Capital, Schwerin.

Mecklenburg-Strelitz, -strā'lits: grand duchy of Northern Germany, consisting of two separate parts—Stargard, between Mecklenburg-Schwerin and Pomerania, and Ratzeburg, between Mecklenburg-Schwerin and Lauenburg. The total area is 1,131 sq. miles. Pop. (1900) 102,628. Capital, Neu-Strelitz.

Mecoptera: See Entomology.

Medal [from Fr. *médaille*: Ital. *medaglie* < Vulg. Lat. **metal'lea*, deriv. of *metal'lum*, metal. See Metallurgy]: in the usual sense, a flat metal disk, stamped on each side with one or more inscriptions, and often a figure or group, the whole in low-relief like that of a coin. Although such medals are *coinage*, in the sense of being struck in the coining-press, they are distinguished from coins in not being intended for use as money. A medal is struck in commemoration of a victory, as has long been a custom among the nations of Europe; or in honor of a great soldier, as in the case of the gold medal voted by Congress to Gen. Grant; or in recognition of any important event, as a treaty of peace, the disappearance of a pestilence, the visit of a foreign potentate, the completion of a public building; or even the appearance of a brilliant comet, or a misfortune such as the great fire of London in 1666. In the Paris mint (*la Monnaie* or *l'Hôtel des Monnaies*, on the Quai Conti) a very large collection may be seen of the medals struck in that institution, as well as others. There are about 600 of the single reign of Louis XIV., and nearly as many were devoted to the triumphs of Napoleon I. during the brief period of his power, 1796 to 1815. The size of such medals rarely exceeds 3 inches in diameter; one of about 4½ inches, struck at the Paris mint in 1842, is often cited as the largest piece of coinage existing. This Paris mint is the center of artistic

work in die-sinking and medal-coining. Many artists are kept busy there, and orders are sent thither from all parts of the world. The term *medal* is used also for the great cast medallions of the fifteenth and sixteenth centuries (see MEDALLION), also for any ancient or unfamiliar coin, especially if large and striking in design, and also to many small tokens of success or favor, prizes at an exhibition, school rewards, etc., even when not ornamented in relief, or even when not of metal. RUSSELL STURGIS.

Medallion: originally a large medal; hence, and very commonly, a flat, circular work of art of any sort, even if several feet in diameter and carved in marble; and, thirdly, any piece of ornament consisting of an independent design isolated by its own frame, within the bounds of a larger composition (see below). In the first sense the term is applied to unusually large coins, even to some silver coins of the Greek cities, and especially to the remarkable bronze pieces of the Roman emperors, those without the S. C. (for *Senatus Consultum*), and thus shown to be not a part of the regular bronze coinage. (See NUMISMATICS.) In the second sense the bas-reliefs in question may be considered as imitations of medals, as if medals had been copied larger for general popular inspection. Thus the arch of Constantine, at Rome, is decorated with ten bas-reliefs within circular molded frames about 8 feet in diameter; eight of these, which are generally thought to have been taken from an arch of Trajan no longer existing, represent scenes of the imperial life and ceremonial, very much as the same scenes would be represented on a coined medal of unusual finish and elaboration, except that they are in higher relief. At the time of the Renaissance a similar decoration was used in building; thus in the courtyard of the Palazzo Riccardi at Florence, in a band over the arches of the ground floor, are eight disks sculptured by Donatello, alternating with others inclosing armorial shields; but in the third sense a medallion may be of any shape, square or oblong, or even irregular. Thus, on a Sèvres vase, a painting with figures and an elaborate landscape background will often be inclosed within a frame of the general shape of a trapezoid, the rest of the vase being decorated with simple gilding and scroll-work; but this painting is spoken of as a medallion, or as being in a medallion. In carpets which are woven in one piece and rugs, table-cloths, etc., there is very often a central pattern, between which and the border there is left a space somewhat less richly ornamented; this central division is spoken of as the medallion, and a carpet of this kind is often called a medallion carpet. RUSSELL STURGIS.

Mede'a [= Lat. = Gr. Μήδεια]: in Greek mythology, the beautiful daughter of Æëtes, King of Colchis, and Hecate, the sister of Circe. Both mother and aunt educated her in sorcery, in which she attained great proficiency, but being kindly disposed, she used her knowledge to bring to naught the plans of her teachers, and exerted herself especially to prevent the sacrifice of foreigners. Æëtes, being fearful that she might dethrone him, imprisoned her, but thanks to her magic powers, she easily escaped, and fled to the temple of the Sun, on neutral ground. At this juncture Jason and the Argonauts came to Colchis in search of the GOLDEN FLEECE (*q. v.*) Medea fell in love with JASON (*q. v.*), and made it possible for him to get and carry off the Golden Fleece. At the close of her career in Corinth she fled to Athens, where she married the aged king Ægeus, and bore to him a son, Medus, according to one myth. When Theseus had come to Athens from Trœzen, she plotted his death, but was finally forced to flee from Athens. She returned to Colchis, found her father deposed by his brother Perses, and restored him to the throne. Her son Medus became the eponymous hero of the Medes. According to another myth she fled from Athens to Phœnicia, married the king, and begat Medus by him. She at last became immortal, and like Helen, married Achilles in Elysium. Her story is variously told, and has furnished much material for the artist and the tragedian. See the tragedy of Euripides, entitled *Medea*. J. R. S. STERRETT.

Medellin, mā-dāl-yeen': capital of the department of Antioquia, Colombia, and, with the exception of Bogotá, the largest and most important city of the republic. It is in a beautiful valley (incorrectly called the "Cañon"), watered by a small river which flows to the Cauca; 147 miles N. W. of Bogotá, and 4,852 feet above the sea (see map of South America, ref. 2–B). It is well built, with wide and straight streets, and has a delightful climate and an abundant water-supply. The inhabitants are noted for their intelligence and progressive spirit, and the city is an educational center, containing a university, a school of arts and technology, library, museum, theological seminary, several charitable institutions, a park, etc.; it is the episcopal city of a large diocese, and has a mint and other Government institutions. Many of the wealthier residents are engaged in mining enterprises, this being the metropolis of the Antioquia gold belt; a large proportion of the metal is exported to England. Medellin was founded in 1674, but during the colonial period was an unimportant village. Since 1825 it has grown steadily, supplanting the older town of Antioquia. Pop. (including the suburb of Buenos Ayres) about 30,000. H. H. SMITH.

Medford: city (founded in 1630, incorporated as a city in 1892); Middlesex co., Mass. (for location of county, see map of Massachusetts, ref. 2–H); on the Mystic river, and the Boston and Maine Railroad; 5 miles N. by W. of Boston. It is the seat of Tufts College (Universalist, chartered in 1852), and contains a house erected in 1634, which still retains its original walls and shape. The city is noted for its manufactures of rum, crackers, and felt boots, and has a public library, print and dye works, pressed and face brick-works, brass-foundry, carriage-factories, and paper-mills. Pop., township (1880) 7,573; (1890) 11,079; (1900) 18,244. EDITOR OF "MERCURY."

Medford: city; capital of Taylor co., Wis. (for location of county, see map of Wisconsin, ref. 4–C); on Black river, and Wis. Cent. Railroad; 67 miles N. W. of Stevens Point, in an agricultural and lumbering region, and has two weekly newspapers. Pop. (1880) 504; (1890) 1,193; (1900) 1,758.

Med'hurst, WALTER HENRY: missionary and linguist; b. in London, England, in 1796; went to the East in 1816 as a missionary; resided at Batavia (Java) eight years (1822–30), laboring also in Borneo; settled at Canton, China, about 1830, and at Shanghai in 1843; spent six years in the interior of China; died in London, Jan. 24, 1857. He acquired a remarkable knowledge of the Chinese, Japanese, and Javanese languages, translated the Bible into Chinese, edited the *Chinese Repository* (20 vols., Canton, 1838–51); published a *Chinese and English Dictionary* (2 vols., Batavia, 1842–43), and many other linguistic works; wrote an *Account of the Malayan Archipelago*; a valuable work on *China, its State and Prospects, with especial reference to the Diffusion of the Gospel* (1838), followed by *A Glance at the Interior of China* (1850); and translated the Chinese classic called *Shu-King* (1848), besides numerous minor works from the Chinese and other Oriental languages.

Me'dia (in Gr. Μηδία): a territory of Asia; bordering N. on the Caspian Sea, and bounded on the other sides by Parthia and Hyrcania, Assyria and Armenia, and Persia and Susiana, corresponded nearly to the present Persian provinces Irak-Adjem, Azerbaidjan, Ghilan, and Mazandaran. The Medes were closely allied to the Persians in language and religion, and they distinguished themselves by their horsemanship and their skill with the bow. The original inhabitants of Media were called Aryans, though the name *Madai* is given them even in Gen. x. 2. They came first into notice when attacked by the Assyrians about 830 B. C. The great monarchy established by them dates from 650 B. C., with Ecbatana for its capital. In 625 B. C. their king, Cyaxares, in league with Nabopolassar of Babylon, took Nineveh and overthrew the Assyrian empire. The revolt of the Persians under Cyrus brought the Median kingdom to an end, 558 B. C. The Medes, who originally were a warlike race, are later spoken of as a very effeminate people. The country produced abundance of fruit and horses. The grapes of Ecbatana (Hamadan) are celebrated to this day. The inhabitants of Media were worshipers of the sun, and their priests were called Magi. Revised by J. R. S. STERRETT.

Media: borough; capital of Delaware co., Pa. (for location of county, see map of Pennsylvania, ref. 6–J); on the Phila., Wil. and Balt. Railroad; 5 miles N. of Chester, 12 miles W. of Philadelphia. It is in an agricultural region; contains the Delaware County Institute of Science and an academy, each with a library of over 3,000 volumes; and has 2 national banks with combined capital of $200,000, 3 weekly newspapers, and, in its vicinity, the State Training-school for Feeble-minded Children. Pop. (1880) 1,919; (1890) 2,736; (1900) 3,075. EDITOR OF "AMERICAN."

Mediæ, or **Medials**: in phonetics, the voiced non-aspirated explosives *g*, *d*, *b*, which are distinguished from the *tenues k*, *t*, *p* on the one hand, and the *aspiratæ* k^h, t^h, p^h,

g^h, d^h, b^h on the other. The term is merely a translation of the Greek μέσα, intermediate, which the early Greek grammarians applied to the group because they regarded the sounds as intermediate between the *tenues* (ψιλά) and the *aspiratæ* (δασέα); as in Dionysios Thrax (*Techne*, p. 631 b) "they have been named μέσα because they are more shaggy than the bare sounds and barer than the shaggy sounds" (ὅτι τῶν μὲν ψιλῶν ἐστι δασύτερα, τῶν δὲ δασέων ψιλότερα). The terms δασέα and ψιλά were originally chosen as involving the contrast, hairy, shaggy *versus* bald, bare. See PHONETICS and LANGUAGE. BENJ. IDE WHEELER.

Medical Electricity: the use of electricity as a therapeutic means in the treatment of disease. In the year 1804, and further back, the static form, obtained from the large glass friction apparatus, was used somewhat empirically, the spark being thrown from the brass balls of the machine. Later investigations have shown what real value this powerful agent has in many forms of nervous disease, notably in paralysis and neuralgia. Duchesne, of Boulogne, was among the first to treat patients with the localized induced current, and Remak in Germany employed the galvanic current with equally successful results. Three forms of electricity are employed, viz., the induced or faradic current, the galvanic current, and the static current. The two first are examples of dynamical electricity, and the other of frictional electricity. Galvanic electricity, or galvanism, and induced electricity, or faradism, as it has been called out of compliment to its discoverer, Faraday, are the two modes generally made use of, while frictional electricity is rarely resorted to. Electro-magnetism, a species of induced current produced by the rotary apparatus, has been the favorite form of treatment among quacks and empirics. Faradism is furnished by an instrument containing a coil of wire surrounded by another, the inner one, containing in its center a bundle of wires or a rod of soft iron. Through the inner coil a galvanic current is passed and an induced current thereby generated in the outer. The former is known as the direct or *primary* current, the latter as the induced or *secondary*. At the end of the wires in every instrument is a small hammer of soft iron fastened to a spring, and a pole containing a platinum-pointed screw is placed at a short distance from it, opposite the end of the bundle of wires. This hammer breaks the current in the coil of wire, and rapidly vibrates, producing shocks. The galvanic current used in medicine is obtained from a series of cells sufficient in number to give a current of *tension*. Tension is the resistance offered to the passage of a current. One cell supplies a current, the poles of other cells being alternately joined, and there are finally but two terminal poles. We find that as the current from the original cell passes through the cells which follow, its *tension* or power is increased, and the effect is appreciable to a greater or less degree in proportion to the number of cells included in the circuit. *Quantity* is another attribute of the galvanic current, but is not as a rule desired in medical electricity. A current of *quantity* is furnished by a large surface of metal in the battery-cell, while *tension* is the product of a number of small metal plates.

The best *galvanic cell* for medical purposes is the Bunsen, which has been adopted by Stöhrer, of Dresden, and the Grenêt, a modification of the latter, is that most commonly used. The Siemens and Halske cell is now employed to a great extent. It consists of an outer cell of glass with elements of zinc and copper, a diaphragm of porous earthenware, and a diaphragm of papier-maché between the solutions. The *static current* may be furnished by the Holtz electric machine, which is undoubtedly the best. The Ruhmkorff coil has been used, one wire only being brought in contact with the patient, the air forming the other conductor. A spark having all the peculiarities of the ordinary friction spark will be produced.

For the application of electricity to the body we make use of various appliances called *electrodes*. These are either sponge-covered or present a polished metallic surface to the skin. Some have sponges of different sizes for the face or smaller parts of the body, and large ones for the trunk and limbs. The points of Duchesne consist of two cones of metal attached to handles. The sensation upon the skin is like that associated with the entrance of many small needles. The electric brush is often used to restore diminished cutaneous sensibility. It consists of a number of fine wires bound together in a handle. This electrode, as well as the other metallic ones, are used upon the dry skin. Various double electrodes and electrodes for special parts, such as the eye, uterus, and bladder, are employed in different cases.

Rational electro-therapeutics should be based upon electro-physiology. Remak, Dubois-Reymond, Ziemssen, Onimus and Le Gros, Brenner, Benedikt, and Erb stand in the front rank as authorities. Morgan gave to the world a work of very great value which remains as a monument to his greatness.

Certain facts have been evolved from the labors of the workers in this field. We have been taught that a motor nerve, when stimulated by an electric current, is followed by a contraction of the muscles it supplies. The theory of *electrotonus* is based upon the following facts: If a portion of a motor nerve is included between the poles of a galvanic battery it is said to be *polarized* and in a state of "electrotonus." At the positive pole the irritability of the nerve is diminished, while at the negative it is excited and more susceptible to stimulation. The condition at the positive pole is called *anelectrotonous*, and that at the negative *catelectrotonous*. The positive pole is known as the *anode*, the negative the *cathode*, and these give the names to the states described. A nerve is said to be *tetanized* when the muscle supplied is thrown into a state of permanent tetanic contraction by a rapidly intermitting current. The passage of a number of these shocks for some time will diminish the irritability of the nerve to such an extent that finally there will be no further response. This is a valuable fact to consider in connection with electro-therapeutics. An ascending current, i. e. a current running toward the spinal cord or brain, causes a greater irritability in a nerve than a descending one. The stimulus is felt at the negative pole when the current commences, and when it is broken it is felt at the positive pole. Greater sensation is felt at the negative pole, and with very weak currents no sensation may be felt except at the negative electrode when the current is started or *opened*. With stronger currents sensation may be felt at discontinuing the current and at both poles. With very strong currents sensation is diffuse, not limited to the region to which the electrode is applied.

The action of the faradic current upon the surface of the body is probably the same as that of a galvanic, except that it is a momentary shock instead of a constant current. It does not affect the deeper muscles nor nerves as much as the skin. When an electrode is applied to the moistened skin it is followed by prickling sensations, attended by redness and tingling. The faculty of perceiving sensation by the cutaneous nerves and muscles has been called the *electro-muscular sensibility*. The sensation produced by the galvanic current is one of warmth, like that which always follows the application of local stimulants, such as liniments or a mustard plaster. When the faradic current is applied to the skin previously dried, or when the electrodes are lightly brought in contact with it, there is appreciable pain produced. Cutaneous sensibility is more exaggerated by rapidly succeeding shocks from a faradic instrument than by slow ones. The galvanic current produces deeper impressions than the faradic. It likewise produces electrolytic changes which do not follow the use of the faradic. The effects of the galvanic current upon various parts of the body may be briefly enumerated as follows: The application of the electrodes of a battery of moderate strength to any part of the head or face will be attended by the occurrence of flashes of light appreciated by the individual, a metallic taste, giddiness, dizziness, and a peculiar sensation at the root of the nose. The possibility of the passage of a galvanic current through the bones of the cranium has been doubted by Cyon and other writers, though other physiologists, Ziemssen and Erb among them, agree as to its feasibility. The passage of such a galvanic current, according to certain neuro-therapeutists, is followed by beneficial results in many diseases of the brain, but there is at the present day no proof of this at all.

Electricity for the Purpose of Diagnosis.—By it we may detect local tenderness, exalted sensibility, or their opposite conditions, anæsthesia and paralysis. We may sometimes ascertain whether there is disease of the nerve-centers, the brain, or spinal cord—whether a paralysis is of recent date or long standing. We may settle the question of doubtful death; we may also detect malingering. There are several important physiological facts to be taken into consideration—the function of muscles or nerves, their loss of contraction and senation, or the reverse; and as various nervous diseases are associated with these conditions, we are enabled by electricity to determine the extent of such changes. A

reference to a few morbid conditions will make these facts more clear. The existence of some recent disease of the brain will be characterized by increased muscular contractility oftentimes when there is paralysis of the muscles. Certain local paralyses, or central diseases attended with atrophy of the muscles or disease of some part of the nerve destroying its conductivity, are associated with loss of reaction.

Galvanism and faradism are used for the relief of pain and spasm and to procure sleep, for the improvement of the nutritive processes, to restore lost muscular power, for stimulation of secretion, to influence circulation by means of the vaso-motor system, to produce absorption of fluids, morbid tissues, and deposits, and in the form of the galvano-cautery for surgery. Both forms of current are used in the treatment of paralysis, the galvanic perhaps being the most important for paralysis from central diseases. One of the most decided and unquestionable uses of electricity is in cases of headache and sleeplessness of brain-fag. The gentle application of galvanic currents in these cases or of the faradic currents sometimes acts marvelously. There are many cases of paralysis in which faradic currents will produce no muscular contraction, while the galvanic current will be followed by vigorous contractions of the muscles. In cases of this kind treatment is begun with the galvanic current, and afterward the faradic is used. It should always be the rule to use that current which produces the maximum of muscular contraction with the minimum of pain. In cases of spinal or brain disease, such as apoplexy, it is injudicious to use any electrical treatment for the muscles in the early stages, because there is active irritation at the seat of lesion. The forms of paralysis from all causes, whether they be from pressure, from injury, or from rheumatism, may be treated successfully. Paralyses of special parts are treated by differently shaped instruments. There are electrodes for applying it to the vocal cords, to the muscles of the orbit, to the ear, to the stomach, larynx, bladder, etc.

Galvanism asserts itself most favorably in neuralgia of all kinds. It is indicated particularly in sciatica, tic douloureux, spinal irritation, and a number of other conditions attended by pain. Forms of hysteria are particularly under the control of galvanism. Writers' cramp and chorea are benefited to some degree by both currents. Little can be said of the value of electricity in the treatment of skin diseases. Electricity has produced very few authenticated cures, and those reported are undoubtedly due for the most part to other remedies (or galvanism only so far as it proved of use as a general tonic) and disappearance of the causes. Electricity has been used by Simpson, Thomas, Dubois, Murray, and Allen in obstetrics for the production of uterine contractions. A most important use of electricity is its application for the production of absorption of morbid products in different parts of the body.

When the two poles of a galvanic battery are connected with needles, and these needles thrust into the tissues of the body, a process goes on which has been called *electrolysis*. At the *negative* pole bubbles of hydrogen gas are disengaged, which separate mechanically the surrounding tissues and break them down, so that the disintegrated particles may be taken up in the circulation. At the *positive*, oxygen is disengaged, which forms an acid with certain elements of the tissue, and the albumen is coagulated, forming a clot if this happens in a cavity filled with blood. With this mode of treatment the physician is enabled to disperse certain tumors of small size. The same treatment has been used in the removal of small hairs from the lips of women.

A platinum wire placed between the poles of a powerful battery possessing the requirement of sufficient electromotive force will become in a very few minutes white hot. Such wires properly adjusted in handles may be used in place of the knife or *écraseur* in many surgical operations, especially in deep cavity operations, where the use of the knife is impossible. The galvanic cautery is unattended by pain or hæmorrhage. Its cuts are covered by perfect cicatrices, and it is very valuable in certain uterine operations. Care must be exercised by all persons who use electricity to avoid applying strong currents to the head. It is unadvisable to use it for over ten or fifteen minutes at a time, and then very carefully. Revised by WILLIAM PEPPER.

Medical Jurisprudence: See JURISPRUDENCE, MEDICAL.

Medical Schools: See SCHOOLS.

Medici, mā′dĕe-chĕe: a famous Florentine family who in the fourteenth century became prominent in public affairs, and later attained the sovereign power. They acquired great wealth as merchants, and spent it in a manner that won them popularity. COSIMO DE' MEDICI, "Pater Patriæ," b. 1389, was the son of Giovanni, *gonfaloniere*, and by his liberality, urbanity, and prudence won great influence with the people, but avoided the appearance of power, being content with the substance. He adorned Florence with splendid public buildings, patronized art, and died Aug. 1, 1461.—His grandson, LORENZO THE MAGNIFICENT, b. Jan. 1, 1448, was the splendid patron of Greek learning and of all the liberal arts, being himself no mean poet. He brought Florence to a great pitch of opulence and power, and, notwithstanding the hostility of Pope Sixtus IV., exercised a great influence throughout Italy. D. Apr. 8, 1492. —His son, Pope LEO X., did much to advance the fortunes of his family. (See LEO X.)—COSIMO, b. June 11, 1519, the first Grand Duke of Florence, was a successor of Alessandro (1510–37), the subverter of Florentine liberty. Cosimo was declared grand duke by Pius V. 1569, and died Apr. 21, 1574. The grand ducal line of the Medici family ended in 1743 with Jean Gaston de' Medici (1671–1737), but the princely line of Ottajano, the ducal house of Sarto, etc., have perpetuated the name till our times. The popes Leo X. and XI. and Clement VII., Queens Catharine and Marie de Médicis of France, some eminent cardinals and Dukes of Urbino, were also of this family. See CATHARINE DE' MEDICI and MARIE DE MÉDICIS.

Medicine [from Lat. *medici′na* (sc. *ars*, art), the art of a physician, or of healing, deriv. of *me′dicus*, medical, a physician, deriv. of *mede′ri*, heal]: the art and science of curing disease. Its origin is obscure, but dates back to the early existence of the human race, coincident with the liability to injuries, sickness, and processes of decay. Medicine in its primitive state comprised a recognition of the relative virtues of different articles of food, an empirical use of medicinal herbs and roots, and superstitious rites. For ages it was merely traditional usage in families or communities. Hence it was practiced, as it is to-day in barbarous tribes, by the local chiefs. Superstition ascribed disease to evil spirits or to the displeasure of divinities, and reverenced the gifted physicians as superhuman. Temples were erected to their worship, whose priests were guided in their treatment by invocation of the oracle. The profession thus became a sacerdotal order, within which acquired knowledge of medicine was preserved and secretly transmitted. The Chinese have practiced and written of medicine from the remotest ages, but without intelligence or method, being possessed only of a vast collection of extravagant empiric formulas. The Hindu practice has always been simple, restricted to a knowledge of dietetics, hygiene, and mild antiphlogistic measures. The methodical study of medicine began in the fabulous age of Egypt. At first the method pursued was to expose the sick by the wayside, that passers-by who had suffered from similar maladies might recognize them and declare the means of cure. Herodotus tells us that the Babylonians, Chaldæans, and other nations had no physicians, but followed this custom. Afterward, in Egypt, the sick were required, upon recovery, to go to the temple and record on tablets their symptoms and remedies. The temples of Canopus and Vulcan were the repositories, and a skilled priesthood arose which framed a code controlling public hygiene, individual regimen, and the treatment of disease. Thus far back in a period of mythology Egypt possessed a store of medical knowledge, had able surgeons, many devoted to the study and pursuit of a single specialty, as lithotomy, and remedies bearing the name of Isis and Osiris came down through subsequent Grecian, Roman, and early Christian centuries. The reports concerning the practice of medicine in Greece in early times are legendary. Æsculapius, instructed in the healing art by Chiron the Centaur, became so skilled that he incurred the displeasure of Pluto, and was stricken by a thunderbolt from Jove. He became the god of medicine, temples were erected bearing his name, and the officiating priesthood were designated the Asclepiadæ. The sons of Æsculapius, Machaon, and Podalirius, accompanied the Greeks in the Trojan war, and their skill was immortalized in the songs of Homer. Hygieia, the goddess of health, and Hercules, reputed to cure epilepsy—the "sacred disease" or "disease of Hercules"—were also worshiped. The practice of the Asclepiadæ was simple. Temples were located in salubrious places, and their interiors were purified by burning fragrant incense and secret remedies. Thither the sick were brought

for treatment. Recourse was had to baths, gymnastics, mineral and thermal springs, and the use of unctions. Remedies were prescribed by the oracle and skill of the priesthood. Votive tablets inscribed with records of the disease and cure were deposited within or placed upon the columns and gates. Pythagoras and the sect which took his name supplanted the Asclepiadæ. They promulgated the knowledge which had before been kept a secret, and sought the philosophy of disease, but confined their treatment to dietetics and hygiene. The Pythagoreans declined about 500 B. C. Hippocrates was born in the year 460 B. C., and is known as the "father of physic." He was descended remotely from the Asclepiadæ through a long line of physicians. He developed a system of theories on disease and medicine which has given to his school and period of practice the title "dogmatic." He acquired anatomy by dissection of animals, and was skilled in surgery. His study of symptoms and diseases was careful and accurate; he recognized stages and crises in diseases; he relied upon the power of nature, which he termed "first of physicians"; stimulating when nature failed, moderating when her forces were excited. His remedies were mainly vegetable and dietetic. His works were numerous, chief of which are *The Prognostics*, *Aphorisms*, *On Epidemics*, *Regimen in Acute Disease*. With the founding of the Alexandrian Library (320 B. C.) the Alexandrian school began. Most celebrated were Erasistratus and Herophilus. The latter was an anatomist, studied the nerves, the brain, and to this day his name is retained connected with its circulation, the confluence of venous sinuses being termed the "torcular Herophili." Two Alexandrian schools of medicine flourished successively—the "Empirical" of Philenus and Serapion, who renounced "dogmatism" and relied only on experience, and the "Methodists," whose influence extended over Greece, thence to Rome, and lasted for at least two Christian centuries. Methodism asserted that the body was permeated in health by atoms which entered from without and moved freely in every part and direction of the organism. Disturbances of this perfect relation by constriction or relaxation were states of disease, and all medication was therefore by astringents or relaxants.

Medicine was introduced into Rome from Greece 200 B. C. Asclepiades, who practiced in Rome 100 B. C., was a Methodist. Chief among Roman physicians was Celsus, "the Cicero of medicine," great as a surgeon and scholar, whose work, *De Medicina*, in eight books, is a record of medical knowledge down to his time. Claudius Galen, known as Galen, by his teachings and writings so influenced medicine that he was esteemed infallible authority for fully twelve centuries. He was born at Pergamos A. D. 130, but lived and practiced in Rome. He is reputed to have written 200 distinct treatises upon every subject then known in medicine. He was educated at Alexandria, and his knowledge of anatomy was matured by dissection of animals. He was a "Humoralist," regarding disease as due to putridity of the "four humors"—blood, phlegm, bile, and black bile. The Methodists, on the other hand, found disease only in the tissues, and were known as "Solidists." As long as medicine was swayed by theories, the conflict of Humoralism and Solidism was constantly revived. Chief among Galen's works are treatises *On the Use of the Different Parts of the Body*, *On Temperaments*, *On the Seat of Disease*, *Methods of Cure*. During the Dark Ages medicine declined in Europe, but was preserved and advanced by the Arabian school, which dominated from the ninth to the end of the fourteenth century. Symptoms were studied, new diseases described, Galen's works were translated and commentated, rendering famous the names of Rhazes, Avicenna, Albucasis, Avenzoar, Averroës, etc., and drawing the students of the whole Continent to the renowned Spanish schools of Cordova, Seville, Toledo, and Saragossa. Renouard, in his *History of Medicine*, styles the subsequent period, from the close of the fourteenth century to the present, the "age of renovation." Medicine, thus far an art based upon experience and biased by erroneous theories, now began to advance by successive discoveries in anatomy, physiology, and pathology to the standard of a science. Printing insured the dissemination of each progressive step. The Italian schools succeeded the Arabian. Mondino, of Bologna, dissected before the class in 1315, and wrote imperfectly on anatomy. To Andreas Vesalius, professor at Padua, who published his great work in 1543, anatomy owes its origin and permanent impetus. Vesalius was followed by Eustachius, Fallopius, Sylvius, Pacchioni, and others whose names now exist in anatomical nomenclature. In A. D. 1622 Aselli of Milan described the lacteals; in 1628 Harvey announced the circulation of the blood; in 1661 Malpighi of Bologna detected the movements of the red blood-globules; in 1690 Leeuwenhoek of Delft demonstrated the capillaries. The researches of Vieussens, Haller, Meckel, and Scarpa, the separation of the cerebro-spinal and ganglionic nervous systems by Bichat, the treatise of Sénac (in 1749) on the action and diseases of the heart, of Avenbrugger (in 1761) on percussion of the chest, the great work on pathology by Morgagni in 1762, the recognition of nerve origins, of the ganglia, and different faculties in the brain by Willis and others, the writings of Sydenham and Huxham, the discovery of vaccination by Jenner in 1796, are a few of the very many scientific truths which warrant us in speaking of medicine as a science. The status of medicine was again elevated. The barber-surgeons of Paris were abolished by law in 1743, in London in 1745. Clinical teaching was inaugurated at Padua in 1758. Schools of medicine were established both in Europe and in America. During the nineteenth century this devotion to the development of technical and scientific investigation, rather than to speculation, as the true basis of the treatment of disease, has steadily increased, and warrants the belief that we are erecting a system of scientific medicine. This has also been designated an age of "rational empiricism" in medicine, since skill in treatment is largely cumulative from past experience, yet rendered intelligible and certain by a clear discernment of the laws of life, of the functional activities which constitute health, and of their perversion in disease. Histology, physiology, microscopy, micro-chemistry, pathology, physiological medicine, pharmacy, and therapeutics are fields of incessant work and progress. The physical exploration of the chest, the study of Bright's disease, the discovery of anæsthesia, the recognition of the dependence of many if not most diseases—malignant pustule, erysipelas, tuberculosis, tetanus, and many others—on the presence of micro-organisms, the improved treatment of wounds by aseptic and antiseptic methods, the elaboration of the specialties, are some of the many results. Correct and intelligent diagnosis, study of morbid anatomy and etiology, and an accurate knowledge of the physiological effects of remedies, are sought as the only substantial basis for the treatment of disease, while its prophylaxis by the use of preventive inoculations is a brilliant anticipation which may possibly be realized in the future.

Among the best medical dictionaries available to the English-reading student may be mentioned those of Dunglison (21st ed. Philadelphia, 1893); Duane (Philadelphia, 1893); Gould (Philadelphia, 1894); and the more elaborate works of Billings (2 vols., Philadelphia, 1890); Foster (4 vols., New York, 1893); and the lexicon now (1894) in course of publication by the New Sydenham Society of London.

Revised by JOHN ASHHURST, Jr.

Medicine, Forensic: See JURISPRUDENCE, MEDICAL.

Medicine Hat: a growing town of Assiniboia, Canada; on the Canadian Pacific Railway, 660 miles W. of Winnipeg, on bottom-lands of the South Saskatchewan river (see map of Canada, ref. 9–F). It formerly had the name of Leopold. The origin of the present name is not known. In the vicinity are lignite beds and the petroleum district of Galt. Pop. 1,000. M. W. H.

Medicine Lodge: city; capital of Barber co., Kan. (for location of county, see map of Kansas, ref. 8–E); on the Atch., Top. and S. Fé Railroad; 91 miles W. of Winfield. It is in an agricultural and stock-raising region, and has two newspapers. Pop. (1880) 373; (1890) 1,095; (1900) 917.

Medick, Purple: See LUCERNE.

Medill', JOSEPH: journalist; b. in New Brunswick, Canada, Apr. 6, 1823; removed in childhood to Massillon, O.; studied law; founded in 1849 a Free-soil paper at Coshocton; established at Cleveland in 1852 a Whig paper, *The Forest City*, which in the following year was merged in *The Leader*; was in 1854 one of the organizers of the Republican party in Ohio; went to Chicago soon after, and with two partners bought in May, 1855, *The Tribune*, a paper with which he has since been identified. He was in 1870 a member of the Illinois constitutional convention, and was the author of the minority representation clause; was appointed in 1871 a member of the U. S. civil service commission, and elected mayor of Chicago. He spent a year in Europe (1873–74), and on his return purchased a con-

trolling interest in *The Tribune*, of which he became editor-in-chief. D. in San Antonio, Tex., Mar. 16, 1899.

Medi'na (Arab. Medinet-el-Nabi, City of the Prophet): 132 miles N. E. of Jemb or Yambu, its port (see map of Persia and Arabia, ref. 6–D). It is a handsome, well-built town, situated at the edge of the great Arabian desert on the east side of the mountain range which runs N. and S., parallel to the Red Sea. It is protected by a stone wall over 40 feet high with 30 towers and 3 gates, one of which, the Egyptian Gate (Bab-el-Misri), is exceedingly beautiful. Its importance is derived from the fact that Mohammed is buried here. His tomb, close outside the great mosque El Haram, is visited annually by over 60,000 pilgrims, though the visit is considered not incumbent, but only meritorious. Near by are the tombs of his daughter Fatima and of the Caliphs Aboubekr and Omar. The mosque—according to Burckhardt, 165 paces long and 130 wide, its dome upheld by 400 columns, lighted by 300 lamps which burn night and day—was burned in 1508 and rebuilt in 1514 by Kaid Bey, Sultan of Egypt. Mussulmans do not agree as to whether Mecca or Medina has the greater sanctity. Medina has ninety-two names, all referring to the holy character of Mohammed. The inhabitants are intelligent and sedate, and not so military in their bearing as those of Mecca. Pop. 80,000. See HEJIRA and MOHAMMED; also Burton's *Pilgrimage to El Medinah and Meccah* (3 vols., 1856); and especially Burckhardt's *Travels in Arabia* (1829).

E. A. GROSVENOR.

Medina: village (located in 1805, incorporated in 1832); Orleans co., N. Y. (for location of county, see map of New York, ref. 4–D); on Oak Orchard creek, the Erie Canal, and the N. Y. Cent. and Hud. Riv. Railroad; midway between Buffalo and Rochester. It is an important agricultural and orcharding center; contains 6 quarries, which show rare fossil formations, of the celebrated Medina sandstone, 7 churches, an academy with library founded in 1850, several flour-mills, 5 iron-foundries, and furniture and paper-pail factories; derives good water-power from the creek; and has a State bank with capital of $50,000, a national bank, and a monthly and 2 weekly newspapers. Pop. (1880) 3,632; (1890) 4,492; (1900) 4,716.

EDITOR OF "RECORD."

Medina: village (settled in 1818); capital of Medina co., O. (for location of county, see map of Ohio, ref. 2–G); on the Cleve., Lorain and Wheel. and the Pitts., Akron and West. railways; 28 miles S. W. of Cleveland. It has several flour, saw, and planing mills, foundry and bending works, hollow-ware factory, and a large manufactory of bee supplies, and contains a national bank with capital of $75,000, a State bank with capital of $25,000, and a semi-monthly and two weekly newspapers. Pop. (1880) 1,484; (1890) 2,073; (1900) 2,232.

EDITOR OF "MEDINA COUNTY GAZETTE AND NEWS."

Medina, JOSÉ MARIA: politician; b. in Honduras about 1815. He was acting president of Honduras after the death of Guardiola, Mar., 1862, and again in June, 1863. Supported by the influence of the Guatemalan conservatives, he was elected president of Honduras Feb. 15, 1864, and re-elected 1866 and 1870. Until 1871 he maintained peace, but the country was brought to bankruptcy by wild financiering, and probably peculation in connection with the scheme for building an interoceanic railway. There was a war with Salvador, Feb.–May, 1871; in 1872 Honduras, Salvador, and Guatemala made war on Honduras; Medina was defeated, and in August was deposed and imprisoned by his own troops. Released after some time he revolted against Leiva in Dec., 1875, but was defeated in Feb., 1876; at the end of 1877 he was arrested for another attempt at revolt, condemned to death by a court martial, and shot at Santa Rosa, Feb. 8, 1878. HERBERT H. SMITH.

Medi'na-Sido'nia: town; in the province of Cadiz, Spain; 25 miles S. S. E. of Cadiz (see map of Spain, ref. 26–D). It was built by the Moors, is situated on a steep eminence surrounded by walls, contains a fine Gothic cathedral and the ruins of a magnificent castle, and has an imposing appearance; it is, however, a gloomy and comparatively an insignificant town. Pop. (1887) 11,705.

Medinet Habu: a Christian village at West Thebes in Upper Egypt, dating from the fifth century, which gave its name to a mass of ruins representing two temples. The larger one dates from the twentieth dynasty, and was intended as a memnonium of Ramses III., being devoted to the preservation of his memory and renown. Its mural decorations are of great ethnological value on account of the care taken to reproduce the racial characteristics of the peoples against whom Ramses III. waged war. Other inscriptions are important to the history of the times. The smaller temple dated originally from the eighteenth dynasty, but it was extended by the Ptolemies and even by the Roman emperors, especially Antoninus. CHARLES R. GILLETT.

Meding, OSCAR: novelist, whose pseudonym is *Gregor Samarow*; b. at Königsberg, Prussia, Apr. 11, 1829; studied law at Königsberg, Heidelberg, and Berlin; became an advocate and afterward held office in the Prussian administration, but in 1859 entered the public service of Hanover, in which he rose to the position of councilor of state, and was intrusted with several confidential missions by the king. In 1870 he gave his support to the Prussian Government, and after residing in Switzerland and Stuttgart settled in Berlin, where he applied himself to the work of writing novels based on his own experiences. Of these works may be mentioned *Um Zepter und Kronen* (1872–76); *Die Römerfahrt der Epigonen* (1873); *Höhen und Tiefen* (1879–80); a cycle of romances relating to Russian history (1881–83); and *Die Saxoborussen* (1885). Besides these, he has published *Memoiren zur Zeitgeschichte* (1881–84) and a short biography of the Emperor William I. under the title of *89 Jahre in Glaube, Kampf und Sieg* (1886). F. M. COLBY.

Mediterranean, The [from Lat. *mediterra'neus*, midland, inland; *me'dius*, mid + *ter'ra*, land]: the large sea bounded by the continents of Europe, Asia, and Africa, 2,200 miles long, 700 miles broad to the E. of Sicily, and covering an area of 977,000 sq. miles, excluding 40,000 miles of island surface. It has a very irregular shape, forming many gulfs, as those of Lyons, Genoa, Taranto, Lepanto, Koron, Kolokythia, and Salonica on the shores of Europe; on the shores of Asia, Adramyti, Smyrna, Adalia, and Iskanderun; on the shores of Africa, Sidra and Cabes; and bearing different names in the different localities—as, for instance, the Tuscan, Ionian, Adriatic, and Ægean seas. It is in general a deep sea, the average being 4,393 feet. The greatest depths are W. of Sardinia (12,238 feet), between Crete and Egypt (10,974 feet), and between Sicily, Greece, and Barca (13,018 feet at lat. 35° 5′ N. and lon. 18° 8′ E.). It is nearly cut in two by a shallow region between Sicily and Tunis. It communicates E. with the Black Sea through the Strait of Constantinople, and W. with the Atlantic through the Strait of Gibraltar. A strong current sets into the Mediterranean in the middle of the Strait of Gibraltar on the surface, but below and at the sides the current is outward. The Dardanelles current is always toward the Mediterranean. It also receives the waters of several large rivers, the Ebro, Rhône, Po, and Nile. A much greater evaporation takes place in the Mediterranean than in the Atlantic or in the Black Sea, owing to the hot winds which blow over it from Northern Africa, while the Pyrenees and the Alps prevent the cold winds from Northern Europe from reaching it. The temperature and saltiness of the waters of this sea vary much more in different parts than is the case with the open ocean. There is very little tide, owing to the narrowness of the strait which connects it with the ocean. The prevailing winds are in spring S. E. and S. W., and during the rest of the year N. E. and N. W.; they often rise suddenly and blow with great violence. See *The Mediterranean* (1854), by Rear-Admiral William Henry Smyth.

Revised by M. W. HARRINGTON.

Medlar [M. Eng. *medler*, from O. Fr. *mesler*, medlar-tree, deriv. of *mesle*, *mesple*, medlar < Lat. *mes'pilum* = Gr. *μέσπιλον*, medlar]: popular name of the fruit of the medlar-tree of Asia and Europe (*Mespilus germanica*), belonging to the order *Rosaceæ*. This is a small, sometimes thorny shrub or small tree, which is often cultivated. There are many varieties. The fruit is allowed to decay partially by the process called *bletting*, when its harshness disappears and it becomes edible. The Japan medlar is usually known by the Chinese name of LOQUAT (*q. v.*).

Revised by L. H. BAILEY.

Medley, JOHN, D. D.: bishop; b. in England in 1804; was educated at Wadham College, Oxford, and graduated in 1826 with honors; was several years vicar of St. Thomas's, Exeter, prebendary of the cathedral, and in 1845 was consecrated first Anglican bishop of the see of Fredericton, comprehending the province of New Brunswick, Canada. Here Bishop Medley built a cathedral of great architectural beauty at his own cost, where the services of the cathedrals of the

motherland were maintained. After the resignation of Dr. Oxenden, Bishop of Montreal and metropolitan, Bishop Medley was chosen to be metropolitan, and held the primacy of the Canadian Church until his death in 1892. His *Life*, by Canon W. O. Ketchum, D. D., of St. Andrews, New Brunswick, was published in 1893. Revised by W. S. Perry.

Medoc, mā′doc′: the name of a district of France stretching along the Gironde, from Ambés to Lesparre. It is about 40 miles long and from 5 to 12 miles broad. It is wholly covered with vineyards, which produce the most famous kinds of Bordeaux wine.

Medows, Sir William: soldier; b. in England, Dec. 31, 1738; entered the army in 1756; served with distinction in Germany 1760; went to North America in Sept., 1775, with the Fifty-fifth Regiment; afterward commanded the First Brigade of Grenadiers, distinguishing himself on several occasions; was wounded at Brandywine and at the capture of St. Lucia 1780; was made colonel of the Eighty-ninth Regiment, and sent as major-general to India 1781; was governor of Madras 1790–92; led the right wing of Cornwallis's army at the siege of Seringapatam 1792, where he displayed great courage and ability; became lieutenant-general Oct., 1793; was governor of the Isle of Wight for some years, and commander-in-chief in Ireland 1801–03. D. at Bath, Nov. 14, 1813.

Medra′no, Francisco, de: lyric poet. Almost nothing is known of his life. He was a native of Seville, and flourished in the end of the sixteenth and beginning of the seventeenth century. Aspirations of which we are ignorant carried him to Rome for a time; and when he had been unsuccessful he returned to his native land to die, in what year is unknown. His works were published at Palermo in 1617 as a kind of appendix to the imitation of Ovid's *De Remedio Amoris* by the Sevillian Pedro Venégas de Saavedra. Of all the Spanish imitators of Horace, Medrano is probably the best. His taste is excellent, his style is free from the gongorisms of his time, and the quasi-philosophical Horatian manner is admirably suited to his own character. The best edition of his poems is in vol. xxxii. of Rivadeneyra's *Biblioteca de Autores Españoles* (Madrid, 1872).

A. R. Marsh.

Medulla Oblongata: See Brain.

Medul′la Spinal′is [Lat., spinal marrow]: that part of the central nervous system which is inclosed in the spinal canal, extending from just below the foramen magnum, at the base of the skull, to a point usually opposite the upper part of the first and second lumbar vertebræ. It is a cylindrical, slightly flattened, cord-like mass of nervous matter, continuous at its upper end with the medulla oblongata, and terminating below in a conical extremity, its entire length being about 18 inches. In this course it gives off thirty-one pairs of spinal nerves, by means of which it is placed in communication with the whole of the body below the head. The spinal cord is inclosed by three membranes which lie within the bony canal of the spine — the *dura mater*, the *arachnoid*, and the *pia mater*. The structure and general arrangement of these membranes do not essentially differ from those of the same envelopes around the brain, one or two peculiarities, however, being worth noting. The dura mater has a firm attachment to the bone at its upper end, at the edge of the foramen magnum of the skull. From the pia mater covering the sides of the spinal cord spring numerous little processes having the shape of the teeth of a saw whose sharp points are attached to the inner surface of the dura mater; these fibrous processes constitute the *ligamentum dentatum*, and materially aid in maintaining the proper position of the cord within its sheath. Between the dura and the arachnoid only a little lubricating fluid is present, while under and within the meshes of the arachnoid, as elsewhere within the brain, lies the *cerebro-spinal fluid* in considerable though changing quantity.

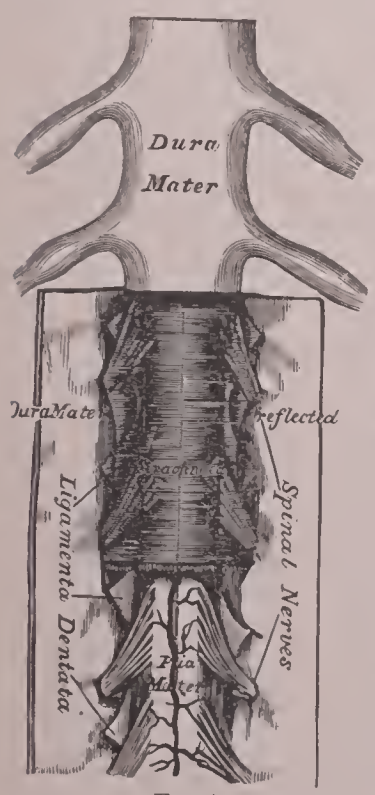


Fig. 1.

The spinal cord itself, like the other nervous centers, consists of certain elementary tissues; these are a supporting basis-substance, the *neuroglia*, the connective tissue derived from the pia mater, the nerve-cells, the nerve-fibers, and the blood-vessels. The special grouping of these elements gives form and character to different parts of the spinal cord. In general terms, it may be said that the spinal cord is made up in its central parts of *gray matter*—i. e. groups of ganglion-cells of different sizes, with nerve-fibers, blood-vessels, and delicate basis-substance; and in its outer peripheral parts of *white matter*—i. e. more or less coarse basis-substance, supporting medullated nerve-fibers and containing blood-vessels. On viewing a spinal cord whose membranes have been stripped off the following external appearances are presented: The cylindrical outline of the organ is made irregular by two swellings occupying those portions of the cord surrounded by the middle cervical and the lowest dorsal vertebræ—the so-called cervical and lumbar enlargements. Along the entire length of the front surface of the cord runs a line or deep mark, which after the removal of the pia mater is seen to be a real fissure or crack which penetrates quite deeply, and separates the organ into two equal halves. This, the *anterior median fissure*, is filled by the pia mater, containing the anterior spinal artery and its branches. On either side of the anterior median fissure very numerous delicate bundles of nerves arise from the spinal cord; these are the *anterior roots* of the spinal nerves. The median line on the posterior surface is not by any means so distinct behind as in front, and it is impossible to demonstrate a dorsal fissure without lacerating the tissue; the separation between the halves of the spinal cord posteriorly is a closely incorporated extension of the pia mater, and is called the *posterior median septum*. On either side of this are arranged the *posterior roots* of the spinal nerves, in the same manner as the anterior. The anterior and the posterior roots—physiologically distinct—pierce the dura mater, conjoin and mingle, and escape from side openings between the vertebræ as the spinal nerves. Just before joining the anterior root the posterior exhibits a swelling—the *ganglion* of the posterior root. At the upper part of the spinal canal the spinal nerves issue from the spine at a point corresponding to the level of their origin in the cord, but in the lower regions the nerves descend for some distance before reaching their canals of exit. Transverse sections of the cord (see Fig. 2) show that the white substance covers in the gray matter everywhere, except at a very narrow point behind where the gray matter reaches the pia mater. This piercing of the white substance by the gray enables us to divide the white substance into two unequal masses on each side —the smaller situated behind between the point of gray matter and the posterior median septum, constituting the *posterior column*, and the larger part, filling up the space in front of the point of gray matter and extending to the bottom of the anterior fissure, the *antero-lateral column*. The gray matter is irregularly developed in the cord and forms a figure like a rough letter H, whose forward arms are club-shaped. The tips of the lateral parts of the H constitute the *horns* of the gray matter, and the connecting bridge the *gray* commissure. The anterior horns are larger, more rounded than the posterior, and differ in structure. In them, particularly in the cervical and lumbar enlargements of the cord, are the largest ganglion-cells known; these "multipolar" elements present a multitude of delicate branching processes of two kinds—the richly branched *protoplasmic* processes and the delicate straighter *axis-cylinder* process. The former ramify within the gray matter, breaking up into extensions of in-

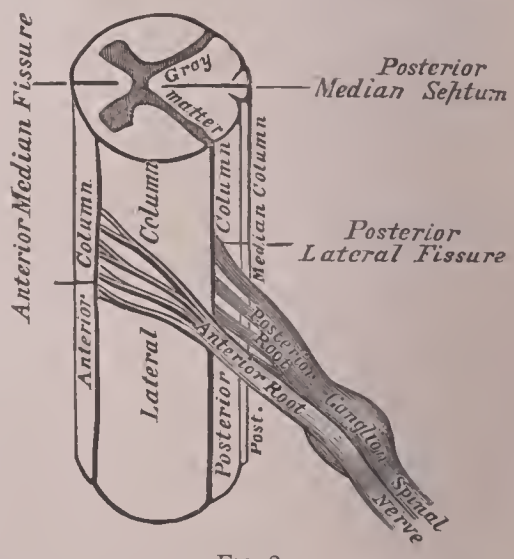


Fig. 2.

creasing delicacy, the latter is continuous with a nerve-fiber, the axis-cylinder of which it becomes. The majority of the anterior root-nerves are connected with the nerve-cells of the anterior horns, although some fibers included within these bundles are connected with more remotely situated elements of the cord. In the cervical and lumbar parts of the cord the ganglion-cells are especially numerous, being arranged within the anterior horns as *outer*, *middle*, and *inner* groups. In the cervical and upper dorsal region additional aggregations of smaller ganglion-cells exist in the inner side of the gray matter, nearly on a level with the commissure; these constitute the *column of Clarke*. The posterior horns possess relatively very few ganglion-cells, those which exist being oval and provided with few processes. The posterior nerve-roots do not, as far as we know, directly communicate with these ganglion-cells; the rootlets enter the white matter a little to the inner side of the point of the posterior horn, and send fibers in several directions—into the posterior horn, upward and downward in the posterior column. The central parts of the spinal cord consist of an *anterior commissure*, lying at the bottom of the fissure, and composed largely of medullated nerve-fibers. Just back of this band of white matter lies the *gray* commissure, the center of which is occupied by a round or oval hole—the *central canal* of the spinal cord—lined by columnar epithelial cells, or filled up by their *débris*. This canal extends from the lowest end of the cord to the fourth ventricle in the medulla oblongata, and is the remains of the primary neural canal of early fœtal life.

Physiology.—During the first twenty-five years of the nineteenth century the spinal cord was looked upon as a bundle of nerves extending from the brain to the external parts, the brain sending nervous force through the passive cord to

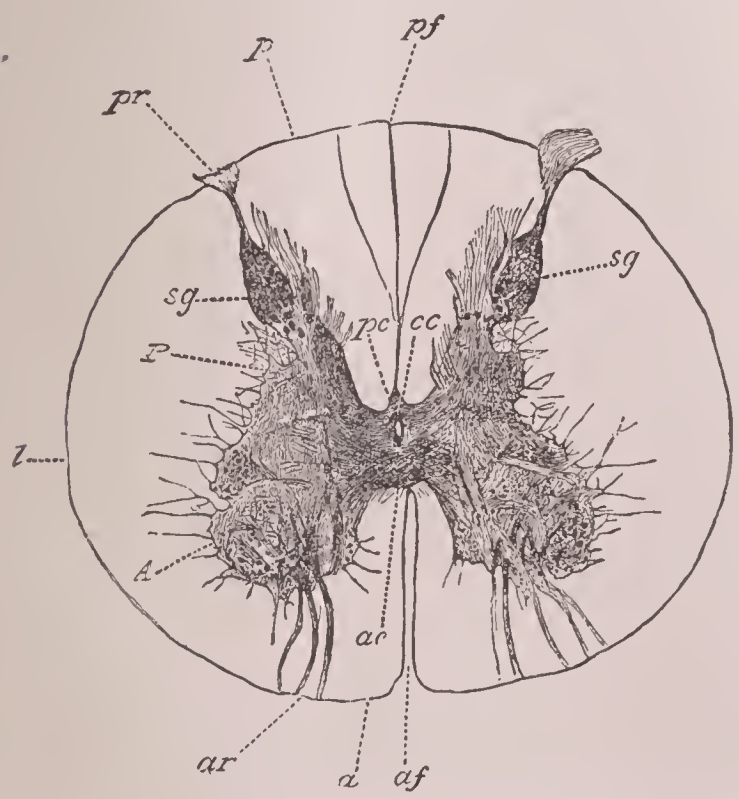


FIG. 3.—Transverse section of spinal cord from the cervical region: *A* and *P*, anterior and posterior horns of gray matter, surrounded by *a*, *l* and *p*, the anterior, lateral, and posterior columns of white matter; *af*, anterior median fissure; *pf*, posterior median septum; *ar* and *pr*, anterior and posterior roots of spinal nerves; *ac*, anterior or white commissure; *pc*, posterior or gray commissure; *cc*, central canal; *sg*, specialized neuroglia, constituting substantia gelatinosa of posterior horn.

the muscles. Later researches made it evident that the cord possesses independent energy which includes all the attributes of a high nervous center, even, according to some, a degree of volition and consciousness. While many points concerning the anatomy and the physiology of the spinal cord must be regarded as far from definitely determined, the complex nature of the functions of the cord must be recognized when we appreciate its multiple *rôle* as a conducting organ for sensory impressions and motor excitations, as a source of nervous force, and, in a degree, as a co-ordinating organ. *Sensory impressions* received from the periphery of the body reach the cord by the *posterior roots* (which are purely sensory), and are then conducted, directly or indirectly, upward to the perceptive centers in the brain. If we imagine the path as one continuous nerve-fiber, we should say that it extends from the right forefinger to the right posterior column of the cord, ascends on that side to the medulla oblongata (some fibers of the sensory path probably having crossed in the cord to the posterior column of the opposite side), from which, after a complex and by no

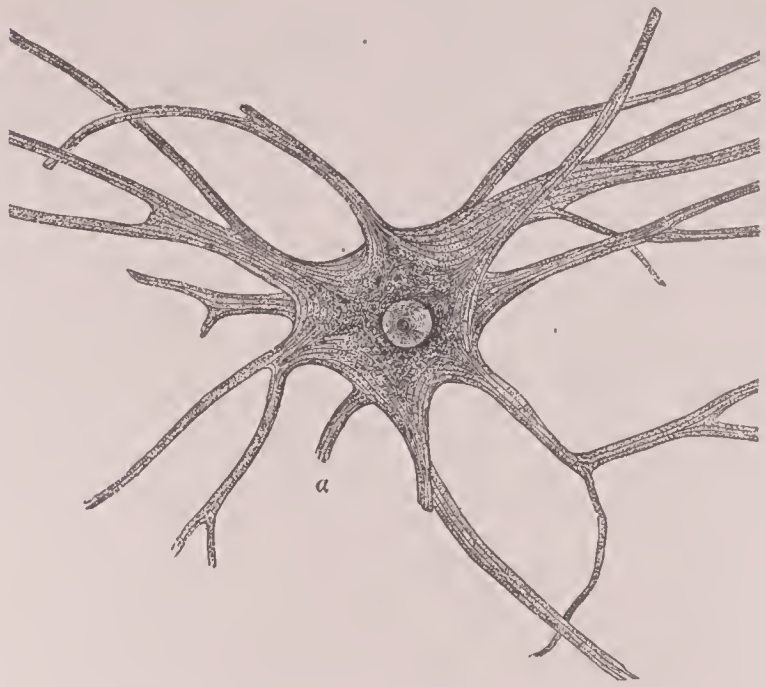


FIG. 4.—Multipolar nerve-cell from anterior horn of gray matter of spinal cord: *a*, the broken axis-cylinder process which becomes continuous with a nerve-fiber; the remaining processes belong to the richly branching protoplasmic group.

means fully known course, the impressions cross the parts of the left brain which perceive and appreciate sensations. *Motor excitations* or impulses pursue quite a different course, in an inverse direction. A motor impulse destined to move the right forefinger starts from the left side of the brain, descends through the left half of the basal parts of the encephalon, until it reaches the lower edge of the medulla oblongata near its junction with the spinal cord, where it suddenly passes across the median line into the right half of the spinal cord, descends in the right half of that organ, issues out of the right *anterior horn*, from which come the nerves of the arm, and follows these nerves to cause contraction of the muscles which move the right forefinger. In general the motor paths or nerves decussate within a definite limited area, the so-called decussation of the pyramids of the medulla oblongata. The motion referred to in the above illustration is a voluntary motion—one starting from the supreme cerebral ganglia—but the spinal cord furnishes involuntary movements of great variety and force originating within itself; it is consequently a source of power, a center for reflex motions. Simple and convincing proof of this assertion is had by watching the movements of a frog whose head has been cut off. The legs of the animal separately move when the creature is touched, and complex movements of jumping, removing irritations by means of two legs, are done just as well as when the animal was perfect. These movements all occur after some irritation of a sensory nerve, never spontaneously; they are consequently called reflex movements. A reflex movement may be defined as the result of a direct transformation (by ganglion-cells) of a sensory impression into motor impulse; in this sense reflex actions occur in every nervous center, great or small. Examples of reflex spinal actions in health are found in the involuntary movements produced by tickling, burning, etc. In diseased conditions certain convulsions are reflex spinal movements, and in some cases of palsy of the legs most extensive and violent movements are commonly observed in the affected limbs. The spinal cord may also be spoken of as a co-ordinating center for certain coarse movements. By co-ordinating center is meant a mass of gray matter whose ganglion-cells act in such a way, harmoniously and simultaneously, as to produce an exact movement. The performance of an exact movement, as walking, must be learned by repeated trials, but when the ganglion-cells have acquired the habit of acting together (education), they so act without the watchful and directing influence of volition; e. g. we start walking by a volitional impulse, but continue walking by spinal action, quite inattentive to what our legs are doing. Thus it is with very many complex movements of daily life. The spinal cord probably possesses a capacity to receive and retain impressions which reach it by sensory nerves.

This property of the ganglion-cells of the spinal cord, as well as of the ganglion-cells of other centers, has been termed retentivity, or it may be spoken of (as by a few authors) as the memory of the spinal cord. In proof of this may be adduced the performance of various acts without volitional interference and outside of consciousness—the execution of complicated movements by decapitated cold-blooded animals, and the well-known possibility of educating the spinal cord. Impressions are stored up and kept ready for use in the gray matter of the spinal cord as well as in that of the brain.

In conclusion, one word may be added about centers for certain actions in the spinal cord. Some ganglion-cells are grouped, and exert an influence over particular nerves destined for the control of special organs; thus nerve-fibers supplying the blood-vessels of the face and eyeball are connected with the upper cervical region of the spinal cord. Movements of the parts within the pelvis (bladder, uterus, etc.) are under the control of a part of the lumbar spinal cord and parts just above it; these are respectively the cilio-spinal and the genito-urinary centers. The spinal cord furthermore exerts an influence upon the organs contained in the chest and abdomen, and also, probably, upon the nutrition of tissues in general.

Revised by G. A. Piersol.

Medum (in Egyptian *Metun*): a locality in Lower Egypt; about 30 miles S. of Memphis; noted as containing some of the most ancient monuments of the country. The pyramid of Medum, called the "false pyramid" by the natives, was never completed. It rises in three parts. It is conjectured that it belonged to Snofru of the fourth dynasty. Just to the N. are several mastabas ornamented in archaic style, which belonged to relatives of that Pharaoh. From one of these mastabas came the sitting statues of Rahotep and Nefert, rightly adjudged to be among the finest efforts of Egyptian sculpture. This region and the neighboring Fayum have been explored by Flinders Petrie, who devoted several volumes to the results of his researches. See his *Medum, Hawara, Kahun, Illahun* (London, 1890–92).

Charles R. Gillett.

Medusæ [Mod. Lat., named from *Medu'sa*, one of the Gorgons = Gr. Μέδουσα. So called from the resemblance of its tentacles to Medusa's snaky locks]: a term given to the free-swimming Cœlenterates, commonly called jellyfish. These all have a disk-like or umbrella-shaped body, the proboscis, at the end of which is the mouth, corresponding to the handle, while the radiating divisions of the digestive cavity correspond to the ribs which support the cloth. The common name jellyfish is most apt, so far as the jelly is concerned, for these forms are scarcely more solid than the water in which they float. They swim by means of contractions of the umbrella, and they kill their prey by means of the many poisonous cells (nettle-cells) which cover certain portions of the body. Around the margin of the umbrella occur sense organs (eyes and ears), while below these depends a fringe of tentacles like the fringe on a parasol. Two great groups of medusæ are recognized, which, though so similar in external appearance, are widely different in structure. In the one belonging to the Hydrozoa (*q. v.*) the digestive layer of the body (entoderm) extends clear to the mouth. Most of the medusæ of this group are the sexual stages of the Hydroids, the asexual stage of which is firmly fixed to some submarine support. To this group belong the only fresh-water medusæ known. Some have been recorded from the Central African lakes, while one suddenly appeared in the *Victoria regia* tanks in the Kew Gardens in London. These forms may be recognized at once by the fact that the aperture of the umbrella is partially closed by a circular membrane (see the figures in Hydroida), whence the name Craspedote medusæ often applied to them. In the other group (Acraspedia) this membrane is lacking, and there is a throat lined by the outer body layer, leading from the mouth to the digestive cavity. For an account of the alternation of generations, the reader is referred to Acalephæ. See also Hydrozoa and Scyphozoa. The literature of the medusæ is large. We may mention A. Agassiz, *Catalogue of Acalephs of North America* (1865); L. Agassiz, *Contributions to Natural History of the United States* (1857–62); Haeckel, *System der Medusen* (1879–81); and papers by Brooks, Fewkes, Macready, etc. J. S. Kingsley.

Meek, Alexander Beaufort: jurist and journalist; b. at Columbia, S. C., July 17, 1814; graduated in 1833 at the University of Alabama; was admitted to the bar in 1835, and became editor of a Democratic newspaper; served three months in 1836 in the Seminole war, and on his return became attorney-general of Alabama; edited *The Southron* 1839; was (1842–44) judge of the court of Tuscaloosa County; law-clerk to the solicitor of the U. S. Treasury 1845; U. S. district-attorney for Southern Alabama 1846–50; a journalist of Mobile 1848–53; went in 1853 to the Legislature, where he originated the free-school system of Alabama; became in 1854 judge of the city court of Mobile; was Speaker of the House of Alabama 1859; was a fine chess-player, and author of a legal digest (1 vol., 1842); *The Red Eagle* (New York, 1855); *Songs and Poems of the South* (1857); *Romantic Passages in Southwestern History* (1857); and an unpublished *History of Alabama.* D. at Columbus, Miss., Nov. 30, 1865.

Meek, Fielding Bradford, M. N. A. S.: palæontologist and geologist; b. at Madison, Ia., Dec. 10, 1817; became at an early age interested in the study of the Silurian fossils, which are very abundant there; at majority, engaged in commercial pursuits, continuing, however, his scientific studies. In 1848 and 1849 he was employed as an assistant in the U. S. geological survey of the upper Mississippi country, under D. D. Owen. From about 1852–58 he worked as an assistant of Prof. Hall at Albany on the palæontology of New York, and meanwhile spent two summers in connection with the State geological survey of Missouri. In 1853, assisted by Dr. F. V. Hayden, he made a valuable collection of vertebrate and other fossils from the *Mauvaises Terres* or Bad-lands of Dakota for Prof. Hall. In 1858 he settled in Washington, D. C., and investigated and reported on organic remains brought in by exploring expeditions. The results of his labors were published jointly with others; his minor papers on paleontology and geology were various *Reports* and *Transactions*; the most important was *A Report on the Invertebrate Cretaceous and Tertiary Fossils of the Upper Missouri Country* (Washington, 1876, liv., 629 pp., 45 pl.). D. Dec. 28, 1876, at the Smithsonian Institution.

Meeker, Joseph Rusling: See the Appendix.

Meeks, Eugene: See the Appendix.

Meerschaum, meer'shawm [= Germ., liter., sea-foam; *meer*, sea + *schaum*, foam. Perhaps a corruption of Tartaric name, *myrsen*]: a compact mineral with a smooth surface; soft when first dug out of the earth, but hardening to 2·0 and 2·5. In composition it approaches silica, 60·9 per cent.; magnesia, 26·1 per cent.; water, 12 per cent. It is obtained from localities in Turkey, Asia Minor, Morocco, etc., where it is used as a substitute for fuller's earth; its principal use, however, is as a material for the bowls of tobacco-pipes.

Meerut, or **Mirat**: one of the seven great divisions or provinces of the Northwest Provinces, British India; lying between lats. 27° 38′ and 30° 57′ N., and meridians 77° 7′ and 78° 42′ E. It comprises the six districts of Dehra-Dun, Saharanpur, Muzaffarnagar, Meerut, Bulandshahr, and Aligarh. Area, 11,319 sq. miles. Pop. (1891) 5,324,910. The province extends in a narrow strip from the lower Himalayas over the marshy *terai* at their base into the *doab* or alluvial plain between the Ganges and Jumna. Except the *terai* and some small saline deserts adjacent, and the immediate banks of the Ganges, the country is fertile and well-watered either naturally or by irrigation. It exports large quantities of wheat, barley, millet, rice, cotton, and cane-sugar. It is traversed by the railway from the Punjaub to Allahabad. The district of Meerut is in the center of the province about the city of Meerut. Area, 2,379 sq. miles. Pop. 1,350,000. It is the most populous, fertile, and prosperous of the districts of the province. M. W. H.

Meerut: city of the Northwest Provinces of British India, and capital of the district and division of the same name; 38 miles N. E. of Delhi, near the right bank of the Kali-Nadi, an affluent of the Ganges, and a station on the railway connecting Delhi and Lahore (see map of N. India, ref. 5–E). It is an ancient city and numerous ruins show its former splendor. At the time of its submission to the British in 1803 it was in decadence, but its selection as a military center caused its revival. It has little commerce except the local trade. Pop. (1891) 119,390. M. W. H.

Megaby'zos (in Gr. Μεγάβυζος): (1) one of the conspirators who slew the false Smerdis; (2) a grandson of the former, son of Zopyrus, and one of the generals of Xerxes, whose daughter Amytis he had married. He was afterward commander in Syria and Egypt, where he was victorious over

the Athenians and Egyptians. On a hunt he gained the ill-will of Artaxerxes, and, though his life was spared, he was banished to Crete, whence he returned after five years, and was forgiven. D. at Susa in extreme old age. J. R. S. S.

Meg'acles (in Gr. Μεγακλῆς): a name that recurs frequently in the illustrious family of the Alcmæonidæ at Athens—(1) The first bearer of the name was the son of Alcmæon and Archon of Athens, in 612 B. C. (2) Megacles, the grandson of (1) and a son-in-law of Clisthenes, tyrant of Megara, took part as a conservative in the partisan politics at the time of Solon; but in 560 B. C., when Pisistratus became tyrant, he and the entire family of the Alcmæonidæ were forced into exile; later on they returned and twice forced Pisistratus into exile, but when Pisistratus had established himself firmly in the tyranny Megacles again went into exile. (3) A grandson of (2), maternal grandfather of Alcibiades; was a victor in the Pythian games, and twice ostracized. (4) Another grandson of (2), and uncle of Pericles on his mother's side. J. R. S. Sterrett.

Megalich'thys [Mod. Lat.; Gr. μέγας (stem μεγαλο-), great + ἰχθύς, fish]: the generic name of extinct rhomboganoid fishes whose bones are found in European Carboniferous strata. They were covered with huge bony plates, and their powerful jaws armed with immense teeth. These fishes seem to have possessed a crocodilian character, and are now represented by the much smaller garfishes of the U. S.

Meg'alo-Cas'tro: See Candia.

Megalon'yx [Mod. Lat.; Gr. μέγας (stem μεγαλο-) + ὄνυξ, claw]: the generic name of extinct Quaternary mammals from North and South America, allied to the sloths. The type, *Megalonyx*, was first discovered in the caves of Virginia, and named by President Jefferson in allusion to its large claws, the length of the terminal phalanx or bony support of the median claw being 7 inches, or more than one-third the length of the humerus of the same animal. Its remains have also been found at Bigbone Lick in Kentucky, and other localities. The typical species has received the name *Megalonyx jeffersoni*. Many other species of the genus occur in South America, principally in the southern part.

Megalop'olis [= Gr. Μεγαλόπολις, liter., Great City; μέγας, μεγάλη, great + πόλις, city]: city of Greece; on both sides of the river Helisson, an affluent of the Alpheus. It was founded by Epaminondas in 370 B. C., immediately after the battle of Leuctra, for the purpose of gathering the Arcadian communities, hitherto independent of each other, into a compact state, thereby forming a bulwark against Sparta. The city was laid out on a grand plan, being 50 stadia in circumference, with about 70,000 inhabitants, but it never acquired any considerable importance. It contained the greatest theater in Greece, of which remains are extant. Megalopolis was excavated by the British School at Athens in 1890–91. See Gardner, Loring, and others, *Excavations at Megalopolis* (London, 1892); see also *Journal of Hellenic Studies* (1892–93, pp. 319–337 and 356–358); *Mittheilungen, Athenische Abtheilung* (1893, pp. 215–219).
Revised by J. R. S. Sterrett.

Meg'alops [Mod. Lat., deriv. of Gr. μεγάλη, great + ὤψ, eye]: a name given to the last larval stage of crabs, in allusion to the relatively large size of the eyes.

Megalosau'rus [Mod. Lat.; Gr. μέγας (stem μεγαλο-) + σαῦρος, lizard]: a large carnivorous reptile from the Oolite and Wealden of England, belonging to the order *Dinosauria*, and exemplifying the carnivorous type of that order, as *Iguanodon* does the herbivorous. *Megalosaurus bucklandi*, the best-known species, was perhaps 30 feet in length, and attained a weight of 2 or 3 tons. The teeth are large, curved, pointed, and compressed; the crown is covered with smooth enamel, which rises along the margin of the tooth into a trenchant serrated edge. They are directed backward and set in sockets. The cervical vertebræ are little known, but appeared to indicate an upward curve in the neck, as in some mammals and birds. The dorsal vertebræ have the anterior face somewhat convex, the posterior concave. The bodies of the vertebræ are smooth and hour-glass-shaped, and the neural spines elongated. Both faces of the lumbar vertebræ are concave. The sacrals are five in number, and the caudals estimated at between thirty and forty. The humerus is hollow, but beyond that bone the structure of the fore limbs is unknown. They were, however, small in comparison with the hind limbs. In the pelvis the ilium was a broad, strong, arched plate, wide in front. The lower margin projects in thick, strong proesses, which receive the pubic and ischial bones. The ischium was slender and directed backward. The pubis projected downward and forward. The femur was more curved than in *Iguanodon*. It appears hollow like that of a bird. There were three well-developed toes on the hind foot, and the claws were strong and pointed. These animals lived upon the land, and probably moved mainly by means of their hind limbs. Remains of *Megalosaurus* have been found in the strata of the Mesozoic or Reptilian age in England, from the Lias to the Wealden; also in the Kimmeridge clay at Honfleur in Normandy, and in Oolite at Besançon, France. O. C. Marsh.

Megantic: a lake of Compton co., Quebec, near the boundary of Maine. It discharges through the Chaudière river into the St. Lawrence. It is 15 miles long by 2 or 3 broad, and is in picturesque surroundings. It is very full of fish. The surrounding country is being rapidly colonized. Lake Megantic town, at the N. of the lake, is a station on the Canadian Pacific Railway, 175 miles E. of Montreal. M. W. H.

Megapodes: See Megapodidæ.

Megapod'idæ [Mod. Lat., named from *Megapo'dius*, the typical genus; Gr. μέγας, great + πούς, ποδός, foot]: scientific name of a family of gallinaceous birds whose representatives are chiefly Australian, and there are commonly known as brush turkeys and mound-birds; they are nearly related to the curassows (*Cracidæ*) of South America, and the two form the group *Peristeropodes* of Huxley. The different types of the group vary much in external appearance, some

Nest of megapodius.

(*Megapodius*) reminding one of a rail or a tailless hen, while others (*Tallegallus*, etc.) rather resemble a turkey; the head and neck are sometimes (in *Megapodinæ*) thickly feathered, and sometimes (in *Tallegallinæ*) sparsely feathered or almost naked; the bill is more or less like that of the common cock; the gape not deep; the nostrils are subcentral or somewhat anterior; the tarsi unarmed; the hind toe on a level with the fore ones; the tail is very variable in its development. The different forms differ considerably in habits, but are all terrestrial birds; the *Tallegallinæ* live in small flocks; the *Megapodinæ* generally in pairs. The *Megapodinæ* are unique among birds in their nesting arrangements; they do not sit upon their eggs, but deposit them in mounds formed by themselves, and composed of sand, leaves, etc.; and in these a sufficient degree of heat is generated to hatch the eggs. The mounds are out of all proportion to the size of the birds, and sometimes measure from 30 to 50 feet in diameter and 14 feet in height. The young are *præcoces* in the fullest sense of the term, for they can run and fly as soon as hatched. See Brush-turkey. Revised by F. A. Lucas.

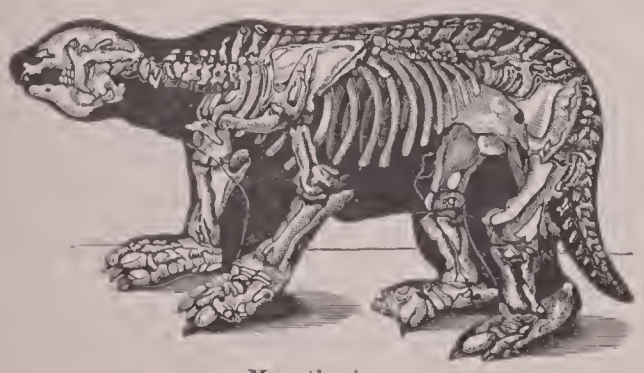
Meg'ara (in Gr. τὰ Μέγαρα): city of ancient Greece, and the capital of Megaris, a territory bounded by Attica, Bœotia, Corinthia, the Saronic and the Corinthian Gulfs. As early as the seventh and eighth centuries B. C. it was a prosperous and even wealthy city. It formed many colonies, of which Chalcedon and Byzantium were the most remarkable. It entered into rivalry with Athens, but had to yield in the contest, and became subject to that city. By its attempts to free itself from the Athenian supremacy it became one

of the causes of the Peloponnesian war, during which it suffered severely, and sustained losses from which it never recovered. Theognis the poet and Euclid were citizens of Megara. Revised by J. R. S. Sterrett.

Megas'thena [Mod. Lat.; Gr. *μέγας*, great + *σθένος*, strength]: a name given by Prof. Dana to the group of generally large mammals constituting the orders *Primates* (exclusive of man), *Feræ*, *Ungulata*, *Cetacea*, etc. The term in question alludes to the supposed superior life-force and specialization (so far as ways and means, mental as well as physical, are concerned) exhibited by them. The group is exactly equivalent as to its contents with the sub-class *Gyrencephala* of Owen, and, with the addition of man, to the super-order *Educabilia*. Theodore Gill.

Megas'thenes (Gr. Μεγασθένης): a Greek statesman and author in the service of Seleucus Nicator, one of the generals of Alexander the Great, who became monarch of Syria, Persia, and Bactria. He was sent as ambassador about B. C. 302 to the court of Sandracottos (Chandra-gupta), King of the Prasii, at Palibothra (Pataliputra) on the Ganges, supposed to be the modern Patna. He resided at this great capital many years, and wrote a work (*Ἰνδικά*, in four books) upon the history and geography of India, which was the foundation of nearly all that subsequent writers have communicated upon ancient India. The work of Megasthenes is lost, but an abstract of the work is given by Diodorus (ii., 35–42), and copious extracts, given by Strabo and other geographers, show him to have been an acute observer, though like most of the writers of his time he was fond of the fabulous, and of showing the relation of Greek and Indian myths. So he makes the Brahmans tell of the wanderings of Dionysos, whom they claimed as the civilizer of India. These fragments were edited by E. A. Schwanbeck, *Megasthenis Indica* (Bonn, 1846). See also Müller, *Fragmenta Historicorum Græcorum* (Paris, 1868–74), ii., 397–439. Revised by J. R. S. Sterrett.

Megathe'rium [Mod. Lat.; Gr. *μέγας*, great + *θηρίον*, wild animal]: generic name of certain Quaternary mammals. The genus *Megatherium* may be considered as typical of the extinct family of Edentates, *Megatheriidæ*. Their remains are more abundant in South than in North America, and indicate a former much greater development of the or-



Megatherium.

der of *Edentates* than now prevails. The tibia and fibula are co-ossified. The vertebræ of the tail are very large and powerful, and that organ, with the hind legs, seems to have formed a support for the heavy body, while the huge fore legs were employed in breaking the branches from trees or tearing them down for food. There are four toes in front, two behind. The teeth, five above and four below on each side, resemble those of the sloths. They grew from persistent pulps, and are deeply implanted in the jaw; they have a grinding surface of triangular ridges, and were fitted for masticating coarse vegetable food. The lower jaw is prolonged, and grooved in the symphysial region, and probably supported a powerful, muscular tongue. *Megatherium cuvieri*, from South America, exceeded the rhinoceros in size, its skeleton measuring 18 feet in length. The femur is three times as thick as that of the elephant. *M. mirabile* is a North American species, and its remains occur in Georgia and South Carolina. O. C. Marsh.

Megerle, Ulrich: See Abraham-a-Sancta-Clara.

Meghna: a river and estuary of Eastern India, into which flow the combined waters of the eastern branch of the Ganges and the Brahmaputra, forming the eastern branch of the Gangetic delta. The body of water is very great, but navigation is difficult because of constant changes in bars and islands. The mouth of the Meghna is said to be advancing to sea (4 miles in twenty-three years) and to the westward. The regular rise of the tide forms a wave 10 to 18 feet high, which rushes with great speed up the river and is much dreaded by boatmen. An occasional storm wave, due to cyclones, sweeps up the river. The last great wave of this sort was in 1876, when whole islands and the sea-face of the mainland were submerged, causing death directly to about 19 per cent. of the population of Noakhali district and the islands Sandwip and Hatia, and indirectly to about as many more by the cholera and other diseases resulting from it.
Mark W. Harrington.

Megrim: See Migraine.

Mehemet Ali Pasha: first Viceroy of Egypt; b. at Kavala, European Turkey, in 1769; the youngest of the sixteen children of Ibrahim Agha, an Albanian officer in the Ottoman service. He headed the contingent sent from Kavala to assist in expelling the French from Egypt, and having survived the land-battle of Aboukir (1799) he was appointed *binbashi* (colonel). Speedily obtaining ascendency over the other Albanians in the army, he, during the next six years, pursued a course of almost unparalleled cunning and duplicity, opportunely betraying or deceiving friend or foe, invariably reaping advantage from every dissension or intrigue, adroitly manipulating every foreign and domestic interest and faction, until in a revolt of the Albanians he was proclaimed, ostensibly against his will, Viceroy of Egypt. In this office he was confirmed by the sultan (July 9, 1805). During the next forty years his personal history and that of Egypt are identical. The Mamelukes were the scourge of Egypt, and it was impossible to crush them by war. He solemnly offered them his friendship, gathered their chiefs in his palace for a great festival of reconciliation, and then had more than 1,000 of his guests massacred in a narrow pass on their departure. Similar measures through the land annihilated the Mameluke power. He then organized an army after the European system, crushed the Wahabees, who had seized Mecca, and sent their chief, Abd-Allah-Ebn-Sououd, a prisoner to Constantinople (1818). Ordered by the sultan to assist in putting down the Greek revolution, he was able (1824) to send, under his son Ibrahim Pasha, a fleet of 167 vessels, carrying 17,000 men, against the Peloponnesus, which was subdued, but the fleet was destroyed at Navarino (1827). He confiscated private property, gained vast revenues from traffic in slaves, and became practically proprietor of Egypt, which he sought to develop to the utmost, that he might be able to maintain a powerful army and become independent. He laid out roads, cultivated cotton, indigo, and sugar, established some schools, and sought the friendship of the foreign residents. A quarrel with Abdallah Pasha of Acre furnished a pretext for the invasion of Syria, against which he sent his son Ibrahim Pasha (*q. v.*) with 24,000 men. Sultan Mahmoud, who at first had sanctioned the expedition, was soon terrified at the rapid progress of the Egyptians and ordered them to withdraw. Mehemet Ali, refusing and demanding investiture as governor of the joint Syrian pashalies, was declared an outlaw. Ottoman armies sent to enforce the sultan's will were defeated at Homs, Beilan, and Konieh. Great Britain and France, fearing the intervention of Russia, persuaded the sultan to yield. Mehemet Ali agreed to evacuate Asia Minor after appointment as governor of Syria (1833). During six years the European powers intrigued at both Constantinople and Cairo, France being favorable to Mehemet Ali and the rest of Europe against him. Troubles arose anew (1839), and the Ottoman army was destroyed at Nezib. Austria, Great Britain, Prussia, Russia, and the sultan signed a treaty and ordered the viceroy to evacuate Arabia and Syria within ten days. The four powers agreed to enforce this order, but, encouraged by France, Mehemet Ali refused to submit. Speedily deserted by France, he, after a desperate struggle, was compelled by Admiral Napier to accept conditions which left him nothing save the viceroyalty. That was declared hereditary in his family. The remainder of his life was uneventful. Falling into dotage, he died in Cairo, Aug. 2, 1849, and was succeeded by his son Ibrahim Pasha. Utterly unscrupulous, madly ambitious, with a veneering of European civilization, he is best described by Lamartine as "an adventurer of genius." E. A. Grosvenor.

Méhul, mā'ül', Étienne Henri: composer; b. June 22, 1763, at Givet, in the department of the Ardennes, France, in humble circumstances; went in 1779 to Paris with an introduction to Gluck, whose favor he gained, and under whom he studied; made a successful *début* as a composer

in 1791 by his opera *Euphrosine and Conradin*; achieved a most brilliant success by his composition of Chenier's song, *Chant du Départ*; became professor at the Conservatory; wrote forty-two operas. D. in Paris, Oct. 18, 1817. His most remarkable composition, besides the above-mentioned song, is his opera of *Joseph* (1807). The overture to the opera *La Chasse du Jeune Henri*, also characteristic, is often performed. See the *Biography* by Pougin (1889).

Meï, mā′ĕe, Lev (or **May**, Lyoff) Aleksandrovich: poet; b. in Moscow, Russia, Feb. 13, 1822, the son of an official of German origin. He was for a number of years in the service of the Government at St. Petersburg. While still a schoolboy he began to make creditable verses, and to the end of his life continued a most prolific writer. Besides translations, many of them remarkable, from eight foreign languages, and a modern rendering of *The Tale of the Troop of Igor*, he was the author of three historical dramas, *Tsarkaïa Nevesta* (The Bride of the Tsar. 1849), *Servilia* (1854), and *Pskovitïanka* (The Woman of Pskov, 1860), as well as of many shorter poems, some on biblical or classical subjects, others expressing with great skill and fidelity the life and character of the Russian people. D. in St. Petersburg, May 16, 1862. Meï was never a particular favorite of the public. He lacked individuality; also, partly owing to poverty, he wrote too much and too hastily. See his complete works (3 vols., St. Petersburg, 1863–65). A. C. Coolidge.

Meignan, mān′yaŭn′, Guillaume René: theologian; b. at Denazé, in the department of Mayenne, France, Apr. 11, 1817; was educated for the Church; was ordained a priest in 1840; held various minor charges, and was in 1862 appointed Professor of Biblical Theology at the Sorbonne; in 1863 vicar-general of the diocese of Paris; and in 1864 Bishop of Châlons; in 1882 was transferred to Arras; in 1884 promoted to the archbishopric of Tours. He published *Les Prophéties messianiques* (1858; 2d ed. 1878); *M. Rénan réfuté par les Rationalistes Allemands* (1863); *Les Évangiles et la critique au XIX^e siècle* (1864; 2d ed. 1871); *La crise Protestante en Angleterre et en France* (1864); *Le monde et l'homme primitif selon la Bible* (1869); *Instructions et conseils addressées aux familles chrétiennes* (1875); *Léon XIII. pacificateur* (1886); *Solomon, son règne, ses écrits* (1890); *Le Christ et l'Ancien Testament*; *Les Prophètes d'Israel: Quatre siècles de lutte contre l'idolatrie* (1892); besides a great number of minor essays. D. at Tours, France, Jan. 20, 1896. Revised by S. M. Jackson.

Meigs, Charles Delucena, M. D.: obstetrician; b. at St. George's, Bermuda, Feb. 19, 1792; received medical degree from the University of Pennsylvania 1817; settled in Philadelphia in 1817; made specialties of obstetrical practice and the diseases of women and children, in which he acquired a high reputation; was a professor in Jefferson Medical College 1841–61. He wrote several professional works, among which are *Midwifery* (1838); *Lectures on the Female* (1847); *Obstetrics*, a standard work (1849); *Childbed Fevers* (1854); he made valuable translations from French medical literature. He was the author of a *Memoir of Samuel George Morton, M. D.* (1854). D. in Delaware co., Pa., June 22, 1869. Revised by S. T. Armstrong.

Meigs, James Aitken, M. D.: clinician and physiologist; b. in Philadelphia, July 31, 1829; graduated at Jefferson Medical College 1851; became in 1856 librarian of the Philadelphia Academy of Natural Sciences; Professor of the Institutes of Medicine in Pennsylvania Medical College 1859–61; was Professor of the Institutes of Medicine in Jefferson Medical College 1868. He was the author of works chiefly on craniology and ethnology. D. in Philadelphia, Nov. 9, 1879. Revised by S. T. Armstrong.

Meigs, Montgomery Cunningham: officer and scientist; b. at Augusta, Richmond co., Ga., May 3, 1816; was educated at the University of Pennsylvania and U. S. Military Academy; graduated from the latter July 1, 1836; was appointed second lieutenant of artillery, which commission he relinquished in 1837 for the purpose of being transferred to the corps of engineers as brevet second lieutenant from date of graduation; became first lieutenant of engineers 1838, captain 1853. From 1836 to 1841 he was mainly engaged in the construction of Fort Delaware, of the Delaware breakwater, and in the improvement of the Delaware Bay and river; in charge of the construction of Fort Wayne, Mich., and Forts Porter and Niagara, N. Y., 1841–49; of Fort Montgomery, N. Y., 1850–52. From Nov., 1852, to 1860 he was engaged upon his great work of supplying the national capital with water from the Potomac river; the Washington aqueduct, by which the cities of Washington and Georgetown are now supplied, was designed and constructed under his personal direction, during which time he conducted the construction of the Capitol extension and its iron dome, as well as of the post-office extension. In Nov., 1860, he was sent to Florida to put Forts Jefferson and Taylor in a condition to resist attack; returning to Washington, he was by request relieved from other duties, Apr., 1861, and appointed chief engineer of the expedition for the relief of Fort Pickens; was appointed colonel of the Eleventh Infantry May 14, 1861, and the next day quartermaster-general U. S. army, with the rank of brigadier-general, and as such directed the equipment and supply of vast armies during the civil war, making frequent inspections of the operations of the quartermaster's department in the various armies in the field, being at Chattanooga throughout its investment, and engaged in the battle of Nov. 23–25, 1863; during Gen. Grant's operations in the Wilderness, May, 1864, was in charge of the base of supplies at Fredericksburg and Belle Plain; and during the appearance of the Confederate forces under Breckenridge and Early in front of Washington commanded a division composed of employees of the War Department. He was breveted major-general July 5, 1864. In Jan., 1865, he directed, at Savannah, Ga., the supply and refitting of Gen. Sherman's army, just arrived from Atlanta, and in March, at Goldsboro, N. C., directed the opening of communications for the supply of that army on its arrival there and at Raleigh. Visited Europe 1867–68, after which he inspected the operations of his department in Texas, California, Dakota, Wyoming, and Arizona; also the North Pacific Railway route to the Red River of the North. In 1875 he was sent to Europe particularly to inspect the organization of the staff departments (especially the quartermaster's) of European armies. Retired Feb. 6, 1882. D. in Washington, D. C., Jan. 2, 1892.

Meigs, Return Jonathan, Jr.; soldier and Senator; b. at Middletown, Conn., Nov., 1765; graduated at Yale in 1785; went to Marietta, O., with his father, Col. R. J. Meigs, in 1788; became a lawyer there, and was much engaged in border warfare; was made chief justice of the Ohio Supreme Court 1803–04; brevet colonel U. S. army, serving in Louisiana 1804–06; a judge in Louisiana 1805–06; U. S. district judge in Michigan 1807–08; U. S. Senator from Ohio 1808–10; Governor of Ohio 1810–14; U. S. Postmaster-General 1814–23. His governorship was remarkable for the active support which he and his State afforded the U. S. Government during the war of 1812–15. D. Mar. 29, 1824.—His nephew, of the same name, became a distinguished lawyer, and published a volume of *Law Reports* (1839), and with William F. Cooper prepared the *Code of Tennessee* (1858).

Meikong: a river of Indo-China. See Mekong.

Meilhac, Henri: See the Appendix.

Meinam, a river of Siam. See Menam.

Meineke, mī′ne-ke, August: classical scholar; b. in Soest, in Westphalia, Germany, Dec. 8, 1790; received his early education at the famous gymnasium of Schulpforta; studied under G. Hermann at Leipzig from 1810 to 1812, when he was appointed Professor of Greek and Roman Literature at the gymnasium at Jenkan; thereafter director of the gymnasium in Dantzic; and from 1826–57 director of the Joachimsthaler Gymnasium in Berlin. D. Dec. 12, 1870. Meineke's astounding philological activity was almost exclusively devoted to text critical editions of Greek authors, his work in the departments of Greek comedy and Alexandrian literature being particularly valuable. Among his many writings are *Fragmenta Comicorum Græcorum* (5 vols., 1839–57), the first volume containing the first complete and scientific survey of our knowledge concerning the development of Greek comedy, and the lives and works of its representatives; *Aristophanes* (2 vols., 1860); *Athenæus* (3 vols., 1859); *Analecta Alexandrina* (1843), a collection of learned monographs on the poets Euphorion, Rhianos, Alexander Ætolus, Parthenius, and others; *Theocritus, Bion* and *Moschus* (1856); Callimachus's *Hymns* and *Epigrams* (1861); the lexicon of *Stephanus Byzantius* (vol. i. 1849, the second never appeared); *Strabo* (3 vols., 1853); *Stobaeus* (6 vols., 1855–63); the histories of *Johannes Kinnamas* and *Nicephorus Bryennios* for the Bonn *Corpus scriptorum Byzantinorum*; *Horace* (1834), in which edition the so-called four-line strophe law, discovered independently by him and Lachmann, is consistently applied. See F. Ranke, *A. Meineke, ein Lebensbild* (Leipzig, 1871). Alfred Gudeman.

Meissen, mī'sen: town of Saxony; on the Elbe; 14 miles by rail N. W. of Dresden (see map of German Empire, ref. 4–G). It has a beautiful Gothic cathedral. St. Afra's School (founded in 1543), celebrated manufactures of porcelain, in which the so-called "Dresden china" is made (an industry begun in 1710); also manufactures of iron, machinery, jute, and cigars. Pop. (1890) 17,875.

Meissen, Heinrich, von (*Frauenlob*): poet; b. probably at Meissen about 1250. He was a traveling minnesinger, whom we meet at the courts and castles of many contemporary princes and nobles. Toward the end of his life he seems to have settled at Mentz, where he died Nov. 29, 1318. He was called Frauenlob because he extols in his poems the name Frau in opposition to the name Weib, which was used by other poets. He also wrote a long hymn in praise of the Holy Virgin, introducing in this and other poems the element of scholastic learning. The fact that in this style of poetry he was imitated by the later mastersingers is proof for the supposition that to Frauenlob we must trace the beginnings of the mastersong. (See Mastersingers.) Frauenlob was a poet of great technical talent, but an extremely vain man, whose conceit is not warranted by the meager contents of his poetry. Julius Goebel.

Meissner, mīs'ner, Alfred: poet; b. at Teplitz, Bohemia, Oct. 15, 1822; studied medicine at the University of Prague, and published his first volume of poems in 1845. Fearing that the publication of *Ziska*, an epic poem which he was then writing, would be prohibited in Austria, he went to Leipzig in 1846. Here he finished *Ziska*, which met with great success, but on account of its revolutionary spirit was not allowed to be sold in Austria. In order to escape extradition and punishment he went to Paris, where he became intimately acquainted with Heine. In 1848 he returned to Austria, where, on account of the revolutionary events of that year, a more liberal spirit had been inaugurated, and he was allowed to go free. During the remainder of his life he lived mostly in Prague and in Bregenz, at Lake Constanee. Though Meissner wrote several dramas and a number of novels which rank above the average, he is greatest as a lyric poet. Like Anastasius Grün and other Austrian poets of that time, Meissner finds the principal source of his poetical inspiration in the ardent longing for spiritual and political freedom from the fetters of mediæval feudalism and hierarchical despotism. Besides, we find in his poetry an element of melancholy, suggesting a decided influence of Lenau. The last years of Meissner's life were greatly embittered by the consequences of a most unfortunate literary partnership into which he had entered with a man named Hederich. Being ashamed to acknowledge this partnership publicly, he was forced not only to publish novels by Hederich under his own name, but also to meet, under the threat of exposure, the exorbitant pecuniary demands of this man. Nearly driven to madness, Meissner attempted suicide, and finally died, utterly broken down, at Bregenz, May 29, 1885.
Julius Goebel.

Meissonier, mā'sō'ni-ā', Jean Louis Ernest: genre and military painter; b. in Lyons, France, Feb. 21, 1815; pupil for a short time of Léon Cogniet, but obtained his art education in the main by the study of the old masters, especially those of the Dutch school. The first picture he exhibited was *The Visitors*, in 1834. He received a third-class medal at the Salon of 1840, second-class in 1841, and first-class in 1843 and in 1848. Received in 1846 the decoration of the Legion of Honor, and was made a grand officer in 1878; at the Paris Expositions of 1855, 1867, and 1878 he was awarded medals of honor; was elected in 1861 a member of the Institute. He was a member of all the principal art academies of Europe, and received various honors and orders at international exhibitions and from the sovereigns of different countries. D. in Paris, Jan. 31, 1891. His works are remarkable for their wonderful truth and exactness in detail, while they are painted with breadth and completeness of general effect. A number of his works deserve the name of masterpieces. His pictures have been sold for enormous prices, and most of them are in private collections in Europe and the U. S. *Napoleon III. at Solferino* (1864) is in the Luxembourg Gallery, Paris; *La Rixe* (1855) in Buckingham Palace, London; *Friedland—1807* (painted in 1876) in the Metropolitan Museum, New York.
William A. Coffin.

Meisterhans, mīs'ter-hans, Konrad, Ph. D.: classical scholar; b. at Andelfingen, canton of Zurich, Switzerland, Nov. 21, 1858; studied in Zurich and Paris; professor in the cantonal school at Solothurn, Switzerland; author of *Grammatik der attischen Inschriften* (1885; 2d ed. 1888); *Aelteste Geschichte des Kantons Solothurn bis zum Jahre 687* (1890).

Meistersinger: See Mastersingers.

Meistersong: See Mastersingers.

Mejía, mā-hee'ăă, Tomás: soldier; b. in Guanajuato, Mexico, about 1812. He was of pure Indian blood, and uneducated; rose from the ranks; fought against Taylor in the war with the U. S. 1846–47; subsequently supported the conservative or church party, and was conspicuous on its side in the civil wars 1857–61. In 1862 he joined the French and subsequently was one of the most trusted generals of Maximilian, to whom he was much attached. He was captured at the fall of Querétaro, and executed there with Maximilian, June 19, 1867. Herbert H. Smith.

Mejsnar, mās'năăr, Hynek Jaroslav: classical scholar; b. at Jilemnice, near Jičín, Bohemia, 1837; was professor at the gymnasium of Tábor; is professor at the academic gymnasium of Prague. He is best known as translator of Homer's *Odyssey* (1873–76); *Iliad* (1878–81); and *Hymns, Epigrams, and Batrachomyomachia* (1881). He also translated N. Nekrasov's and K. F. Rylejev's poems, Krylov's fables, and trilogy *Oresteia* (1883), etc. J. J. K.

Mek'hitar, or Mechitar: the founder of a congregation of Armenian monks, called after him Mekhitarists; b. at Sebaste in Lesser Armenia, Feb. 7, 1676. His true name was Manuk, but on entering a monastery in the vicinity of his native city in 1690 he received the name of Mekhitar, "comforter." He distinguished himself both for religious zeal and talent for learning, and in 1701 founded in Constantinople a congregation with the purpose of uniting the Armenian and Roman Catholic Churches. Compelled to leave Constantinople on account of the persecutions of the Armenian patriarch, he moved in 1703 to Modon, in the Morea, where, under the authority of the Venetians, who at that time held the country, he founded a monastery. Expelled from this place, too, by the war between Turkey and Venice, he repaired with his followers to the latter city, and having received the island of San Lazzaro, he built a new monastery here (1717). D. in the monastery Apr. 27, 1749. In their original aim of uniting the Armenian and Roman Catholic Churches, the Mekhitarists have not been very successful. They have branches in Italy, Germany, and Turkey, but United Armenians are scarcely found in Armenia proper. (See Armenian Church.) As a link of intercommunication, however, between their native country and European civilization they have developed a great and beneficial activity. Through them Armenia, its language, literature, and history have become known to Europe, and many of the best products of European learning and genius have become accessible to Armenians through their translations. See V. Langlois, *Notice sur le couvent arménien de l'île Saint-Lazare de Venise, et sur la congrégation mekhitariste* (Venice, 1863).
Revised by S. M. Jackson.

Mek'inez: town of Morocco; in lat. 33° 58′ N. and lon. 5° 35′ W. (see map of Africa, ref. 1–B). It is situated on a fertile plain covered with olive-groves. It is fortified, neatly built, and contains a magnificent palace built of marble and surrounded by beautiful gardens. The sultan resides there during the summer. A considerable trade and manufactures of leather and earthenware are carried on. Many of its inhabitants are connected with the court of the sultan. The town was formerly called Tákarat. Pop. estimated at 80,000.

Meklong': river and town of Western Siam, Indo-China. The river rises in the mountains between Tenasserim and Siam, is 250 miles long, is navigable for the lower 30 miles from Pra-Pri, is connected by a canal with the Menam near its mouth, and empties into the northwest angle of the Gulf of Siam. The town of Meklong, an important port, is on the river, 5 miles above its mouth. Pop. 10,000, mostly Chinese merchants and Siamese truck-growers and fishermen. Below the town is a strong fort. M. W. H.

Mekong', **Meikong**, or **Cambodia**: a river of Southeastern Asia, the greatest in Indo-China. Its upper course is not known with certainty, but it is believed to rise in Central Tibet, about lat. 34° N., lon. 94° W., but a few miles E. of the source of the Yang-tse-Kiang, traversing Eastern Kham (of Tibet) and Western Szechuan and Yunnan (of China), and entering Indo-China at the northwest angle of Tonquin, in about lon. 100° E. From here it goes S. until it passes lat. 22°, from which point its course is fully identified.

It passes first S. to lat. 20°, then E. through Luang Prabang to about lon. 102° E., then again S. to about lat. 18° N., thence E. again to lon. 104° E., thence, by a generally southerly course, to its mouth in the China Sea. Its greatest tributary is the Semoun from Siam, in about lat. 15° N. Below Khong, about lat. 14° N., begins a series of rapids and cataracts which make continuous navigation between the lower and upper river impossible. Below the cataracts of Khong navigation is possible without interruption to the mouth. At about 11° 30′ N. lat. the river receives the discharge of Tonlé-Sap, or Great Lake, lying 70 miles N. W. This lake is about 100 miles long, 20 miles in greatest breadth, and lies on the boundary between Siam and French Cambodia. At the junction of the Mekong and affluent of Great Lake is the important city of Pnom-Penh, and it is immediately below this city that the delta of the Mekong begins. The river then passes by many branches for 180 miles through the marshes of Cochin China, and empties into the ocean through four great mouths and innumerable smaller ones. As thus described, the Mekong has a course of over 2,600 miles, about that of the Amur, Hoangho, or Volga. Its basin includes about 350,000 sq. miles, which is small for its length. The stream is called by different names in different parts of its course. It is the Kiamdo-Chu of the Tibetans, the Lan-tsan-Kiang and La-Kao of the Chinese, the Mekwanmit of the Burman Laos, the Kien-long of the Siamese Laos, the Mekong or Namkong in Siam, and the Cambodia or Sangson in Cambodia. Its probable source is at an elevation of 15,000 or 20,000 feet, and its current above lat. 18° N. is generally rapid and turbulent. Below Khong the fall is so slight that the tides are felt as high up as Pnom-Penh, and sometimes to the extremity of the Great Lake and the foot of the cataracts of Khong. See Desgodin's *Missions du Thibet* (1872); Garnier, *Voyage d'exploration en Indo-Chine* (1873).

MARK W. HARRINGTON.

Mekran′, or **Makran′** (anc. *Gedrosia*): geographical name of Persian origin for the coast regions of Southwestern Baluchistan and Southeastern Persia. It is an arid and desolate region, traversed by chains of bare, rocky, or sandy hills running parallel to the coast, without permanent rivers. The climate is hot, and severe fevers are common. It is very sparsely inhabited, and is about equally divided between Baluchistan and Persia. It is inhabited by many mutually independent and jealous tribes.

M. W. H.

Me′la, POMPONIUS: geographer; b. at Tingentera in Spain; flourished in the first half of the first century of our era. He was the first Latin writer who composed a formal treatise on geography. His work, *De Chorographia Libri III.*, is still extant, though the text has suffered much. The first edition was published at Milan (1471); the best editions are those by Tzschucke (Leipzig, 1807), by Parthey (Berlin, 1867), and C. Frick (Leipzig, 1880). There is an English translation by Arthur Golding (London, 1585).

Revised by M. WARREN.

Melamet, DAVID: composer; b. in Prussia in 1861; was celebrated while a boy for his fine soprano voice, and made a concert tour when twelve years old. He studied in Berlin under Kullak, Tiersch, and Becker, and became a singer and chorus-conductor. He removed to New York in 1888, and became director of the Germania Männerchor. In 1889 he succeeded Fritz Fincke in Baltimore. In 1892 he won, with his *Columbus*, the prize which had been offered for the best cantata for the German Columbian celebration in New York.

D. E. HERVEY.

Melam′pus (in Gr. Μελάμπους): son of Amythaon and Idomene, and brother of BIAS (*q. v.*). In front of his house in the country stood an oak-tree in which a snake had built its nest. Servants killed the mother-snake, whose body Melampus reverently burned. The young snakes he reared as pets. In return therefor, as Melampus slept, the young snakes licked out and purified his ears, so that upon awaking he found that he understood the language of the birds, who thereafter instructed him in the prophetic art. After an interview with Apollo in the valley of the Alpheus, he became the most distinguished of soothsayers. See BIAS, PERO, PHYLACUS, and IPHICLUS.

J. R. S. STERRETT.

Melancholia: a form of emotional insanity. See INSANITY and DOUBTING INSANITY.

Melanch′thon (sometimes **Melanthon**), PHILIP: reformer and theologian; b. in Bretten, now in the grand duchy of Baden, Feb. 16, 1497. His father, George Schwarzerd (literally "Black earth," of which Melanchthon is simply the Greek translation), was a skillful and eminent manufacturer of military arms, who by his trade had attained a competency, and by his private virtues and decided religious character was widely known. His mother, Barbara Reuter, was the daughter of the burgomaster of the village. His grandmother was the sister of the renowned humanist John Reuchlin. From his earliest childhood he enjoyed rare advantages for instruction—first, under the supervision of his grandfather, and afterward of Reuchlin, who, in recognition of his attainments, translated his German name into Greek. Entering the University of Heidelberg in his thirteenth year, he resided with one of the professors, and was known familiarly among his fellow students as "the Grecian." Notwithstanding the distraction of private teaching, he took the degree of bachelor of arts when only a few months over fourteen. During this period he wrote his Greek grammar, published several years later. His ambition received a check the following year, when, notwithstanding his acknowledged attainments in scholastic philosophy, he was refused the degree of master of arts solely because of his extreme youth. This, with the insalubrity of the climate, from which he was suffering, determined his transfer in 1512 to Tübingen, where, after pursuing a wide range of studies—including Greek and Latin literature, philosophy, history, jurisprudence, medicine, and theology—he received his master's degree in 1514, and immediately began to lecture on the classics. In 1516 he published an edition of Terence, and for some years was a corrector of the press for publications of Reuchlin and others. In 1518 he declined calls to both Leipzig and Ingolstadt, and accepted a call, given on Reuchlin's recommendation, to Wittenberg. His youthful appearance caused much disappointment, until he delivered his inaugural address *On Matters to be Corrected in the Studies of Youth*, which completely won the hearts of his hearers, especially Luther. In his enthusiasm, Luther wrote: "I desire no other teacher of Greek so long as he lives." His lecture-room was continually crowded with eager students, the number frequently rising as high as 2,000. He enkindled much interest among the theologians in the study of Greek. His association with Luther led him constantly more deeply into the study of theology. In 1519 he accompanied Luther to the Leipzig Disputation, and, although only a spectator, became involved in a controversy with Dr. John Eck, when his letter to Œcolampadius, reporting the discussion, was published. During the same year he received the degree of B. D. He was gradually led to the work of a theological professor by his lectures on the New Testament writings. With great modesty he always protested that his sphere was that of the philologist and expounder of the classics rather than that of the theologian; but the demands of students, as well as of Luther, determined that he should especially devote himself to theology. His lectures on the Epistle to the Romans were published, without his knowledge, by Luther in 1522; but before they were published his prolegomena to the same lectures, as delivered to his students, had led to the publication of a small volume that proved to be the foundation of Protestant dogmatical theology. Recognizing the frequent recurrence of many of the same terms in the Epistle, he had prepared definitions of a number of them. Their publication by his pupils, in an imperfect form and without his knowledge and consent, demanded that an authorized edition should be prepared. This resulted in the *Loci Communes rerum theologicarum* of 1521. In them may be seen Melanchthon's great skill in presenting in the clearest and most accurate form the material derived from Luther. The latter declared that the book had more solid doctrine in it than could be found in any work since the days of the apostles, and that it was worthy of canonical authority. Melanchthon saw more than sixty editions issued from the press. He subjected it to two radical revisions. The former was in 1535 and the latter in 1543, the most noticeable variation being in the change concerning the freedom of the will, since he passed from the most absolute determinism in the edition of 1521 (*tollit itaque omnem libertatem voluntatis nostræ divina prædestinatio*) to the assertion of a synergism of the human will in conversion, that advanced in decision, until in 1548 he taught *Liberum arbitrium est in homine facultas applicandi se ad gratiam.* Other changes were determined either by his conciliatory attitude toward the Reformed or his willingness to compromise with a modified form of Roman Catholicism, as proposed in the *Interim* of 1548. The *Loci* in their three chief editions (Latin and German) are published with full introductions in vol. xxi. of Bretschneider and Bindseil's *Corpus Reformatorum.*

Besides his activity as professor and author, Melanchthon was more prominent even than Luther in what may be called ecclesiastical diplomacy, for which Luther's ardent temperament and directness unfitted him. His greatest work in this direction was his composition of the Augsburg Confession, upon the basis of material provided by him and Luther in common, and with Luther's revision and advice. (See Augsburg Confession.) The Apology of the Augsburg Confession and the appendix to the Smalcald Articles are also from his pen. He participated in the Diet of Spires of 1529 and the Marburg colloquy of the same year. Among other ecclesiastical conferences in which he was prominent were those with the representatives of the Church of England at Wittenberg in 1536, and in the same year with Baur and his associates, resulting in the Wittenberg Concord, in the Diet of Ratisbon (Regensburg) in 1540, and the Reformation of Cologne in 1543. He was entirely unequal to the occasion when, during Luther's absence at the Wartburg in 1521, religious disturbances arose at Wittenberg. Melanchthon in this sphere showed much vacillation, and was influenced by current events. This was particularly observable in his revisions (1540 and 1542) of the Augsburg Confession. Always desirous to improve his statements of doctrine, he seems to have not always discriminated between what he had written as a private theologian and what had been prepared for others to sign, and thus to become the confession of churches. The changes made in the Augsburg Confession, chiefly to make it more acceptable to the Reformed, led to the distinction between the *Invariata* and *Variata*, and occasioned violent controversies in the Lutheran Church. In a similar way, after Luther's death in 1546, when Lutheranism was in extreme peril as the result of the calamities of the Smalcald war, he was ready to concede the use of rites that had become distinctive of Roman Catholicism to secure the continuance of what he deemed evangelical teaching.

The frequent correspondent and adviser of Cranmer in his reformation in England, and the occasional correspondent of King Henry VIII. himself, he was repeatedly called to England, but declined. His influence, however, pervades the *Prayer-book*, the *Articles*, and the *Homilies*.

His last years were burdened with domestic afflictions, as well as by the disturbed condition of the Lutheran Church. He longed to be delivered from what he called the *rabies theologorum*. He died Apr. 19, 1560.

While Melanchthon was eminent as a classical scholar and as a lecturer and writer on philosophy, his chief distinction must always be as a theologian. This rests not upon any extensive investigations or attempts to solve difficulties, but almost entirely upon his extraordinary ability to state any truth presented for consideration in the clearest and simplest form. As Plitt remarks (*Einleitung in die Augustana*, i., 537), he was no systematic theologian in the proper sense of the term; instead of dealing with difficulties, he always sought to evade them; whatever the subject he undertook to treat, he presented it with transparent clearness. This has been stated in the often-quoted sentence, "Luther, the miner's son, dug the pure ore of truth out of the mountain, and Melanchthon, the armorer's son, forged it into a bright weapon." The misfortune of Melanchthon often forced him into positions in which he felt his weakness, and which were uncongenial to him. When there was no creative genius with a more powerful will to determine his course, as when he was by the side of Luther, his skill in what was purely formal did not protect him from errors in the material. Melanchthon, in turn, exerted much influence upon Luther. They supplemented each other. "If Luther was able to kindle, to rouse and elevate, and even ravish the heart, it was through Melanchthon's cooperation that the effect he produced received its abiding power, outlasting the change of moods; and thus what Luther gave was incorporated with the daily life, with quiet Christian enlightenment. In Melanchthon, Luther, the man of the people, had placed by his side the fine architectural and organizing spirit, who, gifted with a delicate moral tact, a circumspect and dialectic mind, and a power of unadorned but transparent and convincing representation, had the skill to give to the matter, born at first in the heart of Luther, an objective shape and the stamp of validity. Melanchthon, in particular, was the medium of extending the Reformation to the educated classes, to statesmen and learned men, who might easily have failed to recognize in Luther's sturdy language the matter that was of saving virtue to them." Dorner's *History of Protestant Theology*, Eng. transl., i., 116, *seq.*

The writings of Melanchthon fill twenty-four folio volumes of the *Corpus Reformatorum* (Halle, 1834–60). The first nine volumes contain his letters, to which Bindseil added in 1879 a volume of letters that were not included. These volumes are accompanied by the *Annales Vitæ*, a most minute chronological table of the chief events of his life. His biographies begin with that of his most intimate friend, Camerarius, 1566. Among the more recent are those of Köthe (1829), Matthes (1841), Ledderhose (1847), E. Schmidt (1861). In English we have Cox (1835) and Krotel's translation of Ledderhose (1855). See also Herrlinger's *Melanchthons Theologie* (Leipzig, 1879); Hartfelder's *Philip Melanchthon als Præceptor Germaniæ* (Berlin, 1889). See also German Theology.

Henry E. Jacobs.

Melanes'ia: one of three great ethnographic divisions of Oceania, being the part occupied by peoples with a black skin, while the natives of Micronesia and Polynesia are lighter in color. The Melanesian archipelagoes are, in order from the N. W. to the S. E., Bismarck Archipelago, the Solomon islands, the Santa Cruz islands, the Tucopia group, the New Hebrides, New Caledonia and the Loyalty islands, the Chesterfield islands, and finally the Fiji islands, where the population is so mixed with Polynesian that it may be indifferently attributed to Melanesia or Polynesia. The total area of these islands is 56,300 sq. miles, and the combined population 642,300, or about twelve persons to the square mile. The population of New Guinea or Papua is on the whole nearly allied to the Melanesians. If this is included the total area becomes 358,300 sq. miles, and the population 1,150,000. The Melanesians are closely allied to the Negritos, though there are great differences in language. They differ physically from the Polynesians, though there are striking resemblances in customs and languages. Probably considerable intermixture has taken place with the latter. The Melanesians are ugly, especially the women, but muscular, and good workmen. They have some simian characters fairly well pronounced; woolly but not crinkled hair; hairy bodies; narrow shoulders, and slender arms and legs, but large hands and feet; color a deep brown. They are less thievish than the Polynesians, and more energetic, though inferior in the making of weapons and canoes and in the art of navigation. See Coddrington, *The Melanesian Languages* (1885) and *The Melanesians: Studies in their Anthropology and Folklore* (1891).

Mark W. Harrington.

Melani'idæ [Mod. Lat., named from *Mela'nia*, the typical genus, from Gr. μέλας, μέλανος, black]: a family of fresh-water gasteropod molluscs in which the usually long or conical shell is covered with a thick, dark-colored epidermis. The foot is large, the proboscis short and stout, and the eyes near the base of the tentacles. The species are very numerous, especially in Southern Asia and in the Mississippi valley. Almost nothing is known of the structure or development of the various forms.

J. S. K.

Melanip'pus (in Gr. Μελάνιππος): son of Astacus of Thebes, who, when the Seven Heroes were attacking Thebes, was stationed by Eteocles opposite to Tydeus, whom he wounded mortally. Later in the fight Amphiaraus killed and beheaded Melanippus. Amphiaraus blamed Tydeus mostly for the war, upon which he had entered against his will, because he foreknew its issue. He therefore bethought him of a terrible vengeance. Being a seer, he knew that Athene was hastening from Olympus in order to cure Tydeus and make him immortal. In order to prevent this Amphiaraus gave the head of Melanippus to Tydeus, who still had strength enough to split open the skull and drink the brains, a deed which caused Athene to shrink back in horror. Amphiaraus was avenged, and Tydeus died.

J. R. S. Sterrett.

Mel'anism [from Gr. μέλας, -ανος, black]: a term used to denote the assumption of an abnormally dark or even black phase of color among animals; the opposite of albinism. It appears to be of such frequent occurrence in some animals, e. g. the rough-legged buzzard (*Archibuteo sancti joannis*) and black variety of the gray squirrel (*Sciurus carolinensis*), as to almost amount to Dichromatism (*q. v.*), while in others it is infrequent.

F. A. L.

Melanite: See Garnet.

Melan'thus (in Gr. Μέλανθος): son of Andropompus and King of Messenia. He was driven out of Messenia by the Heraclidæ, and took refuge in Attica. Xanthus, the King of Bœotia, was pressing the cowardly Thymœtus, the last King of Athens of the race of Theseus, and challenged him

to a duel for the possession of the town of Œnoë on the Bœotian frontier. Thymœtus refused to fight, but Melanthus took his place, and by the help of Dionysus killed Xanthus. Melanthus became King of Athens. In honor of the victory over Xanthus a sanctuary was erected to Dionysus Melanægis, and the festival of the Apaturia was established in honor of Zeus Apaturios. J. R. S. STERRETT.

Melba, NELLIE: See the Appendix.

Mel'bourne: the capital of the colony of Victoria, Australia; on the Yarra-Yarra river, 9 miles above its mouth in the basin of Port Philip; in lat. 37° 50′ S. and lon. 144° 57′ E. It was founded in 1837. In 1847 it had 10,955 inhabitants, and became the see of a bishop. In 1851 it had 20,400 inhabitants, and became the capital of the newly formed colony of Victoria. It had in 1891 491,378 inhabitants, nearly half of the population of the entire colony. This marvelous growth is mostly due to the discovery in 1851 of the gold-fields at Mt. Alexander and Ballarat, from 60 to 70 miles from Melbourne. Dec. 31, 1895, its population, including suburbs, was 452,258. In 1852 the shipping amounted to 1,657 vessels, of 408,000 tons burden. In the same year the value of imports rose from £1,056,000 to £4,044,000, and in 1853 to £14,000,000. In 1891 2,034 vessels, of 2,222,805 tons burden, entered, and 1,988, of 2,139,333 tons, cleared. In the same year the total value of imports amounted to £16,949,393, and that of exports to £14,558,658. The situation of Melbourne is very fine. Although the Yarra-Yarra does not admit large sea-going vessels on account of the bar at its mouth, railways have been constructed between Melbourne and Fort Philip, which is on a beautiful inlet of the Indian Ocean, safe and deep. The streets are all paved and provided with gas, electricity, and water. It is distinguished for its university, mint, museum, observatory, public library, hospital, and public gardens, and is an Episcopal see. M. W. H.

Melbourne, WILLIAM LAMB, Viscount: statesman; b. at Melbourne House, Derbyshire, England, Mar. 15, 1779; was educated at Eton and Cambridge; studied politics and jurisprudence at Glasgow; was called to the bar at Lincoln's Inn Nov. 23, 1804; entered Parliament and married Lady Caroline Ponsonby 1805. He attached himself to the Whig party, and continued a moderate opposition to the administrations of Perceval and Lord Liverpool; became Chief Secretary for Ireland on the accession of the Canning ministry Apr., 1827; succeeded to the title on the death of his father July 22, 1828; was a distinguished advocate of Catholic emancipation and of parliamentary reform; became Secretary of State for the Home Department in Earl Grey's cabinet Nov., 1830, and on the retirement of the latter July 9, 1834, succeeded him as First Lord of the Treasury and Premier; was dismissed in November of that year, but recovered his place in Apr., 1835, through the support of the House of Commons, and retained his position until Aug. 30, 1841. He was therefore the responsible head of the British Government at the accession of Queen Victoria and during the first four years of her reign, and contributed much to the education of his young sovereign in her royal duties. D. at Melbourne House, Derbyshire, Nov. 24, 1848.—His wife, CAROLINE PONSONBY, known in literature as Lady CAROLINE LAMB (she died before he succeeded to the title), a daughter of the Earl of Bessborough, b. Nov. 13, 1785, acquired great celebrity through her romantic attachment to Lord Byron, and her subsequent bitter quarrel with him. She wrote three novels—*Glenarvon* (1816); *Graham Hamilton* (1820); and *Ada Reis* (1823). D. in London, Jan. 25, 1828. See Torrens, *Memoirs* (1878); *The Greville Memoirs* (1875–85); and Justin McCarthy, *History of Our Own Times* (1878–80).

Mel'chites (royalists, Gr. Μελχίτης, from Semit. *melek*, king): (1) a name applied to the orthodox Christians of Egypt to distinguish them from the Jacobites (monophysites). The term was first employed in the fourth century, but especially after the Council of Chalcedon (451 A. D.), as a term of reproach, because of the charge that the decrees of the council were received simply because of the royal edict of the Emperor Marcian. Under the Mohammedan caliphs the term was taken to imply allegiance to the Eastern emperors, and still later to indicate Greek or foreign sympathies. In both cases it was an occasion for oppression to the orthodox, who were few in numbers. (2) An Eastern, Arabic-speaking branch of the Roman Church, worshiping according to the rites and ceremonies of the Eastern or Greek Church, but acknowledging the supremacy of the Roman see. The sect is found principally at Aleppo and Damascus, its patriarch residing at the latter place. It is supposed to have originated from the labors of Jesuit missionaries in the seventeenth century. It was found that the people were unwilling to abandon the customs of the Greek Church, and these they were allowed to retain in consideration of their acknowledgment of the authority of the Roman pontiff and acceptance of Roman doctrine. The laity partake of the sacrament in both kinds, using unleavened bread, and are allowed free use of the Scriptures; deacons and priests are allowed to marry before ordination, but bishops must be celibate. Their number has been estimated at between 30,000 and 40,000. C. R. GILLETT.

Melchizedek, mel-kiz'e-dek, or **Melchisedec** [= Lat. = Gr. Μελχισεδέκ, from Heb. *Malki-tsedhek*; liter., king of righteousness]: King of Salem and priest of the most high God; who met Abraham on his return from the rescue of Lot and slaughter of Chedorlaomer, brought forth bread and wine, and offered a banquet to Abraham and the King of Sodom in the valley of Shaveh, called "the king's dale," in the neighborhood of Jerusalem, after which he blessed Abraham, and received from him tithes of the spoil. (Gen. xiv. 18–20.) Being of unknown origin and end he typified Christ (Ps. cx. 4; Heb. vi. 20, vii. 1–21). Jewish traditions, recorded in the Targums as well as in many cabbalistic and rabbinical writings, identified him with the patriarch Shem, who, according to the current biblical chronology, was still living at that period. This was the prevalent Jewish opinion in the time of Jerome, was adopted by Luther and Melanchthon, and by Selden and Lightfoot among English writers. A sect of Christian heretics, called Melchizedekians, regarded him as an incarnation of the "great power of God," superior even to Christ. Others regarded him as an angel, as the Holy Ghost, or as the son of God, with which conception harmonized a Jewish belief that he was the Messiah. Revised by S. M. JACKSON.

Mele'ager (in Gr. Μελέαγρος): in Greek mythology, a son of Œneus, King of Caledon, in Ætolia, and Althæa, daughter of Thestius, husband of Cleopatra, daughter of IDAS (*q. v.*); a powerful hunter who was distinguished for his skill with the spear. He it was who killed the boar which Artemis had sent to ravage the fields of Caledon because Œneus had neglected to offer up to her a sacrifice. (See CALYDONIAN HUNT, THE). When Meleager was seven days old the Fates announced to his mother that the child would live as long as the stick of wood then burning in the fire was unconsumed. Althæa snatched the brand from the fire and preserved it carefully in a chest, but when Meleager had slain the brothers of Althæa (see ATALANTA) she burned the stick and Meleager expired at once. Thereupon Althæa and Cleopatra hanged themselves, and the sisters of Meleager wept so for his death that Artemis took pity on them and changed them into guinea-fowls (μελεαγρίδες). Ancient artists were fond of depicting Meleager and the Caledonian boar-hunt. A number of statues have come down to us. Chief among them are those in the Berlin and Vatican Museums. See Baumeister, *Denkmäler*, under *Meleagros* for a discussion of Meleager in art. J. R. S. STERRETT.

Meleager (in Gr. Μελέαγρος): poet; was a native of Gadara, in Palestine, and flourished under the last Seleucus, who died in 94 B. C. His first essay was in the line of cynical philosophy, for he was a disciple of his famous townsman, MENIPPUS (*q. v.*), and his satirical dialogues were much read and sedulously imitated; but he is chiefly known as a writer of love epigrams and as the compiler of a collection of short poems called the *Garland* (Στέφανος), made up from the works of some forty poets and arranged alphabetically according to the initial letter of each piece. Of this garland we have only stray flowers, together with the delightful introductory verses in which Meleager characterizes the different poets who were laid under contribution. His own poems, some 130 in number, are among the most attractive in the parterre of the Greek Anthology, except that a large proportion of them require a certain Greek elasticity of moral sense. They have been edited separately by Manso (1786), by A. C. Meineke (1789), and Graefe (1811); and Meleager's merits as a poet have been eloquently brought out by J. A. Symonds, *Studies of the Greek Poets*, c. xxii. See also Walter Headlam, *Fifty Poems of Meleager, with a Translation* (1890), and Susemihl, *Geschichte der alexandrinischen Literatur*, vol. i., p. 46. B. L. GILDERSLEEVE.

Meleagrid'idæ [Mod. Lat., named from *Melea'gris*, the typical genus, from Lat. *melea'gris* = Gr. μελεαγρίς, a kind of guinea-fowl]: a family of gallinaceous birds containing

the turkeys. They have a characteristic form in the large upraised body, long neck, and small head; the head and neck are destitute of feathers, but have scattered "hairs," and are more or less carunculated; an extensible fleshy process is also developed from the forehead; the bill is moderate; the nasal fossæ are bare; the tarsi armed with spurs in the male; the hind toe elevated; the tail (about as long as the wing) is truncate, and has more than twelve feathers. The breast-bone has a long, narrow keel (the "lophosteon") extending far backward, while from near the front on each side, and separated by a very deep notch from the sides of the anterior portion, a wing-like process (the "metosteon") both diverges and extends far backward, but is split into two parts, the external and internal xiphioid processes; the pelvis is peculiar in the extension of the post-acetabular area (or that behind the insertion of the legs), which is greater than the anterior. The family is at present limited to two species—(1) the common turkey, *Meleagris gallopavo*, and (2) the rare and beautiful turkey, *Meleagris ocellata*, of Honduras. The common turkey shows four local races or sub-species—*M. gallopavo*, of the Northern U. S.; *M. gallopavo osceola*, of Southern Florida; *M. g. mexicana*, of the Mexican uplands; and *M. g. elliotti*, of the Mexican lowlands and Southern Texas. The common domesticated bird is a descendant of the Mexican form and not of the common wild one of the U. S., which has even been considered a distinct species. In former geological epochs other species existed within the limits of the present U. S., the remains of two species (*Meleagris altus*, or *superbus*, and *M. celer*) having been found in the Post-pliocene of New Jersey, and of another (*M. antiquus*) in the Miocene beds of Colorado. Revised by F. A. Lucas.

Melegnano, mā-len-yaa′nō: town; in the province of Milan, Northern Italy; on the railway between Milan and Piacenza (see map of Italy, ref. 3-C). This little town is well built, having the aspect of a small city, and its trade in the produce of the neighborhood is very active. Its mediæval history is interesting, and in modern times it has been the theater of two important battles—one in which Francis I. defeated the Swiss mercenaries of the Duke of Milan in 1515, the other the victory of the French and Italian allies over the Austrians on June 8, 1859. Pop. 5,438.

Meléndez Valdez, mā-len′deth-vaal-deth′, Juan: poet; b. at the village of Ribera del Fresno, near Badajoz, Spain, Mar. 11, 1754. After studying the humanities and philosophy at Madrid and Segovia, he went in 1772 to Salamanca to prepare himself for the law. Here he made the acquaintance of the poet Cadahalso, who saw the poetic possibilities in the ballads which the youth had been writing in imitation of Gerardo Lobo. Under the influence of his new friend the young poet attempted to enlarge the range of his verse. In the meantime specimens of his work had come into the hands of Jovellanos, then living in Seville, and a friendly correspondence ensued between the two men. In 1780 he won his first public success with an eclogue, *Batilo*, on the charms of a country life, written for the Spanish Academy's third prize-competition in poetry held by that institution. The delightful freshness of this ("It smelt all of wild thyme"—*olía todo á tomilla*—said one of the judges) made it far superior to the artificial eclogue of his chief rival, Yriarte. In 1781 he went to Madrid and was received with great kindness by Jovellanos and his friends. Invited to write a poem for a brilliant function of the Academy of Fine Arts, he made a great success with his ode *Á las Artes*. In the same year he returned to Salamanca as Professor of the Humanities. This was the happiest and most productive period of his life. In 1784 he gained the prize offered by the city of Madrid for a comedy on the occasion of the celebration of the birth of twin heirs to the throne. The piece offered by him, *Las bodas de Camacho el rico*, founded on an episode in *Don Quixote* (part ii., chap. xx.), is modeled upon the pastoral dramas of Tasso (*Aminta*) and Guarini (*Il Pastor Fido*). When put on the stage it was not a success. In 1785 the author won great applause by a first collection of his poems. Soon after this began the troubled period of his life. He was tempted to take public office, secure as he supposed in the influence of his friends Jovellanos and the Prince of Peace. In 1789 he became judge in one of the courts of Saragossa; in 1791 he was given a place in the chancery of Valladolid; in 1797 he became *fiscal* of the court of alcaldes de Casa y Corte in Madrid. In 1797 also he published a new and much enlarged edition of his poems. The next year his friends in power fell and he with them. After several years of partial disfavor he unwisely attached himself to the new French rulers of Spain, thus bringing upon himself the hatred of his countrymen. In Oviedo on one occasion he was seized by a mob and barely saved from being shot. After the withdrawal of the French he hoped to retrieve himself, but fortune was against him, and in 1811 he fled to Southern France. Here he passed the rest of his life, an unhappy exile, whose only solace was the correction of his poems for a definitive edition. He did not even have the pleasure of seeing this printed, as he died at Montpellier, France, May 24, 1817, some three years before its appearance. Other editions are Paris (1832), Barcelona (1838), and in Rivadeneyra's *Biblioteca de Autores Españoles*, vol. lxiii. (Madrid, 1871). Quintana's *Life* of Meléndez Valdez is printed in vol. xix. of the same *Biblioteca* (Madrid, 1867). Meléndez Valdez is one of the most important figures in Spanish letters of the eighteenth century. A true poet, he surpassed almost all his contemporaries in intellectual culture, as well as in the instinctive perception of what constitutes poetic harmony and proportion. A. R. Marsh.

Meletius: Bishop of Lycopolis, a see which then stood second to that of Alexandria; originator of the Meletian schism of Alexandria, which was occasioned by his audacious assumption of episcopal functions in the see of Alexandria during the absence of its bishop. He was condemned by the Council of Nicæa, 325. He does not seem to have been heretical, but his followers, who were the beneficiaries of his arbitrary acts, became Arians.

Meletius: Bishop of Antioch: originator of the Meletian schism, which lasted from 361 to 381, when he died. Although personally orthodox, he had received ordination from Arian bishops, and was therefore unacceptable to the Catholic party in Antioch.

Mel'fi: town; in the province of Potenza, Southern Italy; lying in a most fertile region, about 28 miles from the town of Potenza (see map of Italy, ref. 7-G). The commerce and industry of this place are considerable. Melfi was a large town in 304 A. D., and its mediæval story is one of the most stormy of these turbulent times. In 1528 the French general Lautrec de Foix took Melfi after an obstinate resistance, and slew 18,000 of its inhabitants. It suffered from earthquakes in 1456, 1694, and 1851. Pop. about 11,760.

Melgar, māl-gaar′, Mariano: poet; b. at Arequipa, Peru, 1791. Disappointment in love gave a melancholy cast to his mind, and his verses are nearly all of a plaintive character. Many of them have been set to music, and they are among the most popular songs of the Spanish-American country people. Melgar joined the patriots during Pumacagua's rebellion, was taken prisoner by the Spaniards at the battle of Umachiri, and shot at Cuzco, Mar. 10, 1815. H. H. S.

Melgarejo, māl-gaă-rā′hō, Mariano: soldier and politician; b. at Cochabamba, Bolivia, in 1818. He rose from the ranks by skill and reckless daring, but was a hot-headed and unprincipled partisan, and during twenty years was involved in revolutions with almost every Bolivian president. In Dec., 1864, he succeeded in overthrowing the government of his brother-in-law, Gen. Achá, and had himself proclaimed president, or, practically, dictator. Counter revolutions at once began. In 1865 the insurgents occupied La Paz, but were beaten, and Melgarejo shot with his own hand ex-President Belzú, his rival (Mar., 1866). In 1865 he joined in the alliance against Spain, and in Aug., 1866, signed a boundary treaty with Chili, which, however, was not ratified by congress. Constant revolts ended in a great rebellion of the Indians against Melgarejo's tyranny. He was beaten in a hot battle in the streets of La Paz (Jan. 15, 1871), fled the country, and was killed at Lima, Peru, by his son-in-law, Gen. Sanchez, in a quarrel, Nov. 23, 1872. H. H. Smith.

Melicer'tes (in Gr. Μελικέρτης): son of Athamas and Ino, who fled with him in her arms when she was being threatened with death by Athamas because of her attempt to murder Phrixus and Helle, children of Athamas by Nephele. Ino leaped from the Scironian rocks into the sea with Melicertes still in her arms. Both mother and son escaped unhurt, and were changed into sea divinities, who were worshiped especially at Megara, on the Isthmus, and at Corinth. Ino was worshiped as Leucothea, and Melicertes as Palæmon. The Isthmian games, which were held in honor of Poseidon, were thought to have been first held on the occasion of the funeral of Melicertes. Melicertes is the Greek form of the Phœnician Melkart. J. R. S. Sterrett.

Melikoff, more properly **Loris-Melikoff**, Michael Tarielovitch, Count: soldier and statesman; b. at Lori, a town of Transcaucasia, Jan. 1, 1826, of Armenian descent; entered the army as colonel; commanded a regiment of light cavalry in the Crimean war, and was adjutant-general to the Grand Duke Michael, who commanded the army of the Caucasus, in 1877. Ardaban was taken in May and Kars in November, and after the war Loris-Melikoff was made a count. He still more distinguished himself as governor of Astrakhan by his measures against the plague, and as governor of Kharkov by his measures against the Nihilists. After the crisis of Feb. 17, 1880 (the blowing up of the dining-room in the imperial palace of St. Petersburg), he was made the chief of an extraordinary commission, with almost unlimited power, and afterward Minister of the Interior. D. at Nice, Dec. 24, 1888.

Mel'ilot [Lat. *melilotus*, honey lotus, from its sweet smell]: a name applied to various leguminous herbs of the genus *Melilotus*. *M. officinalis* (common melilot), *M. alba* (sweet clover), *M. cœrulea*, *arborea*, *Messanensis*, and others are cultivated in Europe, but not much in the U. S., as forage-plants. The fiber of some species is useful. These plants possess the rich odor so familiar in "sweet clover." The forage is eagerly eaten by cattle, and is of excellent quality, but is not very abundant.

Melinite: See Explosives (The Picrates).

Meliphag'idæ [Mod. Lat., liter., those belonging to the honey-eating family, named from *Meli'phaga*, one of the genera; Gr. *μέλι*, honey + *φαγεῖν*, eat]: a family of passerine birds, the "honey-suckers," distinguished by G. R. Gray in the following combination of characters: The form is thrush-like; the head well-shaped; the bill more or less long, curved, and usually acute at the tip, which is slightly emarginated; the nostrils placed in a large groove and generally covered by a membranous scale; the tongue is extensile, and furnished at the tip with a pencil of short fibers; the tarsi rather short and strong; the toes more or less long, the outer always united at its base; the tail long and broad. The species are quite numerous, and almost entirely confined to Australia and New Zealand, with the outlying islands; and of the ornis of the former country especially they form a characteristic feature. They vary in size from a large thrush to a small warbler. Gray divides the family into three sub-families—viz.: *Meliphaginæ*, with seven genera; *Melithreptinæ*, with two genera; and *Myzomelinæ*, with four genera.

Melito: Bishop of Sardis; flourished in the third quarter of the second century, and wrote, besides many other works, an apology for Christianity, of which some fragments are found in Routh, *Reliquiæ Sacræ* (vol. i., 113–153), and in Otto, *Corp. Apol. Chr.* (ix., 375–478). The *Apologia Melitonis*, of which a Syriac translation was discovered by Tattam and printed in Syriac by Cureton, with an English translation, *Spicilegium Syriacum* (London, 1855), is generally ascribed to Melito of Sardis, but on doubtful grounds. See Harnack, *Texte und Untersuchungen zur Geschichte der altchristlicher Litteratur* (Leipzig, 1882, vol. i., 240–278; Eng. trans. of the *Apology* and fragments in *Ante-Nicene Fathers*, vol. viii., 750–762). Revised by S. M. Jackson.

Mell, Patrick Hues, D. D., LL. D.: educator; b. at Walthourville, Liberty co., Ga., July 19, 1814. He spent two years at Amherst College, Mass.; became a Baptist minister, and soon after the organization of Mercer University by the Baptist convention of Georgia he became Professor of Ancient Languages in that institution. In 1857 he was called to the same chair in the State University; subsequently became vice-chancellor; resigned in 1872, but retained a professorship. For fifteen years he was president of the Georgia Baptist convention, and for nine years president of the Southern Baptist convention. Dr. Mell published several works which have been highly valued and extensively circulated—one on *Baptism*, one on *Corrective Church Discipline*, one on *Predestination*, an *Essay on Calvinism*, an *Argument on the Subject of Slavery*, a sermon on *God's Providential Government*, a treatise on *Parliamentary Practice*, and *Prayer as Related to Providence*. D. at Athens, Ga., Jan. 26, 1888.

Mellarosa: See Bergamot.

Mellon, Harriet: See St. Albans, Duchess of.

Me'lo, or **Mello**, Francisco Manoel. de: soldier and writer; b. at Lisbon, Portugal, Nov. 23, 1611; was educated by the Jesuits; rose to the rank of colonel in the Spanish army (Portugal being then subject to Spain), serving in the Netherlands and in Catalonia against the rebels who attempted to establish a separate kingdom. Of this movement he wrote (in Spanish) a history which has taken rank as a classic, *Historia de los movimientos, separación y guerra de Cataluña en tiempo de Felipe IV.* (Lisbon, 1645; published under the name *Clemente Libertino*; ed. by Ferrer, 2 vols., Paris, 1826–32; also in *Historiadores de sucesos particulares*, Madrid, 1851). He entered the service of Portugal when it declared its independence; was imprisoned nine years through the enmity of a powerful nobleman, who charged him with the murder of Francisco Cardoso, and spent many years in exile in Brazil. Through the intercession of the French court he was allowed to return to Lisbon, where he busied himself with literary work. D. at Lisbon, Oct. 13, 1665. He wrote a multitude of works, chiefly in Portuguese—enough to fill a hundred volumes, it is said—embracing essays, satires, poems, tragedies, and farces, few of which have been published, as well as historical works relating to Portugal and Brazil. His satirical poems, *Las tres musas de Melodino* (Lisbon, 1649), show the influence of his friend Quevedo. Revised by A. R. Marsh.

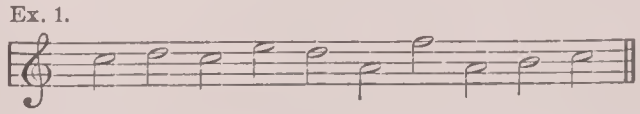
Melodeon: See Reed Instruments.

Melodra'ma [from Gr. *μέλος*, song + *δρᾶμα*, drama, liter., production, deriv. of *δρᾶν*, make, produce]: a name first bestowed upon the opera by Rinuccini, but now more frequently given to a non-operatic play of a semi-tragic or serious character, and marked by sensational, effective, or startling situations, and by exaggerated sentiment.

Melody [from O. Fr. *melodie* < Lat. *melo'dia* = Gr. *μελῳδία*, singing, melody, choral song; *μέλος*, song, tune + *ᾠδή*, song, words of a song]: in music, a connected series of single sounds, so arranged and linked together as to become capable of expressing some sentiment, and stirring up pleasurable, religious, patriotic, warlike, tragic, or other emotions. It is not every succession of sounds that can properly be called a "melody," for sounds in any number may be produced by voice or instrument which are unrelated, devoid of form, rhythm, accent, and symmetrical arrangement, and are therefore unmeaning, and incapable of awakening any feeling other than that of weariness. The music of the ancient Greeks appears to have been of a type not unlike this, however admired and extolled in its own day, when true melody was unborn, and music and noise were nearly akin. To our perceptions the music of the ancients seems to have consisted of a mere succession of intervals, selected without taste and refinement, and laid together without skill, design, or any trace of elegance and inspiration. The fragments that remain to us of such music, while valuable as curiosities and historical relics, are yet so sterile as to yield no indications of that connection of thought and richness in ideas which we look for now in what bears the name of "melody."

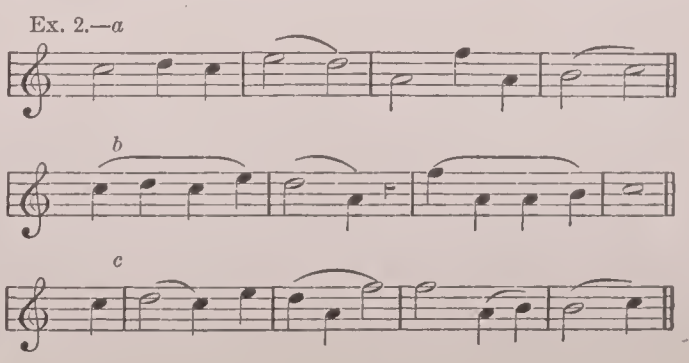
In the conception or formation of melody far more is implied than the mere arranging of several sounds or notes in any haphazard order of succession. Considerations of key and scale, mode, rhythm, time, accent, cadence, and rules affecting the progressions of certain intervals, are all to be taken into account if from any series of notes we would form a melodious strain, having in itself evidence of meaning and design. To illustrate this, we give in Ex. 1 a short train of notes, which, taken just as they stand, express little or nothing:

Ex. 1.



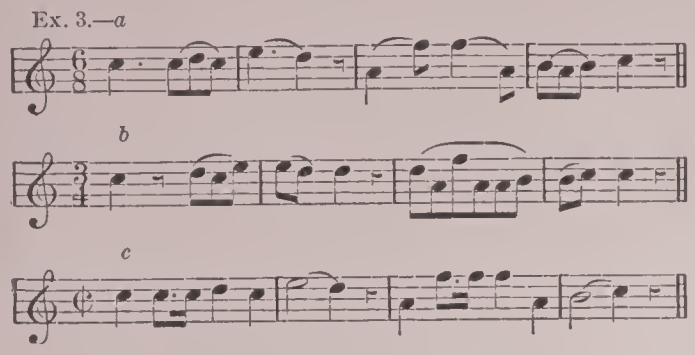
These same unmeaning notes, however, when molded into form and regularity by the application of rhythm, and by various changes of their time-values, as at *a*, *b*, and *c* in Ex. 2, are found to assume more or less of a melodious character:

Ex. 2.—*a*



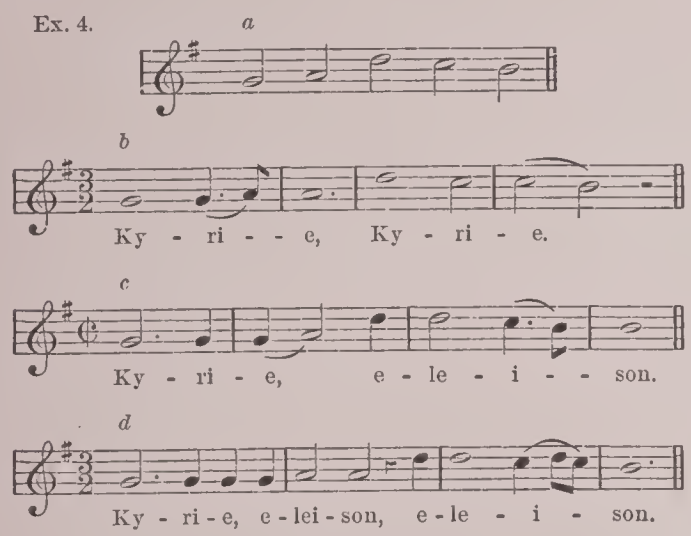
Under still freer treatment, as at *a*, *b*, and *c* in Ex. 3, the dryness of the original notes entirely disappears, and the qualities of a simple but true melody are distinctly apparent:

Ex. 3.—*a*



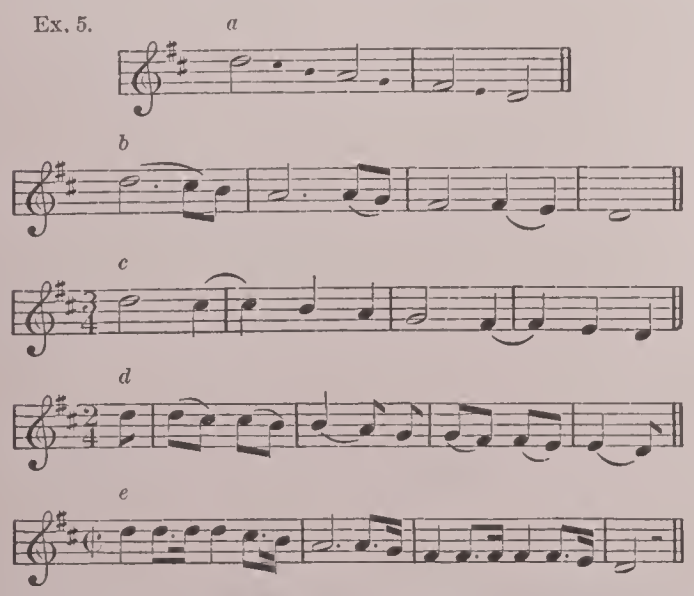
By dint of art and contrivance the most meager and limited series of notes may thus become the origin and source of many melodious ideas and progressions, often interesting and attractive, and suggestive also of still other ideas by the simple laws of association. In Ex. 4, at *a*, see a formula of only five notes, from which the melodies at *b*, *c*, and *d* are derived, and into which they may again be readily reduced:

Ex. 4.



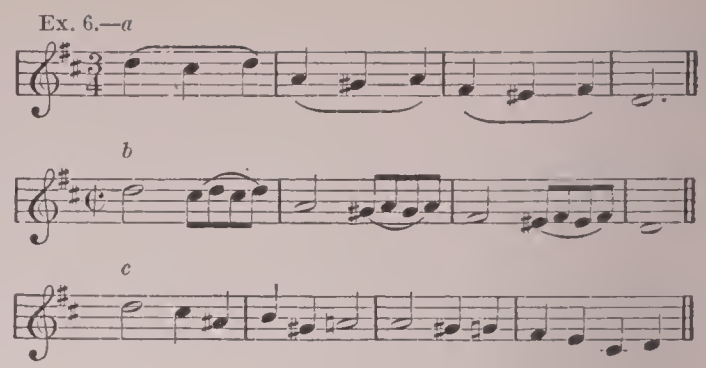
In the derived melodies given in the above examples no other notes have been used than those found in the rough formulas from which they spring. It will be observed, also, that those melodies have been produced chiefly by the addition of *rhythm* and of variations of the *times* of the original notes; but the field of invention is much enlarged, and the process of creating new melodies greatly facilitated, first, by filling up with notes the intervals made by skips in the original sketch, and using such notes as occasion serves. See Ex. 5, where at *a* the notes thus gained are marked by black dots, and several of the melodious forms obtained are shown at *b*, *c*, *d*, and *e*:

Ex. 5.



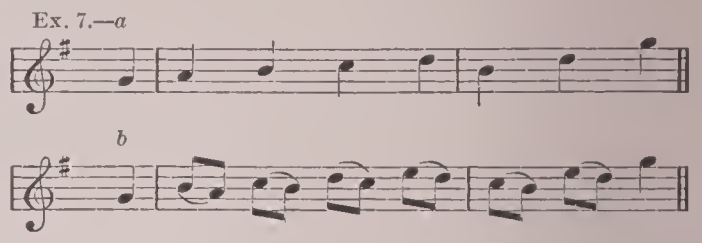
Second, by a judicious use of the semitone *below* any prominent note of the model, in the manner of an accidental leading-note, as in Ex. 6, at *a*, *b*, and *c*.

Ex. 6.—*a*



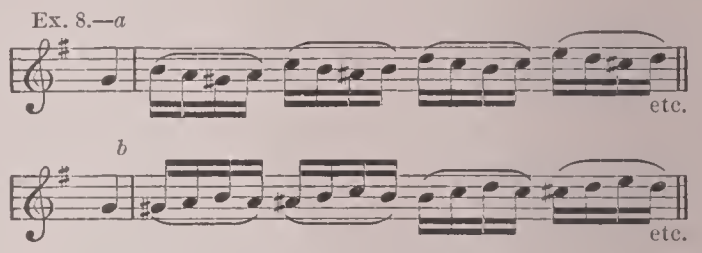
Third, by a similar use of the note *above*, as in Ex. 7, at *b*, where the progression may be compared with the plain notes at *a*:

Ex. 7.—*a*



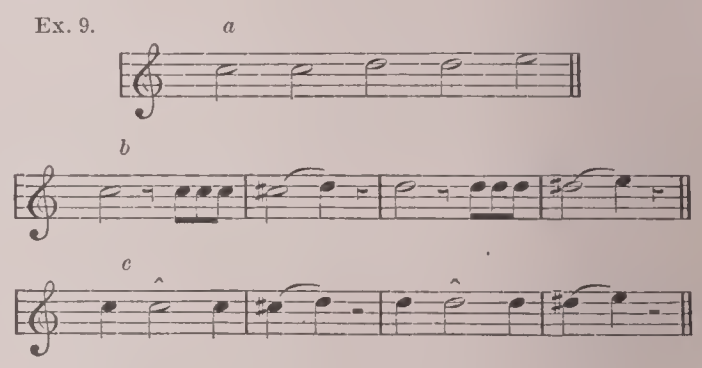
Fourth, by the use of both the note above and the semitone below, by which means the plain notes at *a* in the last example may take such forms as appear at *a* and *b* in Ex. 8:

Ex. 8.—*a*



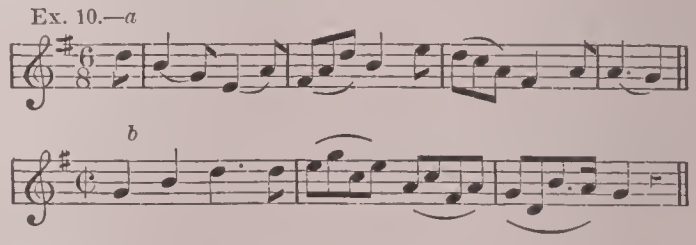
Fifth, by a discriminating use of a lengthened semitonic appoggiatura where the current of the melody naturally suggests it. See Ex. 9, where the plain notes at *a* are cast into form at *b*, and enforced by appoggiaturas. At *c*, the appoggiaturas are accompanied by suspensions and marks of emphasis:

Ex. 9.



Sixth, by the use of harmonic intervals in arpeggio form, either as the prevailing character of the melody, or as a passing relief to the ordinary motion when it consists of direct and contiguous intervals. It is to be observed, however, that as melodies of this kind consist chiefly of broken *chords*, their progressions must be such as are proper to those chords and in conformity with the rules of musical harmony. Instances of such melodies are given in Ex. 10, at *a* and *b*:

Ex. 10.—*a*



The observations thus made on the development of melody are to be taken, of course, rather as hints than rules. Melody is so dependent on the power of imagination and the existence of a creative talent as to render it far less amenable to laws and restrictions than the harmony by which it is accompanied. Revised by DUDLEY BUCK.

Melon [viâ O. Fr. from Lat. *me'lo, melo'nis*, clipped form of *melo'pepo, melopepo'nis* = Gr. μηλοπέπων, liter., apple-melon; μῆλον, apple + πέπων, kind of large melon]: a term applied to the fruits of various plants of the family *Cucurbitaceæ*, especially to *Cucumis melo*, the true melon or muskmelon, and to *Citrullus vulgaris*, the watermelon.

Muskmelons—The muskmelon is probably indigenous to India and adjacent parts of Asia, and there is some reason to suppose that it was also aboriginal in parts of Africa. It is now widely distributed, and it has run into numerous and very diverse forms. In fact, it is one of the most variable of all plants. The most serviceable classification of the many forms will be found to be approximately as follows:

1. *Cucumis melo*, var. *agrestis*, comprising the supposed wild forms of Oriental countries.

2. Variety *cantaloupensis*, the cantalopes, or melons distinguished by hard and more or less scaly, warty, or rough rind, often deeply furrowed. The name is derived from Cantaluppi, a former country-seat of the pope, near Rome, where these melons were early grown from Eastern sources. The cantalopes are prized in the U. S., particularly in the Southern States, where the name is sometimes used generieally (but erroneously) for all muskmelons. There are many cultivated forms.

3. Variety *reticulatus*, the netted melons, eommon in the Northern States, where early melons are essential, and known, as a class, by a more or less finely netted or rugose, but not deeply grooved rind.

4. Variety *saccharinus*, or sugar-melons, comprising a group of oblong melons represented in the U. S. chiefly by the pineapple class.

5. Variety *inodorus*, the seentless or winter melons. These are very little known in the U. S., although they are eommon in parts of Europe. They are hard-skinned green or yellow melons, which ripen late and keep until midwinter. Some of them are of good quality.

6. Variety *flexuosus*, serpent-melon or snake-cucumber. This is a strange variety in whieh the fruit is as long as one's arm and no thicker, with a very small core. It is grown mostly for curiosity, although it is edible.

7. Variety *acidulus*, or eucumber-melons of India, scarcely known in the U. S. The group comprises various sourish fruits of oblong or cylindrical form, yellow or mottled.

8. Variety *dudaim*, the curious Dudaim or Queen Anne's pocket melon, sometimes called vegetable pomegranate. The fruits are the size of a turkey's egg, beautifully mottled with yellow and brown, and exhaling a powerful and delicious perfume. They are grown for curiosity and for scenting wardrobes, but are not edible. This plant is sometimes sold by seedsmen as *Cucumis odoratissimus*.

9. Variety *chito*, the Chito melon, introduced into the U. S. under a variety of names, as vegetable orange, vine-peach, garden-lemon, melon-apple, and the like. The plant is slender, covering but a small space, and the fruits—the size of a hen's egg or an orange—are lemon-yellow with a clear white, slightly acid cucumber-like flesh. The little fruits are used for making pickles or eonserves.

10. Variety *erythræus*, or red Persian melons, not grown in the U. S.

The muskmelon is a popular fruit in North America, where it thrives over a wide territory because of the hot sunny summers. Varieties are grown in the Canadian provinces with entire success. In the year 1889 there were eighty-eight varieties of muskmelons on sale by North American seedsmen. The plant is very impatient of cold, and also of backward and poorly drained or hard soil. The seed should be put in the ground only after the weather is thoroughly settled. For early crops, especially in the northern parts of the U. S., the plants are often started in hotbeds or cold-frames in pots, boxes, or on inverted sods. The soil in which the crop is grown should be very rich and thoroughly tilled. All coarse new manures should be avoided. The plants are allowed to stand in hills, two to four together, 5 or 6 feet apart each way. Two to three pounds of seed is required for an acre. Some of the leading varieties are Nutmeg, Netted Gem, Osage, Hackensaek, Montreal Market, Christiana, and various cantalopes. The supposition that melons and cucumbers will mix when planted together is erroneous.

There are various diseases and enemies of the muskmelon. A downy mildew (*Plasmopara cubensis*) attacks the foliage, and should be treated with Bordeaux mixture. (See Fungicide.) The leaf-spot, due to a fungus of the genus *Phyllosticta*, which also attacks the shoots, can probably be checked by spraying with the Bordeaux mixture. A bacterial trouble, for which no remedy is yet known, is serious in many places. It attacks various parts of plants, but is usually a kind of damping off of the stems when the plants are young. Many insects feed upon the melon, although the plant seems to have no specific enemies. The melon-worm (*Phakellura hyalinitalis*) is confined mostly to the Southern States. The larva, a long green caterpillar, bores through the flesh of the melon. These worms feed upon the leaves while young, however, and in this stage they can be killed by Paris green. (See Insecticide.) The striped beetle (*Diabrotica vittata*), which feeds upon the young plant, can usually be repelled by sprinkling lime or plaster saturated with kerosene oil or turpentine about the plant; or a mixture of lime and sulphur may answer the purpose. If these repellents are not suecessful, Paris green should be sprayed upon the plant.

In 1890 there were 28,477 acres devoted to muskmelons in the U. S. upon the large truck-farms. This acreage was widely distributed, being largest in the Central States E. of the Mississippi, and in the territory tributary to New York city and Philadelphia. In the same year, also, 5,149 acres of muskmelons were grown for seed purposes.

Watermelons.—See Watermelon.

The Chinese preserving melon is the *Benincasa cerifera*, the hairy and resinous fruit of which is used for making conserves.

L. H. Bailey.

Melozzo da Forlì: See Forlì, Melozzo.

Melpom'ene [= Lat. = Gr. Μελπομένη, liter., singer, the singing one, fem. pres. partic. of μέλπεσθαι, sing]: one of the nine Muses—the Muse of Tragedy. As represented by Greek art she bears a mask, Heracles's club, or a sword, is shod with buskins, and wears on her brows a garland of ivy or vine leaves.

Revised by J. R. S. S.

Mel'rose: a village of Roxburghshire, Scotland; 31 miles S. E. of Edinburgh; containing the ruins of the celebrated Melrose Abbey (see map of Scotland, ref. 12–I). A Columbite monastery of Melrose stood at the place now known as Old Melrose, about 1½ miles to the E. of the village; but that building, which was not distinguished by any architectural magnifieence, was destroyed in the ninth century. The present abbey was founded in 1136 by David I., but destroyed in 1322 by the English under Edward II. It was rebuilt in 1326 by Robert Bruce and David II., but suffered severely in 1385 and 1545 by the English, and still more during the Reformation. While standing in its original splendor it was the finest structure in Scotland and a remarkable specimen of Gothie architecture; now it is only a ruin, though the church has been fairly well preserved.

Melrose: city; Middlesex co., Mass. (for location of county, see map of Massaehusetts, ref. 2–H); on the Boston and Maine Railroad; 7 miles N. of Boston. It contains 9 churches, public library founded in 1871, electric lights, public park, 3 public halls, 2 hotels, 2 club-houses, a national bank with capital of $100,000, a savings-bank, a monthly and 2 weekly newspapers, and manufactories of boots and shoes, sewing-machine needles, furniture, etc. Pop. (1880) 4,560; (1890) 8,519; (1900) 12,962.

Editor of "Journal."

Melton-Mowbray, mel'ton-mō'brĕ: a market-town, in the county of Leicester, England: at the confluence of the Wreake and the Eye; 15 miles N. E. of Leicester (see map of England, ref. 9–I). It has large breweries and tanneries, an important cattle-market, and a considerable trade in Stilton cheese. It is the center of a large and celebrated hunting district. Pop. (1891) 6,392.

Mel'vil, or **Melville**, Sir James, of Hallhill: courtier; b. at Raith, Fifeshire, Scotland, about 1535; went to France in early youth as page to Mary Stuart, who was betrothed to the dauphin; was for nine years a gentleman of the household to the Constable Montgomery, and was employed for three years at the court of the elector palatine; traveled in Italy; returned to Scotland when his former mistress had become Queen of Scots, and was appointed by her privy councilor and member of the royal household. He was closely connected with political affairs for several years, but having opposed the queen's inclination in favor of Bothwell after the murder of Darnley, he was obliged to consult his own safety by withdrawal from court. After the overthrow of the queen's party Melvil returned to court, enjoyed the confidence of the four suecessive regents who governed the country during the minority of the heir, and when King James assumed the direction of affairs was appointed a

privy councilor. When James succeeded to the throne of England, Melvil retired to his estate at Hallhill, where he died Nov. 13, 1617. His name had been nearly forgotten, when in 1660 a collection of manuscripts left by him was discovered in Edinburgh Castle, and found to contain important data concerning the reigns of Mary and James. They were published in 1683 by George Scott, under the title *The Memoirs of Sir James Melvil of Hallhill, containing an Impartial Account of the most Remarkable Affairs of State during the Last Age, not mentioned by Other Historians*, etc. This edition was incomplete; the first perfect edition was published in 1827–33 by the Bannatyne Club, which also printed Melvil's *Diary* (1829).

Melville: an island of British North America; situated in the Arctic Ocean between lats. 74° and 77° N., and between lons. 105° and 117° W., bounded W. by Fitzwilliam and Kellet Straits, S. E. by Melville Sound, and S. W. by Banks Straits. It was discovered in 1819 by Capt. Parry, who wintered here with his crew, and further explored in 1851 by Lieut. McClintock.

Melville, Andrew: clergyman and educator; b. at Baldovy, near Montrose, Scotland, Aug. 1, 1545; was educated at the University of St. Andrews, which he left in 1564 with the reputation of being "the best philosopher, poet, and Grecian of any young master in the land"; studied law and theology in Paris and elsewhere on the Continent; became a teacher at Poitiers (1566), and afterward (1569–74) was professor at Geneva, through the influence of Beza. Returning to Scotland in 1574 he was appointed principal of the University of Glasgow. In 1580 he was made principal of St. Mary's College, St. Andrews. In 1582 he preached the opening sermon before the Presbyterian General Assembly, boldly attacking the interference of the court with religious liberty, and headed a deputation which presented a remonstrance to King James at Perth. He was moderator of the General Assembly in 1587, 1589, and 1594; was made rector of the university in 1590; and was recognized as the most prominent member of the Scottish National Church. In May, 1606, James being King of England, Melville was summoned to London with other Presbyterian divines to confer upon Scottish ecclesiastical matters, and, having denounced the Archbishop of Canterbury for encouraging popery, was committed to the Tower 1607, where he remained four years. In 1611 he was released at the request of the Duke of Bouillon, who appointed him Professor of Theology at Sedan, where he died in 1622. He published a number of Latin poetical paraphrases of portions of the Bible, the best of which, the *Song of Moses*, is accounted an elegant production. His epigrams were very neat, and sometimes brought him into trouble, especially one written in ridicule of the chapel services at King James's English court. See his *Life* by Dr. Thomas McCrie (Edinburgh, 1819; 2d ed. 1823). Revised by W. J. Beecher.

Melville, George John Whyte: novelist; b. near St. Andrews, Scotland, 1821; entered the army in 1839; became captain in the Coldstream Guards 1846, and retired in 1849, but served again in the Turkish cavalry during the Crimean war. He wrote several novels, which became popular in both Great Britain and the U. S.; among them are *Captain Digby Grand* (1853); *Holmby House* (1860); *The Gladiators* (1863); *Sarchedon* (1871); and *Katerfelto* (1875). He also published a translation of the *Odes* of Horace and a volume of *Songs and Verses*. D. Dec. 5, 1878. Revised by H. A. Beers.

Melville, George Wallace: engineer-in-chief U. S. navy; b. in New York city, Jan. 10, 1841; was educated in public schools in New York, N. Y., and at the Brooklyn Polytechnic Institute; served an apprenticeship in an engineering establishment in Brooklyn; entered the U. S. navy July 29, 1861, as third assistant engineer; became chief engineer in 1881; and engineer-in-chief of the navy 1887, and was reappointed in 1891 for a term of four years. In the latter position he has contributed largely to the building up of the new U. S. navy. The most remarkable of his designs as an engineer is that of the triple-screw machinery for two swift cruisers. He has also developed a plan for increasing the speed of ships by lengthening the smoke-stacks. During the civil war he frequently volunteered for desperate service. In 1879 he joined the Jeannette expedition. (See De Long, George Washington.) After the Jeannette was crushed in the ice and he had conducted the crew of his own boat to safety, Melville conducted a search, amid the greatest hardships, for the crews of other boats. The story of this experience is told in his book *In the Lena Delta* (Boston, 1885). For his heroic conduct in these circumstances Congress in 1890 passed a special act advancing him one grade. C. H. Thurber.

Melville, Herman: novelist; b. in New York, N. Y., Aug. 1, 1819; shipped as a common sailor when eighteen years old; deserted in 1842 from a whaling-ship at the Marquesas islands, remaining four months a prisoner in Typee (Taipi) Valley, Nukaheva; escaped, and returned in 1844 to the U. S. He published *Typee* (1846); *Omoo* (1847); *Mardi* (1849); *Redburn* (1849); *White Jacket* (1850); *Moby Dick* (1851); *Pierre* (1852); *Israel Potter* (1855); *The Piazza Tales* (1856); *The Confidence Man* (1857); *Battle Pieces and Aspects of the War*, poems (1866); *Clarel*, a poem (1876); *John Marr and Other Sailors*, a story, privately circulated (1888); *Timoleon*, poems (1891). He married a daughter of Chief Justice Shaw of Massachusetts in 1847. In 1850 he removed from New York to Pittsfield, Mass. In 1860 he made a voyage around the world, and on his return held for some time a post in the New York custom-house. D. in New York, Sept. 28, 1891. Revised by H. A. Beers.

Membranous Angina: See Diphtheria.

Membré, măăn'brā', Zénobe, or Zenobius: missionary; b. in Flanders in 1645; entered the Franciscan order; went as a missionary to Canada in 1675; accompanied La Salle upon his expedition to the Western rivers 1679; remained at Fort Crèvecœur, on Lake Peoria, with Tonty, whom he aided in effecting a peace between the Iroquois and Illinois Indians; descended the Mississippi with La Salle 1681; returned to France the same year; wrote a narrative of the expedition, which was published by his cousin, Chrétien Le Clercq, in his work *Établissement de la Foi dans la Nouvelle France* (1691); became warden of a convent at Bapaume, France; returned to North America; accompanied La Salle in his final expedition to Texas by sea 1684, and remained in Fort St. Louis on Matagorda Bay, where, with other colonists, he was massacred by the Indians in Jan., 1689. Membré's narrative is based upon the official report of La Salle. It was plagiarized by Hennepin (1697), and by some authorities is ascribed to La Salle himself. See Parkman, *The Discovery of the Great West* (Boston, 1869); Sparks, *Life of La Salle* (Boston, 1844).

Memel, mā'mel: town of Prussia, founded in 1252; on the great fresh lagoon called the Kurisches Haff; 70 miles N. N. E. of Dantzic (see map of German Empire, ref. 1–K). It has a large and safe harbor, considerable ship-building, manufactures of ropes, sailcloth, and linens, distilleries, breweries, and iron-foundries, and a very important trade in corn, hemp, flax, timber, and amber. Pop. (1891) 19,282.

Memlinc, John: painter; b. at Damme, near Bruges, in 1450; date and place of death unknown, as also where he learned his art. He was a soldier for some time, and was taken into the hospital out of charity, in return for which he left to it his *Adoration of the Shepherds*, one of his finest pictures. He lived at Bruges, where he painted a *Virgin and Child with Saints*, a *St. Christopher* carrying the infant Christ across the river, the martyrdom of a saint, a crucifixion with the Virgin, St. John, and other saints; also the *Story of St. Ursula*. All these works are painted in tempera. W. J. Stillman.

Memnon: a name of several persons, the most remarkable of whom was the son of Tithonos and Eos, who after the death of Hector brought the Æthiopians to the assistance of Priam in the war against Troy. His adventures were the subject of the poem by Arktinos called the *Aithiopis*, according to which his armor was made by Hephaistos or Vulcan. Although of dark color, he was distinguished for his beauty. He killed Antilochos, the son of Nestor, in single combat, and was himself subsequently killed by Achilles. His mother, Eos, had in vain pleaded before Zeus against Thetis for the life of Memnon, her son, and was present with the daughters of the Sun at the fight. Ajax challenged him to single combat, and, Memnon being wounded, Achilles came and pierced him through the neck. The ancient works of art, however, represented a monomachia or single combat between Achilles and Memnon alone over the dead body of Antilochos. Eos carried in her arms the naked corpse of her son out of the battle-field. A flower, the *Paphlagonios*, was supposed to have sprung from the earth out of his blood. His body, according to some traditions, was burned on a pyre in the plains of Troy, and the ashes sent to his country or his sister Hemera, or to the Æsopos, where a mound was

erected for his grave, or else in the Trojan territory. His companions, the Æthiopians, or Negroes, always thus represented in ancient art, were changed into birds which contended at his pyre and frequented his grave. (For a discussion of Memnon in art, chiefly vase-paintings, see Baumeister, *Denkmäler*, under *Memnon*.) Other and later traditions make Memnon come to Troy with 20,000 Æthiopians and Susians and 20 war-chariots, by order of Teutamos, King of Assyria, and state that the palace or city of Susa was called Memnoneion, because Memnon had built it. The name of Memnon was connected at the period of the Roman empire with that of Amenhetp or Amenophis III., of the eighteenth Egyptian dynasty, about B. C. 1400, and attached to the northernmost of the seated colossal statues still remaining on the west bank of the Nile at Thebes, where they formed part of a dromos or row of statues leading to the pylon or gate of the Amenopheum, or palace of Amenophis in that quarter. The two statues still remaining amid the ruins of eighteen others, all made of a breccia sandstone, bear the name and titles of Amenophis III., and the most northern gave out sounds at sunrise when touched by the morning beams, supposed to be the salutations of Memnon to his mother, Eos or Aurora. The statue was said to have been broken in two by Cambyses (B. C. 525), and was called by the Thebans Phamenoph. The upper part appears really to have been thrown down by an earthquake B. C. 27, and continued so till A. D. 170, when it was set up and restored by brickwork, but ceased to give out sounds. In that interval seventy-two inscriptions were cut in Greek and Latin on it, recording the visits of Roman military officers, prefects, and others, some of which are dated, the earliest one mentioned being in the eleventh year of Nero (A. D. 64), and the last, A. D. 194. These record, sometimes in verses, the visit of the writer, and attest that he has heard the voice of Memnon. The most remarkable visit was that of the Emperor Hadrian and his wife Sabina (A. D. 130), recorded in verses by Julia Balbilla, a poetess in their suite. There has been much speculation as to the cause of the harp-like sound or tone given forth by the statue, which was heard emanating from the pedestal by several modern travelers in 1821 and later. It has been attributed to the expansion of the stone by the warmth of the sun, a phenomenon occurring occasionally in certain mountains, or to the frauds of the priests. Certain parts of Egyptian Thebes were named Memnoneia in honor of Memnon. Some historical personages of this name are known, as a Rhodian who revolted against Artaxerxes Ochos and fled to Philip, King of Macedon, but subsequently returned to the service of Persia, where he repulsed the first attempts of the Macedonians to establish their forces in Asia Minor, and became under Darius the commander-in-chief of the latter's forces, and fought against Alexander the Great the battle of Granicus (B. C. 334). His plans of the campaign were unfortunately not followed, and after an unsuccessful attempt to defend Ephesus and Halicarnassus, which he burned, Memnon retired to Mitylene, where he died B. C. 333. There was also a historian of this name, who wrote the local history of Heraclea of Pontus in the beginning of the second century A. D., and an Æthiopian people between the Nile and Astapus called Memnones, probably from their supposed resemblance to the hero of the Trojan war.

Revised by J. R. S. STERRETT.

Memno'nium [= Gr. Μεμνόνιον]: a building at Abydos (Egypt. *Abet*), located 8½ miles W. of the Nile in Upper Egypt (lat. 26° 12′ N). This designation, probably derived from the Egyptian *mennu*, monument, was first applied in the Alexandrian period. The building is described by Strabo (xxvii., i, 44) as one of great magnificence. It was quite different in purpose from the ordinary temple, being a mortuary sanctuary devoted to the memory of the builder and his ancestors. Its ground-plan resembles the letter L. It was begun by Seti I. and continued by Ramses II., as is shown by an inscription dating from the latter's first year. The most important information which it has furnished is found in the "Tablet of Abydos," engraved on one of the walls of an interior passageway. (For a copy of the original, see Meyer's *Geschichte des alten Aegyptens*, p. 10, plate). This tablet contains the names of seventy-six Pharaohs arranged in three rows, the lower of which is devoted to the name of Seti I., the same being repeated in the form of both prenomen and name nineteen times. This list is more important and complete than any other which the monuments have preserved (Karnak, sixty-one names; Saqqarah, forty-two; Temple of Ramses, eighteen), though the names actually given represent only a selection from the whole number. In the list given by Budge (*The Mummy*, p. 77 ff.) the name of Seti I. is the 178th in order, while this tablet makes it the seventy-seventh. An ancient temple is known to have stood here, which underwent repairs in the twelfth dynasty, but its remains are indistinct. Abydos was one of the oldest and most sacred places in Egypt, on account of its containing the reputed burial-place of Osiris. Here it was customary for all pious Egyptians to be buried, at least temporarily, in order to enjoy the benefits conferred by nearness to Osiris. The practice of setting up commemorative stelæ, or small chapels, even when the dead were deposited elsewhere, has made the place a mine of information concerning Egyptian biography and history. The tablet of Una, an official of the sixth dynasty, is a specimen of such monuments. It was found in the oldest necropolis (sixth to eleventh dynasty) just W. of the Memnonium. The necropolis dating from the twelfth and thirteenth dynasties is located to the N., and that employed after the nineteenth dynasty to the S. The pyramid tombs N. and W. of the temple are of peculiar interest, as showing the actual purpose of pyramidal structures. Abydos was reputed to have been a large city at one time, on the basis of the statements of Strabo, but there is little monumental evidence to support him; it was near the seat of the earliest culture, since This, or Thinis, the birthplace of Menes the first king, was only a few miles to the N. CHARLES R. GILLETT.

Memorandum of Association: See the Appendix.

Memorial Day: See DECORATION DAY.

Memory [O. Eng. *memorie*, from O. Fr. *memoire* < Lat. *memo'ria*, deriv. of *me'mor*, mindful, remembering; cf. Eng. *remember*, from Lat. *rememora'ri*, to have brought back to one's mind]: a psychological subject which early attracted the attention of the ordinary man and of the professed philosopher. It is frequently discussed in current literature and daily conversation, and it has been investigated with success by modern scientific psychology. The earlier psychology consisted chiefly of descriptions of mental phenomena, obtained from introspection and observation. Descriptive psychology has been supplemented or developed in three important directions: (1) by investigation of the relations of body and mind; (2) by the study of disease; and (3) by experiment.

Descriptions of Memory.—From the Greek philosophy onward to the handbooks of psychology of the present day, a prominent place has been given to descriptions of the phenomena and conditions of memory. Those experiences are best remembered which are most recent, most interesting, best attended to, and most often repeated. The kind of memory possessed by an individual depends largely on his character, interests, and daily life. We may distinguish susceptibility, retentiveness, and readiness. The man of the world may have a good desultory memory, the daily gossip of society and of the newspapers may be readily picked up, repeated, and forgotten; whereas the student may remember chiefly those things which fit into his special study, but then they become a permanent part of his mental life. Many stories have been collected of extraordinary casual memory in persons who were not otherwise noteworthy. Thus we are told of servants, and even imbeciles, who could repeat pages in a language they did not know, on hearing them read once, or of a farmer who could remember the state of the weather on every day for forty-two years. Cases are known of remarkable memory in great men—Pascal, Euler, Leibnitz, and many more—and as great men are but few, we must conclude that good memory is more likely to be associated with genius than with mediocrity. Indeed, we may affirm without hesitation that good memory is a condition of successful accomplishment in any work. It has been noted that in childhood the memory is quick, but not retentive, whereas in old age new impressions are remembered with difficulty. Memory is closely related to other aspects of mental life. Thus we may say that we "remember" that acetate of lead is sweet, but we say we "know" that sugar is sweet. So also imagination, association of ideas, feeling, and action are closely connected with memory, and many aspects of memory can best be treated in connection with a general account of mental phenomena. See PSYCHOLOGY.

Physiological Basis of Memory.—Plato illustrated memory by a piece of wax which takes and preserves impressions, and this figure has been gradually developed as an actual fact of the nervous system. We may not like to explain states

of consciousness by their physiological conditions, but in the case of memory no reasonable psychological explanation has been proposed. To say that all our past experience is stored away in sub-consciousness and that the ideas strive to secure a place in consciousness would seem to be merely a figure of speech. We might nearly as well say that future sensations are in sub-consciousness struggling to arrive in distinct consciousness. From the point of view of scientific psychology we may best regard the physical world in the case of our sensations, and more or less permanent modifications of the nervous system as the cause of our memories, at least so far as retention is concerned. The principle of the inertia of matter is of such universal application that it does not seem to require an explanation. Bodies remain in their state of rest or motion until they are made to change that state by external forces. If the nervous system be modified in a given way, e. g. by a new series of sounds which in consciousness make a melody, the traces of the modification will remain until effaced by new impressions or the metabolism of the tissues. The inertia of the nervous system thus seems to account for both retention and effacement. Indeed, it even accounts for the details of memory, such as the more enduring retention of intense, interesting, or often repeated impressions, the better memory for recent events, the distinction between susceptibility, retentiveness, and readiness, the variations with age and state of health, etc. Physiological considerations also enable us to understand the close relations between memory and habit. When a movement has been often made it follows more readily, and may even take place without consciousness. The latent modifications of the nervous system which account for an acquired reflex movement may be regarded as similar to those which account for the retention of past experience. The facts of heredity, however obscure, must also in some way be due to the persistent modification of organic matter. Further, the known anatomical structure of the brain throws some light on the matter. We find there nerve-cells and nerve-fibers, and can picture to ourselves not only the more or less permanent modification of the parts, but also the gradual formation and deepening of paths which may represent association and recollection. It must, however, be acknowledged that we can only form general and schematic plans of the modifications and processes which condition retention and recollection. The actual alterations in the nervous system are not known from physiological observation and experiment; we have only hypotheses based on our general physical principles and on psychological observation of the facts of memory, and of course we do not know why given modifications of the nervous system are accompanied by given states of consciousness, nor why organic continuity is accompanied by self-consciousness and personal identity.

Diseases of Memory.—The dependence of memory on physiological conditions is further emphasized by the facts of pathology. A blow on the head may cause loss of memory, or a disease in a special part of the brain may cause a peculiar defect in memory. Pliny mentions the case of a man who forgot only the names of the letters after receiving a blow from a stone, and cases of *amnesia* of various sorts have attracted much attention. After an accident, the occurrences immediately preceding, say for an hour or two, may be entirely blotted from memory, and never recovered, or they may gradually return to mind. After severe illness the entire past life of the patient may be effaced—he must begin from the beginning and learn to read, etc. Sometimes, after complete amnesia, the past and its experiences return almost suddenly to consciousness. The most curious cases are those of alternating PERSONALITY (*q. v.*). A patient may forget his past life and become entirely different in interests and character; this may last for a while—weeks, or even years—and he may then return to his original personality and have no memory of the intervening period. The patient may in his ordinary condition be of good moral character, whereas he may be wayward or criminal in the secondary condition, or, on the contrary, his character may be improved in his secondary condition. Temporary lapse of memory occurs normally in sleep and is more marked in intoxication, in epileptic seizures, and in hypnotic trance. The memory may also be excited by disease, experiences being rehearsed in delirium which could not be recalled in health. In the case of APHASIA (*q. v.*), or loss of the power of speech, and *agraphia*, or loss of the power of writing, the localization of the brain lesion has been determined, and the various forms of the disease have thrown light on the normal processes of speech and memory. Under this heading may be mentioned an experience (paramnesia) which is scarcely a disease, as it seems to have occurred to nearly every one, the feeling that one is now living over again a past experience, usually accompanied by an emotion of mystery and weirdness. The phenomenon is probably sufficiently explained by some similarity of present surroundings to past experience.

Experiments on Memory.—We have seen that a satisfactory psychological explanation of memory has not been found, and that while its physical basis seems to account for the fact of retention, we are ignorant of the actual physiological processes concerned. However, exact observations and measurements of memory have been made which have enlarged our knowledge of the subject, and this on the side of psychology, not of physiology. It was known to Aristotle that when we regard a bright object and turn away the eyes, an after-image of the object persists. These after-images have been carefully studied and measured by many observers, and form a link between sensation and memory. Somewhat analogous to the after-image is the fact that a certain small part of immediately past experience always persists in consciousness. In fact, as Prof. James has remarked, the "present" of immediate experience is not a knife-edge, but a saddle-back, which experiments seem to show is in the neigborhood of ten seconds in width. What has happened during this interval is simultaneously in consciousness; thus in reading or conversation we take in the meaning of a sentence as a whole. We may next notice a peculiarly vivid form of memory, the so-called memory-image. If one has been searching for wild flowers, or working with the microscope, or watching machinery in motion, one may have very vivid images of the objects, and these persist for a long time and have many of the qualities of sensations. Then we have the power of calling up mental images of scenes. The individual differences in this respect have been studied by Fechner, Galton, and others with interesting results. Some people can call up a scene in imagination very vividly with the outlines, colors, etc., of the original objects, others can do this very imperfectly or not at all. With some the train of ideas is habitually accompanied by visual pictures, with others by sounds, with others by motor impulses, especially of speech. It should be noted that memory and imagination contribute a great deal to all our perceptions; thus in ordinary conversation what we hear is very largely supplied from our past experience. In this way illusions may occur—if one expect to see a ghost in a graveyard in the moonlight, one is quite likely to see a tombstone as a ghost.

Exact measurements have been made of the amount which can be remembered on one presentation, and of the number of repetitions required to learn by heart a series of impressions. Thus after a moment's exposure an observer could recognize and remember 6 letters, 4 disconnected words, or a sentence composed of 7 words. Ebbinghaus found that he could remember 7 meaningless syllables after a single reading. It required 16 readings to learn 12 syllables, 54 readings to learn 16 syllables, etc. There are considerable individual differences, and such experiments have been made on school-children with interesting results. Thus it has been found that there is a gradual increase in the "span of memory" with age and growth of intelligence, and the results can be used to measure attention and fatigue. Münsterberg has studied the part played by sight and hearing in memory. A series is best remembered when presented to two or more senses simultaneously. Thus in learning the letters a child should see them, and hear them, and name them, and write them. The rate of forgetting has been measured in several ways. Thus a light of a given intensity is shown to an observer and then a second light somewhat brighter or fainter, and what difference there must be in the lights in order that the observer may perceive the difference is determined. The interval between the two lights is then increased, and the greater "error of observation" measures the amount forgotten in a given time. Such experiments were first made by Weber, and have been extended by Wolfe and others. Another device is to measure the time required to learn a series of meaningless syllables. If the same syllables be used in a second experiment, the time is shorter, and the decrease in time may be used to measure the amount remembered. Thus in a series of experiments it was found that a saving of 58 per cent. in the time was secured after twenty minutes, 44 per cent. after one hour, 33 per cent. after one day, and 21 per cent.

after one month. We thus forget most rapidly at first: more is forgotten in the first hour than in the following month. It is commonly supposed that memory is strengthened by practice, but this is questioned by James, who has made experiments which do not show any improvement in retentiveness after practice.

Experiments have also been made measuring the time required for one idea to suggest another and for an act of memory. Thus it takes about half a second to name an object or a familiar color, whereas words, owing to the habitual association, can be named more quickly. The time required to name words in a foreign language measures familiarity with the language. It takes about a third of a second to add two numbers and about half a second to multiply them. Thus also has been measured the time required to remember in what country a city is situated, who is the author of a given work, etc. In this way individual differences may be determined, readiness and retentiveness compared, methods of education studied, etc. Ordinary accuracy of observation and recollection has been studied experimentally. Thus when a class of fifty-six college-students was asked what was the weather a week ago, sixteen answered clear; 12, rain; 7, snow; 9, stormy; 6, cloudy; and 6, partly stormy and partly clear. Such experiments, measuring the values of testimony, have important applications in the courts of justice and in other directions.

Bibliography.—Accounts of memory will be found in the standard handbooks of psychology, by James, Baldwin, Ladd, and Sully. An historical sketch by Burnham, with full references is contained in *The American Journal of Psychology*, vol. ii. Among special books on memory, see *Memory*, by Kay; *Das Gedächtniss*, by Fauth; and *Diseases of Memory*, by Ribot. Experimental papers are *Das Gedächtniss* by Ebbinghaus, and researches by Wolfe, Lehmann, Cattell, Müller and Schumann, Münsterberg and others, in *Philosophische Studien*, *Zeitschrift für Psychologie*, *Mind*, and *The Psychological Review*. See Aphasia, Mnemonics, and Psychology. J. McKeen Cattell.

Memphis [Gr. = Egypt. *Men-nefer*, pleasant dwelling; Coptic, *Memfe*, *Menfi*; Assyr. *Mempi*; Heb. *Moph* (Hos. ix. 6), or *Noph* (Isa. xix. 13, etc.)]: a city of Egypt; located near the apex of the Delta; the capital during the third to the fifth and the seventh and eighth dynasties. It was reputed on Greek authority (cf. Herodotus, ii., 99), to have been founded by Menes, but the Egyptian original (*Men-nefer*) does not appear till the sixth dynasty, when it was first applied to the pyramid of Pepi I. The "cities" of preceding Pharaohs had been built close to their pyramids and were unnamed; hence the city as a whole had a great north and south length and an immense area. During the Hyksos period the city lost its power, but it was revived and extended after the eighteenth dynasty. It was captured by the Ethiopian Pianchi and by the Assyrians. Strabo (xvii., i., 32) describes it as being large and prosperous. The Arabs deserted it, using it as a quarry for materials to build Cairo. Its destruction was not completed, however, till after the close of the twelfth century. About the middle of the nineteenth century Dr. Henry Abbott, an army-surgeon residing in Cairo, explored the site, and formed the valuable collection of antiquities now belonging to the New York Historical Society. Recently excavations have been renewed with some interesting results. At present the site is level with the ground and exposed to inundation, against which a dyke was erected in very ancient times. It is supposed that the intervening change of elevation has been insignificant. The center of the ruins is at *Mitrahineh* (29° 51′ N. lat.), whose mound is supposed to mark the great temple of Ptah (*Ḥā-ka-Ptaḥ*, House of the image of Ptah, the "sacred" name of the place). The city was also noted as the seat of the worship of Apis-Bulls (see Serapis), several of whose mummies are preserved in New York.

Charles R. Gillett.

Memphis: town; capital of Scotland co., Mo. (for location of county, see map of Missouri, ref. 1–H); on the Keokuk and West. Railroad; 45 miles W. of Keokuk. It is in an agricultural and stock-raising region; contains 7 churches, union school, business college, a national bank with capital of $50,000, 2 State banks with combined capital of $75,000, and 3 weekly newspapers; and ships large quantities of live stock. Pop. (1880) 1,418; (1890) 1,780; (1900) 2,195.

Editor of "Scotland County Democrat."

Memphis: city (laid out in 1820, incorporated as a city in 1831, had its charter repealed and was made a "taxing district" in 1879, and was reincorporated as a city in 1891); capital of Shelby co., Tenn. (for location, see map of Tennessee, ref. 7–A). It is at the head of navigation for large vessels on the Mississippi river, and on the Ches., O. and S. W., the Ill., Cent., the Kan. City, Ft. S. and M., the Kan. City, Mem. and B., the Little Rock and M., the Louisv. and Nash., the Mem. and Charleston, the St. L., Iron Mt. and S., the Tenn. Mid., and the Yazoo and Miss. Valley railways. It is the principal commercial point on the Mississippi river between St. Louis and New Orleans, is built on a bluff 80 feet above low and 40 feet above high water, has a waterfront of about 2 miles, with massive stone-paved wharves, and is the center of a large trade which is facilitated by its numerous railways and by regular steamboat connections with points on the Mississippi and other regions that naturally seek an outlet in the Gulf of Mexico. Its manufacturing interests are large, important, and rapidly increasing. The census of 1880 showed 138 manufacturing establishments, with $2,313,975 capital and 2,268 persons employed, which paid $845,672 for wages, and had products valued at $4,413,422; and that of 1890 showed 302 establishments, with $7,985,888 capital and 5,569 persons employed, which paid $2,874,526 for wages and $6,170,670 for materials, and had products valued at $11,800,455. The principal industries reported in 1890 were the manufacture of oil, cottonseed, and cake, 8 establishments, $1,511,632 capital, and $1,482,198 value of products; foundry and machine-shop products, 7 establishments, $1,308,750 capital, and $1,243,924 value of products; and lumber and planing-mill products, 10 establishments, $984,778 capital, and $1,462,733 value of products. The city is regularly and attractively laid out; has been provided with a thorough system of sewerage since the epidemic of yellow fever in 1878 (which bankrupted the city), and a water-service by the Holly system; has a steel railway-bridge across the Mississippi river, the third largest cantilever bridge in the world, opened May 12, 1892; and contains 4 national banks with combined capital of $2,250,000, 11 State banks with capital of $2,955,000, 3 other banks with capital of $720,000, 7 fire-insurance companies with capital of $780,000, and 3 daily, 15 weekly, and 2 monthly periodicals. In 1893 the city had a net debt of $3,132,100, a total assessed valuation of $39,637,950, and a tax-rate of $17.50 per $1,000. On June 6, 1862, a short engagement took place near Memphis, in which the Confederate fleet of eight vessels, under Commodore Montgomery, was defeated by the Union fleet of fourteen vessels, under Commodore C. H. Davis, and the city was thenceforth occupied by Union forces; in Aug., 1864, Gen. Forrest's Confederate cavalry entered and took several hundred prisoners. In 1879 the city became unable to meet its financial obligations and surrendered its charter. The Legislature designated the former city "the taxing district of Shelby County," and vested its control in a governing council of three commissioners, and a board of public works of five members. Under this council the improved system of sewerage was established, the debt compromised and funded, and the "district" brought into a condition that warranted its change into a municipality again in 1891. Pop. (1890) 64,495; (1900) 102,320.

Memphremagog, Lake: a beautiful sheet of water, extending from the village of Magog, Stanstead co., Quebec, Canada, to Newport, Orleans co., Vt.; 35 miles long and from 2 to 5 miles wide, and discharging its waters into the Magog river, a tributary of the St. Francis. Magog is connected with Montreal by the Canadian Pacific Railway, which reaches Newport viâ Mausonville, and with Newport, in summer, by a steamboat line; Newport is also connected with Sherbrooke, Quebec, by the Boston and Maine Railroad. The lake presents bold and striking scenery, and has on and near its shore many charming summer resorts. On its west side are Mt. Orford, over 3,500 feet above lake-level, and opposite Magog; Mt. Elephantis, to the S. W. of Georgeville, a village of summer residences; and Owl's Head, near the widening of the lake toward Newport. Among the places of special interest on the lake are Knowlton's Landing, on Sargent Bay, near the Bolton mineral springs; Kitteredge island, Gull Rock, and Black island, in the broad basin S. of Fitch Bay. Mausonville is on the Missisquoi river, in Brome County, Quebec, inland from the lake, W. of Owl's Head, and in a dairying and maple-sugar making region. Marbleton, in Wolfe County, Quebec, 25 miles from Sherbrooke, is the Canadian terminus of the Maine Central Railroad, and has extensive quarries of marble in its vicinity. Eighteen miles from Sherbrooke is Lake

Massawippi, extending from North Hatley S. through Stanstead County. It is a summer resort, and has excellent fishing within the shadows of the hills on its west side.
J. M. HARPER.

Mena, mā′năă, JUAN, de: poet; b. at Cordova, Spain, about 1411; studied at Salamanca and in Rome, and became Latin secretary and historiographer to John II., King of Castile. D. in 1456. He composed many verses in honor of his sovereign, the allegorical poems *Coplas de los Siete Pecados Mortales* and *La Coronación*, and an imitation of the *Divina Commedia* entitled *El Laberinto* (first printed in Seville, 1496). All these productions were extremely popular, and were printed in many editions soon after the introduction of the press into Spain, but they are no longer esteemed for poetic merit. In the literary history of Spain, however, Juan de Mena is important as one of the first imitators of Dante and introducers of that Italian influence which was powerfully felt by the best Spanish writers down to the seventeenth century. A collected edition of his works, under the title *Copilación de todas las obras de Juan de Mena*, was first printed in Seville, in 1528; and often since (e. g. Madrid, 1804, 1840). Revised by A. R. MARSH.

Menabrea, mā-năă-brā′ăă, LUIGI FEDERIGO, Count: statesman; b. at Chambéry, Sept. 4, 1809, of a Piedmontese family; studied mathematics at Turin; entered the Sardinian corps of engineers, and was appointed professor in technical science at the military academy and at the University of Turin while yet only a lieutenant. In 1848, having attained the rank of captain, he was employed in a diplomatic mission to the Italian duchies which were afterward annexed. He was elected a deputy, and served first in the ministry of War, then in the ministry of the Interior. In the war of 1859 against Austria he was chief of the staff. After the cession of Savoy and Nice to France the French Government endeavored to win him, as a native of Savoy, over to France, but he remained true to Italy, and Victor Emmanuel created him a senator. As chief of the engineering department he fortified Bologna, Piacenza, and Pavia; was made a lieutenant-general in 1860, and led the siege of Gaeta. In 1861 he became a member of the ministry of Ricasoli as Minister of the Marine, in which position he carried through several important reforms and devoted much interest to the building of the arsenal at Spezzia. In 1866 he was Italian plenipotentiary at the conclusion of peace between Austria and Prussia. In 1867, when the ministry of Rattazzi resigned, he formed a new cabinet, and took charge of the ministry of Foreign Affairs under difficult relations with France. In the Roman question he defended the rights of Italy against France, without suffering any breach to take place; he spoke for the annexation of Rome, but he imprisoned Garibaldi for his arbitrary intermeddling; thus he threaded his way between the hostile parties with great adroitness and without compromising the dignity of the Government. Only a few months after he entered office as president of the cabinet the imprisonment of Garibaldi brought him a vote of want of confidence in the house. He sent in his resignation immediately, but was induced by the king to remain and form a new cabinet. In May, 1869, the financial difficulties made another reorganization of the ministry necessary, but even after the accession of the new ministers Menabrea did not succeed in gaining the confidence of the house. On the opening of the session (Nov. 19, 1869) the Government proposed Mari for president, but Lanza was chosen, Menabrea resigned immediately, and Lanza became president of the cabinet. He was appointed ambassador at Vienna in 1870, at London in 1876, and at Paris 1882, where he continued to represent his Government till 1892. Menabrea was a mathematician and physicist. Prominent among his works are *Études sur la série de Lagrange* (Turin, 1844–47) and *Le génie italien dans la campagne d' Ancone et de la Basse-Italie* (Paris, 1866). His administration as president of the cabinet (only two years) brought order into the interior, and the relations of Italy to foreign countries were improved by his cautious policy. D. at Chambéry, May 25, 1896. F. M. COLBY.

Menado, me-naa′dō: town of Celebes, in the East Indian Archipelago; the capital of an important Dutch possession of the same name, comprising the whole northeastern peninsula of that island, and containing an area of 26,900 sq. miles, and a population of 540,000 (see map of East Indies, ref. 6–H). The high, volcanic surface of the territory is well adapted to coffee-culture; rice is also extensively grown. The value of exports of the district during one year amounted to 1,250,370 gulden. The town Menado has about 4,000 inhabitants. Revised by M. W. HARRINGTON.

Menai (men′ī) **Strait**: a narrow channel, 13 miles long and from 250 yards to 2 miles wide, between the island of Anglesea and Carnarvonshire, Wales, crossed by two bridges, the suspension and the Britannia bridge. At the entrance of the channel the tide sometimes rises 30 feet, and ordinarily from 10 to 12 feet. The navigation is difficult, but, as it saves time, the route is often chosen by vessels under 100 tons burden.

Menam′, or **Meinam′**: the principal river of Siam, of which it drains almost all of the western half. It rises in the mountains to the N. and N. W. of the kingdom, and after a southerly course of about 750 miles falls into the Gulf of Siam by a single estuary about 20 miles S. of Bangkok. It is a winding stream which in several cases subdivides into smaller streams, which reunite lower down. Its largest affluent is the Menam-Phe, which drains Central Siam and joins the main stream from the N. E. in the neighborhood of Ayuthia or Krung-Kao. Large ships can come up the Menam estuary to Bangkok. Small steamers can ascend to Ayuthia, about 50 miles farther up. Above this the river is navigable for small native craft to the rapids near Raheng, about 250 miles. MARK W. HARRINGTON.

Menamah, me-naa′măă: a city on the island of Bahrein, in the Persian Gulf, off the east coast of Arabia (see map of Persia and Arabia, ref. 6–G). It belongs to the British, and has 8,000 inhabitants. It is the center of the pearl-fishing industry of the gulf, and in the season is visited by many strangers. M. W. H.

Menander of Athens (Gr. **Μένανδρος**): one of the great chiefs of the New Attic Comedy; was born in 342, and was drowned in 291 B. C. while swimming in the harbor of the Peiræus. He was the son of aristocratic parents, and his uncle and trainer was ALEXIS OF THURII (*q. v.*), the famous poet of the Middle Comedy. He was rich, he was handsome, and it has been said that the only cross in his life was the cross in his eye. He had a house in town, a villa at the Peiræus, and his sweetheart, Glycera, was the type of all that is engaging in womanhood. Theophrastus and Epicurus gave him lessons in philosophy, and so well equipped for work and so happily circumstanced in fortune, he made a brilliant beginning in his art; but his early victory, gained when he was but twenty-one, was not matched by his subsequent career, and he was less favored by the public than were his rivals, especially PHILEMON (*q. v.*), though this comparative failure may have saved him from the weaknesses of the spoiled children of literature; but after his death the drama of Menander dominated the cultured world, and his verses were quoted and alluded to far into the Christian era. Plautus and Terence drew on him for sentiments and for plots, and of these Terence emulated his example so closely that he was called by Cæsar "a half but only half Menander." The ingenuity of his plots, the delicacy and penetration of his wit, the point and cogency of his maxims, the refinement of his language, and the sweetness of his temper made Menander a universal favorite, and his ideal still influences the comedy of situation and manners. Unfortunately, no play survives, and we are left to form our notion of Menander from imitations and quotations. Of his more than a hundred pieces, more than a thousand fragments have come down to us, not to speak of the hundreds of wise saws that have smuggled themselves in under his name. For the remains of Menander, see the collections of Meineke and of Koek. B. L. GILDERSLEEVE.

Menant, mā′năăn′, JOACHIM: Assyriologist; b. at Cherbourg, France, Apr. 16, 1820; studied law; became a magistrate of the civil tribunal at Havre, and acquired considerable celebrity as one of the earliest French decipherers of the cuneiform inscriptions of Assyria. He published, among other works, *Zoroastre* (Caen, 1844); *Recueil d'Alphabets des Écritures cunéiformes* (1860); *Éléments d'Épigraphie assyrienne* (1860; 2d ed. 1864); *Inscriptions assyriennes des briques de Babylone* (1860); *Inscriptions de Hammourabi, roi de Babylone au XVI^e siècle avant notre ère* (1863); *Exposé des Éléments de la Grammaire assyrienne* (1868); *Babylone et la Chaldée* (1875); and *Manuel de la langue assyrienne* (1880). He aided Prof. Jules Oppert in translating the *Grande Inscription de Khorsabad* (1865) and *Les Fastes de Sargon* (1863), and has published several learned essays in the *Journal* of the French Oriental Society.

Menasha: city; Winnebago co., Wis. (for location of county, see map of Wisconsin, ref. 5–E); on the Fox river at the outlet of Lake Winnebago, and on the Chi. and

N. W., the Chi., Mil. and St. P., and the Wis. Cent. railways; 18 miles N. of Oshkosh. It has a number of manufactories, a national bank with capital of $80,000, an incorporated bank with capital of $50,000, and two weekly newspapers. Pop. (1880) 3,144; (1890) 4,581; (1900) 5,589.

Menasseh ben Israel: See MANASSEH BEN ISRAEL.

Mencius, men'shŭs' [a Latinized form of the Chinese name *Mêng-tse*, *Măng-tse*, or *Mŭng-tse*, Mŭng the philosopher]: the most distinguished of the early Chinese philosophers after CONFUCIUS (*q. v.*); b. in the principality of Tsow (adjoining Loo, the native state of Confucius) about 371 B. C. The district city of Tsow-hien, in the department of Yenchow-foo and province of Shantung, claims the honor of being his native town, and there his lineal representative lives. He was in his third year when he lost his father, but his mother educated him so carefully and conscientiously that she is noted throughout China as the model mother. Thrice she changed her abode that he might be saved from the evil influences of unworthy surroundings. From his schoolboy days little is known of him until at the age of forty he emerged as a teacher of some note, with a large following of disciples. He acknowledged himself a disciple of Confucius, and Chinese critics consider it one of his greatest merits that he revived the influence and authority of that philosopher. He considered man good by nature, and his vices and miseries produced, like the stunted and distorted growth of a tree, by evil influences. The great problem, then, was to return to the original goodness, to set one's heart right. In politics he considered the interests of the people of prime importance, and emphasized the rights of the subject so strongly in opposition to those of the sovereign that he declared it righteous for a people to kill their ruler when he injured their welfare. Like Confucius, he traveled through the petty kingdoms into which China was then divided, setting forth his views, but met with little success, and the last fifteen years of his life were spent in retirement among his disciples. The date of his death is not certainly known, but it is stated that he was eighty-four years old when he died. His sayings are contained in the last of the *Four Books* which form the basis of all Confucian teaching. They were not admitted into the canon until near the end of the eleventh century. See Legge's *Chinese Classics* (vol. ii., London and Hongkong, 1861) and Faber's *Mind of Mencius*, translated by Hutchinson (London and Hongkong, 1880).

R. L.

Mendæans: See MANDÆANS.

Mendeléef, DIMITRI IVANOVITCH: chemist; b. at Tobolsk, in Siberia, in 1834; studied at the gymnasium there and at the University of St. Petersburg, where he became privat docent in 1856. After spending two years at Heidelberg, Germany, he became Professor of Chemistry at the Technological Institute of St. Petersburg in 1863, and professor in the university three years later. He is best known for his contributions to the periodic law (see CHEMISTRY). His *Principles of Chemistry* (1869) is one of the most suggestive text-books of chemistry. In 1882 he was awarded the Davy medal by the Royal Society of London, and in 1889 the Faraday medal by the Chemical Society. I. R.

Mendelssohn, men'dels-sōn, MOSES: metaphysician; b. at Dessau, in the duchy of Anhalt, Germany, Sept. 6, 1729, of Jewish parents; studied almost from infancy with the greatest energy, but under the hardest circumstances, the Bible, the Talmud, Maimonides, and afterward also modern literature, and became in 1750 tutor in a rich Jewish family in Berlin, and in 1754 bookkeeper in the firm. An accidental acquaintance with Lessing soon grew into an intimate friendship, and Lessing is said to have taken Mendelssohn as a model for his *Nathan*. He also associated with Nicolai, Abbt, and other literary persons, and began in 1755 to write for different periodicals. In 1763 his treatise on the *Evidence of Metaphysics* received a prize from the Academy of Berlin. In 1767 he published his *Phädon*, a dialogue on the immortality of the soul, which won a European celebrity. In 1783 appeared his *Jerusalem*; in 1785 his *Morgenstunden*, which exercised a considerable influence on his coreligionists. D. in Berlin, Jan. 4, 1786. A complete edition of his works was published by his grandson at Leipzig (1843–45). Mendelssohn possessed the gift of popularizing the philosophy of Leibnitz and Wolf, and of treating, after the model of English writers, religious, moral, æsthetical, and practical questions in a semi-philosophical common-sense manner. He must be considered the greatest of the so-called "popular philosophers" of the eighteenth century, and his theories concerning the beautiful, although based on antiquated psychological conceptions, had some influence on literary production, as may be seen, e. g., from his correspondence with Lessing. Mendelssohn was also one of the first who called attention to the almost forgotten philosophy of Spinoza. See Kayserling, *Moses Mendelssohn* (1882); Braitmaier, *Geschichte der poetischen Theorie und Kritik* (1889).

Revised by JULIUS GOEBEL.

Mendelssohn-Bartholdy, -băar-tōl'dĕ, FELIX: composer; b. at Hamburg, Feb. 5, 1809. His father, a wealthy Israelite, was a man of extensive learning and refined taste, and his mother was equally cultivated, being one of the brightest women in the best society of Berlin. He very early showed great talent for music under the instruction of his mother and of Madame Bigot; became the pupil of the romantic Berger for the piano, and of the severe Zelter for harmony; at eight years of age could read any music at sight, and write correct harmony. Although he had not the time to practice a great deal, yet such were the flexibility of his hands and the quickness of his musical faculty that he played perfectly the most difficult music. For his improvement and the entertainment of their guests, Mendelssohn's father hired for the boy a small orchestra, which he led with skill and great zeal at the home musical evenings. Aided by his talented sister Fanny, he often produced his own compositions before the large circle of artists and scholars frequenting his home; he thus became the musical prodigy and the bright center of their friendly interest. Up to 1826 his compositions showed less of the spontaneousness of genius than of skill in scholastic forms, which were the natural expression of a sensitive and not very self-asserting nature while under the dominion of the scientific Zelter. In that year, writing his *Midsummer Night's Dream*, he left the class-room, and revealed the leading quality of his originality, the graceful vivacity of his fancy. In 1829 he left Berlin to travel through Scotland, England, Germany, Italy, and France. In 1833 he was made musical director of the city of Düsseldorf. This office he kept only two years, and then moved to Leipzig, where he lived till his death, excepting during short periods of time—once to go to Berlin as director of music to the King of Prussia, and occasionally to visit England and various German cities to conduct performances of his works. By his strong personal influence, his intelligent direction of the concerts of the Gewandhaus, and the establishment of the conservatory, he made Leipzig the leading city of Germany for pure music. In recognition of his services the university conferred on him the degree of doctor of philosophy and of fine arts, and in 1836 the King of Saxony made him his honorary kapellmeister. In 1837 he married Cecile Jean Renaud, of Frankfort, whose grace, intelligence, and devotion were the happiness of the remaining ten years of his life. His continuous, laborious activity so much exhausted his sensitive organization that the death of his beloved sister Fanny (in 1847) was a blow from which he could not rally. A few months afterward he died of apoplexy (Nov. 4, 1847).

His nature united strong affections and a keen intellect, great energy, and mirth that was even frolicsome. One of his strongest traits was his unflagging pursuit of perfection; in every detail of every work he strove to express his best thought in the best form. He was too excitable and exacting to be a perfect conductor for the players given him in England and Berlin. In Leipzig, where enthusiasm was in the cause, his power seems to have been little short of magical in rousing his men and leading them to the heights of his conceptions. As a pianist he was one of the greatest of an age that counted such artists as Liszt, Madame Schumann, and Chopin. His execution was a rare union of fire, delicacy, and purity. Among his best known works may be mentioned the oratorio *Elijah*, which is more popular in England than any other oratorio excepting Handel's *Messiah*; the oratorio *St. Paul*, in which are happily united the grandeur of the ancient masters and the resources of modern art; the Forty-second Psalm; the *Midsummer Night's Dream*, a composition of extraordinary sprightliness and grace, probably the most striking work of its kind in the world; the concerto for the violin; the first concerto for the piano; the third symphony (in A minor), and the overture *Fingal's Cave*. His chamber-music, *Songs without Words* for the piano, and his vocal quartets and songs are among the purest and most charming contributions to the art. He seems to have had no dramatic power, or perhaps that side of his genius was undeveloped, for his efforts in opera are few.

See the *Life* by Moscheles (1873; Eng. trans. 1886); Hensel, *Die Familie Mendelssohn* (1879); the collections of Mendelssohn's *Letters* (1861 and 1863; Eng. trans. 1862–63); those to the Moscheles (1888); and *Selected Letters of Mendelssohn*, edited by W. F. Alexander (London, 1894) See also Grove's *Dictionary of Music and Musicians.*

Men'denhall, James William, Ph. D., D. D., LL. D.; clergyman and author; b. at Centerville, O., Nov. 8, 1844; graduated at Ohio Wesleyan University in 1864, and entered the Cincinnati Methodist Episcopal conference; was president of Fremont Collegiate Institute, Sidney, Ia., 1867–68; was transferred to North Ohio conference in 1869; was presiding elder about four years; was a member of the General Conference in 1884, 1888, and 1892; was elected editor of *The Methodist Review* in 1888 and was re-elected in 1892. His principal published works were *Echoes from Palestine* (1883); *Plato and Paul: or, Philosophy and Christianity* (1886). D. in Chicago, Ill., June 18, 1892.

Mendenhall, Thomas Corwin, Ph. D., LL. D.: physicist; b. near Hanoverton, O., Oct. 4, 1841; was self-educated in science, having received as a basis only a common-school education; in 1873 was elected Professor of Physics and Mechanics in the Ohio State University; in 1878 was called to the chair of Physics in the Imperial University of Japan at Tokio. Here he established a physical laboratory and founded a meteorological observatory, which later was merged into the general meteorological system established by the imperial Government. From measurements of the force of gravity at sea-level and at the summit of the extinct volcano Fujisan, he deduced a value for the mass of the earth that agrees closely with that obtained by Baily in England by another method. He aided in establishing the Seismological Society of Tokio, and in introducing a system of popular lectures. In 1881 he returned to the Ohio State University; in 1883 organized the Ohio State weather service, which he directed until 1884. In 1884 he became connected with the U. S. Signal Service at Washington, where he organized and equipped a physical laboratory, carried on observations of atmospheric electricity, and established the systematic gathering of data relating to earthquakes. In 1886 he resigned to become president of the Rose Polytechnic Institute at Terre Haute, Ind. In 1889 he was made superintendent of the U. S. Coast and Geodetic Survey, but resigned this post in July, 1894, to become president of the Worcester Polytechnic Institute, Worcester, Mass. He succeeded Francis A. Walker as President of the Boston School of Technology in 1897. In 1882 he was vice-president of the physical section of the American Association for the Advancement of Science, and in 1888 was chosen president of the association. He is a member of the National Academy of Sciences. In 1892 he was one of the two commissioners who represented the U. S. in the Bering Sea joint commission, and in the same year was appointed commissioner on the part of the U. S. to make a joint survey of the boundary between Alaska and British America; also commissioner to fix in connection with a representative of the British Government the boundary between Canada and the U. S., in the St. Croix river, and Passamaquoddy Bay. He has been chairman of the U. S. board of geographic names since its organization in 1890. Prof. Mendenhall has lectured extensively throughout the U. S., has contributed to many scientific periodicals, and besides monographs and special reports, has published *A Century of Electricity* (Boston, 1887).

Mendes (in Egypt. *Ded*, or *Pa-n-Ded*, House of the *ded* symbol): capital of the sixteenth nomos (district) of Lower Egypt and royal residence of the twenty-ninth dynasty, sacred to the ram of Mendes, which was, however, a he-goat, an incarnation of Osiris. The city name was written with a hieroglyphic sign (*ded*) which represented the spine of Osiris. According to some it was located 11 miles E. of Mansûra, but it is more probably to be identified with Tmey el-Amdîd, a little farther S. C. R. G.

Mendes, Catulle: poet and novelist; b. at Bordeaux, France, May 22, 1841. He went when quite young to Paris, and became very active in the group of young *parnassiens*, founding the *Revue Fantaisiste* (1849). He issued several volumes of verse, in which the concern for form is conspicuous: *Philomela* (1864); *Hesperus* (1869); *Contes épiques* (1870); *Odelette guerrière* (1871); *La Colère d'un franc-tireur* (1871); collected in 1878 as *Poésies.* He has also been an industrious writer in prose, producing dramas, novels, and short stories, marked by a search for strange effects and a prevalent erotic character. Among his novels and short stories are *Les Folies amoureuses* (1877); *Monstres parisiens* (1882); *Jeunes Filles* (1884); *Pour lire au bain* (1884); *Le Rose et le Noir* (1885); *L'Homme tout nu* (1885); *Grande-Maguet* (1888). Among his dramas are *Le Capitaine Fracasse* (1872); *Les Mères ennemies* (1882); *Le Châtiment* (1887); *Fiamette* (1889). A. G. Canfield.

Mendes Leal da Silva, men'dās-lā-ăal'daa-seĕl'vaă, José: poet and statesman; b. in Lisbon, Portugal, Oct. 18, 1820; d. at Cintra, Aug. 14, 1886. He began his literary career by articles in the *Diario* of the chamber of deputies. In 1846 he became secretary to the Duke of Terceira; in 1848 secretary to the conservatory, but lost this place in 1850. In 1851 he was elected a deputy, and soon after was for a time Minister of Foreign Affairs. From 1874 to 1883 he was ambassador to France; from 1883 to 1886 ambassador to Spain. As a poet he has had great popularity, his poems, *Canticos*, being first collected in 1858. His plays have had great success on the Portuguese stage: *Egas Moniz, A pobre das ruinas, O tributo das cem donzellas, Os homens de marmore, Os dous renegados, Pedro, A escala social*, etc. Particularly happy are the comedies *O tio André que vem do Brazil, O caçador*, etc. He published also several romances: *O flor do mar, O mosqueteiros da Africa, O Calabar.* His *Relaçoes de Portugal com a curia romana* (5 vols.) has scientific value. In 1845 he became a member of the Portuguese Academy. A. R. Marsh.

Men'dez-Pin'to, Fernão, or Fernam: traveler; b. at Montemor-o-Velho, near Coimbra, Portugal, about 1510; after various adventures in Europe he set out for the East Indies, and arrived in 1537 at Diu, on the west coast of India. His adventures lasted many years, and were narrated by him in a book published after his death, in which he states that he had spent twenty-one years in the East, had been thirteen times taken prisoner by the enemy, and seventeen times sold as a slave. His captivities had carried him from Egypt, Abyssinia, and Arabia through Persia, India, Burma, Malacca, Siam, Java, the Loochoo islands, Japan, China, and Tartary. Mendez-Pinto made four visits to Japan, one of which was in company with St. Francis Xavier, through whose influence he entered the order of Jesuits at Goa, devoting the large fortune he had acquired to the establishment of a seminary in Japan. Obtaining a release from his vows, he returned to Portugal in 1558 with letters of commendation from the viceroy at Goa. He resided at court several years; died at Almada, near Lisbon, July 8, 1583. His book, *Peregrinação de Fernam Mendez-Pinto*, was first printed in 1614, when it immediately became a favorite, and is now ranked among the Portuguese classics. It was translated into the principal languages of Europe.

Mendiburu, men-deĕ-boo'roo, Manuel, de: general and historian; b. at Lima, Peru, 1805. When a young student he joined the patriots in 1821, was captured by the Spaniards and kept a prisoner until the end of the war. Subsequently he held many civil and military offices; was Minister of War under Gamarra and of Finance under Echenique; and in 1851 was sent on a special mission to Europe. He had collected an immense quantity of material for a history of Peru, but modestly concluded that his abilities were not equal to the task of writing it. He therefore threw the notes into the form of a biographical dictionary entitled *Diccionario histórico-geográfico del Perú.* The first part, in eight volumes, includes the Inca and colonial periods; its publication was begun in 1874 and concluded after the author's death. It is by far the best work of its kind that has ever appeared in South America, and has been heartily praised by scholars; it is very full and contains much new material. The second part, which was to have come down to the present time, has never been published. Gen. Mendiburu died in Lima, Jan. 21, 1885. Herbert H. Smith.

Men'do, Andrés: ecclesiastic and author; b. at Logroño, Spain, in 1608: studied theology in the University of Salamanca; entered the order of Jesuits, and successively filled the positions of preacher to the court, secretary to the Inquisition, director of the schools of Oviedo and Salamanca, vice-provincial of Castile, and confessor to the Duke of Assuna, Viceroy of Catalonia. He died in 1685, having earned a great reputation for learning by his various writings, of which the principal are *Bullæ sacræ cruciatæ Dilucidatio* (Madrid, 1651); *De Jure academico* (Salamanca, 1655; 2d ed. Lyons, 1668); *De Ordinibus militaribus Disquisitiones theologico-morales* (Salamanca, 1657): several collections of sermons in Latin and Spanish; and *Statera*

opinionum benignarum in controversiis moralibus (Lyons, 1666). Revised by S. M. Jackson.

Mendocino, Cape: See Cape Mendocino.

Mendocino Indians: See Kulanapan Indians.

Mendota: city (founded in 1853); La Salle co., Ill. (for location of county, see map of Illinois, ref. 3–E); on the Ill. Cent. and the Chi., Burl. and Q. railways; 83 miles S. W. of Chicago. It contains 8 churches, 3 public schools, Blackstone High School, Wartburg Seminary (Lutheran, opened 1853), public library founded in 1870, 2 iron-foundries, a national bank with capital of $100,000, a private bank, and 4 weekly newspapers. It is in an agricultural region. Pop. (1880) 4,142; (1890) 3,542; (1900) 3,736.

Editor of "Bulletin."

Mendo'za: a western province of the Argentine Republic; bounded N. by San Juan, E. by San Luis, S. by the territories of Pampa and Los Andes, and W. by Chili. Area, as estimated by Latzina, 63,843 sq. miles, but careful surveys would probably reduce this to 55,000 sq. miles or less. The main range of the Andes forms the western boundary, the peak of Aconcagua being at the northwestern angle; spurs and lower ranges cover nearly the whole face of the province, subsiding to hills eastward; in the northwestern part there are extensive arid plateaus. Earthquakes are frequent, but only a few severe ones are recorded. The climate is so dry that in most places artificial irrigation is necessary for successful agriculture; some of the canals used were constructed by the Guarpe Indians before the conquest. Several rivers unite, on the eastern boundary, in the Desaguadero, which, farther S., is lost in marshes and salt lakes. Wheat, corn, and fruits are grown, the latter being dried and exported; but of late years vine-growing and wine-making have almost superseded other industries. In July, 1892, the estimated area in vineyards was 35,000 acres, and about 1,600,000 gal. of wine are exported yearly. Cattle are raised, principally for the Chilian markets, but the herds are not large as compared with other provinces. Silver and copper are mined on a small scale, and coal and petroleum are reported. Mendoza was settled in 1559 by Spaniards from Chili, who easily conquered the peaceful Guarpes. It formed part of the territory of Cuyo, attached to Chili until 1776, when it was united to the viceroyalty of La Plata or Buenos Ayres. Pop. (estimated, 1890) 160,000. The country population is mainly a mixed race, descended from Spaniards and Guarpe Indians.

Herbert H. Smith.

Mendoza: a city; capital of the province of Mendoza; situated at the foot of the eastern sub-ranges of the Andes; 654 miles from Buenos Ayres, and 2,550 feet above the sea (see map of South America, ref. 8–C). It is on the line of the Trans-Andean Railroad from Buenos Ayres to Valparaiso, and has a large trade, especially with the latter place; about one-tenth of the inhabitants are Chilians. Mendoza was founded in 1559 by Castillo, and was named after Garcia de Mendoza, who, at that time was governor of Chili. In 1816–17 San Martin massed his army here, previous to his celebrated march over the Andes into Chili. On Mar. 20, 1861, the city was destroyed by an earthquake; not even the streets were traceable after the disaster, and only some trees and an aisle of one of the churches were left standing. The shock occurred on the morning of Ash Wednesday, when the churches were filled with worshipers; about 13,000 people perished, and only 1,600 escaped. The new city was built a short distance from the ruins. Pop. (1892) about 20,000. Herbert H. Smith.

Mendoza, Andres Hurtado, de: See Hurtado de Mendoza, Andres.

Mendoza, Antonio, de: Spanish administrator; b. about 1485. He was a son of the second Count of Tendilla, and closely related to other distinguished persons of the same name. Charles V. having resolved to create a viceregal government for New Spain, or Mexico, Mendoza was appointed first viceroy in 1530, but did not reach the country until Oct., 1535. His rule was continued until Nov., 1549, and was, on the whole, wise and good; explorations were pushed toward the N. and N. W., mining-regions were developed, a mint was established, and Guadalajara, Valladolid, and other towns were founded; the irregular proceedings of former officeholders were punished, and a rebellion was put down. On the other hand, the burdens which already weighed on the Indian population were increased, and their misery was made greater at this time by a pestilence which swept over the country. Mendoza evaded the "new laws" which had been promulgated to regulate Indian labor, and which were fiercely resisted throughout Spanish America. Transferred to the viceroyalty of Peru, he reached Lima, Sept. 23, 1551, and died there July 21, 1552. During his short rule he commenced the Peruvian code of laws, known as the *Libro de Tasas*. Herbert H. Smith.

Mendoza, Antonio Hurtado, de: Spanish dramatist and poet; b. about 1600; d. in 1644. Little is known of his life. He lived much in Madrid in the company of the great poets of his day; was at one time a royal secretary, and again a secretary of the Inquisition. We have from him a number of plays, of which three are particularly good: *Cada loco con su tema ó el montañés indiano*, *Los Empeños de mentir*, and *El marido hace mujer y el trato muda costumbre*. The last was imitated with great success by the younger Moratín, and seems also to have been under the eyes of Molière when he wrote his *École des femmes*. Mendoza wrote also many ballads and lyrics, and a *Vida de Nuestra Señora*. His works were published in 1690 with the title *El Fenix Castellano, D. Antonio de Mendoza, renascido* (2d ed. Madrid, 1728). The three comedies mentioned above are reprinted in vol. xlv. of Rivadeneyra's *Biblioteca de Autores Españoles*. A. R. Marsh.

Mendoza, Diego Hurtado, de: statesman and writer; b. in Granada, Spain, in 1503, of high lineage. Being a younger son, he was destined for the Church; and to this end learned to speak Arabic in Granada, and then went to Salamanca to study Greek, Latin, and theology. While still a student there, as is commonly believed, he wrote his famous romance, *Vida de Lazarillo de Tormes, sus fortunas y adversidades*. This, the first example of the so-called *novelas picarescas*, while purporting to give the story of a little rascal, who by his native talent for lying and swindling rises from success to success, is in reality a satire upon those classes in Spanish society whose weaknesses made such successes possible. It seems to have been first published, without the author's name, in Antwerp in 1553. Its success was immediate and edition followed edition, certain passages prohibited by the Church, however, being cut out of most of the later ones. It also provoked continuations by greatly inferior writers. A so-called *Segunda Parte de L. de Tormes*, by an unknown hand, appeared in Antwerp in 1555; another *Segunda Parte*, by one Juan de Luna, a teacher of Spanish in Paris, in 1620. In the same year an imitation by Juan Cortés de Tolosa appeared, with the title *El Lazarillo de Manzanares*. The original was translated into many other languages (into English by David Rowland, 1586; again by James Blakeston, 1670). Mendoza seems soon to have found that his vocation was not ecclesiastical, for we next find him a soldier in the Spanish armies in Italy. Here his talents speedily brought him to the front, and in 1538 Charles V. appointed him ambassador in Venice. Here he mingled much with the scholars who were busied with the task of editing the Greek and Roman classics, and giving them to the world in printed form. He was a friend and patron of the great printers, the Aldi (see Manutius, Aldus); and he had made for his own library sumptuous copies of the manuscripts which Cardinal Bessarion had given to the Marcian Library. He thus became thoroughly imbued with the new humanistic culture of Italy; and after his return to Spain his great name and influence did much to diffuse this culture among his countrymen. The emperor, however, required his services as military governor of Siena, and he had to leave Venice. Later we find him the imperial representative at the Council of Trent (1542). Then, in 1547, he was sent to Rome as plenipotentiary to rebuke and overawe the pope. So well did he do this that for six years he was regarded as the head of the imperial party in Italy. In 1554, however, a change of policy on the part of Charles made it possible for Mendoza, already weary of his great responsibility, to return to Spain. The next year Philip II. came to the throne, and for some reason showed little liking for him. He had to go into a kind of exile at Granada, where he amused himself with writing poetry, either in imitation of the Latin poets or after the traditional popular manner of his own country. And here, later, he undertook in imitation of Sallust and Tacitus an account of the uprising of the Moors (1568–70), his famous *Guerra de Granada*, which, on account of its frankness and impartiality, could not be printed till long after its author's death (1st ed., incomplete, 1610; 1st complete edition 1776). In 1575 he was permitted to return to Madrid, but was

seized by a violent illness, and died a few days after his arrival, Apr., 1575. Besides the works mentioned above, we have from him some interesting letters, and an amusing, satiric *Diálogo entre Caronte y el ánima de Pedro Luis Farnesio, hijo del Papa Paulo III.* His works will be found in vols. iii., xxi., xxxii., and xxxvi. of Rivadeneyra's *Biblioteca de Autores Españoles.* See J. D. Fesenmair, *D. H. de Mendoza, ein span. Humanist des 16ten Jahrhunderts* (Progr. des Wilhelmsgymn., Munich, 1882 and 1884). Also K. Stahr, *Mendoza's Lazarillo de Tormes, etc.*, in *Deutsche Jahrbücher für Politik und Literatur* (Berlin, 1862).

A. R. Marsh.

Mendoza, Garcia Hurtado, de: See Hurtado de Mendoza, Garcia.

Mendoza, Iñigo Lopez, de: See Santillana, Marquis of.

Mendoza, Pedro, de: military commander; b. of noble family, in Gaudix, Granada, Spain, about 1487; fought with distinction in Italy, and is said to have profited greatly by the sack of Rome. After the return of Sebastian Cabot from the Rio de la Plata, Charles V. resolved to promote the colonization of that region, with the object of opening a new route to Peru. Mendoza offered to undertake the enterprise at his own expense, was named *adelantado* or governor of the new colony, and sailed from San Lucar Sept. 1, 1534, with fourteen ships and 2,650 men. The squadron touched at Rio de Janeiro, where the vice-admiral, Osorio, was killed on a vague suspicion of conspiracy. Arrived at the Rio de la Plata, Mendoza founded the first city of Buenos Ayres (Feb. 2, 1535) at one of the most inconvenient points on the coast. No attempt appears to have been made to pacify the Querendi Indians of the vicinity; repeated struggles with them followed, and the Spaniards, confined to their fort, suffered greatly from hunger. Ayolas, sent to explore the Paraná, founded on its banks the fort of Corpus Christi, to which a portion of the Buenos Ayres garrison was transferred. Disasters continued, and at length the governor in despair embarked for Spain, at the end of Apr., 1537. The ship, scantily provisioned, was reduced to famine; Mendoza became a lunatic and died before reaching Spain. The colony, under Ayolas and Irala, subsequently prospered. Asuncion was founded in 1537, and soon after Buenos Ayres was abandoned, to be refounded after many years. Herbert H. Smith.

Menede'mus (in Gr. Μενέδημος): (1) son of Clisthenes of Eretria in Bœotia. He began life as a soldier in Megara, but became interested in philosophy and studied under Plato and Stilpon. He transplanted the school of philosophy founded by Phædo in Elis to Eretria. Late in life he was accused of aiming to betray Eretria to Antigonus Gonatas, and went into exile. He left no writings. (2) A cynic philosopher of Lampsacus. (3) A rhetorician in Athens, 94 B. C. (4) A friend of Julius Cæsar. (5) A general of Alexander the Great. J. R. S. Sterrett.

Menela'us (in Gr. Μενέλαος): son of Atreus and younger brother of Agamemnon. After the murder of Atreus by Ægisthus, the two brothers went into exile, Menelaus going to the court of Tyndareus, King of Sparta, whose daughter, Helen, he afterward married. Through her he became King of Sparta. When Paris had carried Helen off to Troy, Menelaus journeyed thither in order to negotiate for the return of his wife, but in vain. Then, according to prenuptial agreement with the many suitors of Helen, he summoned them to war against Troy, himself being the commander of the Spartan contingent of sixty ships. At Troy, thanks to Hera and Athene, he became one of the most conspicuous figures. In a duel he was victorious over Paris, who was rescued by Aphrodite, but, owing to the treachery of Pandarus, Menelaus failed to get back Helen and her treasures. He protected the dead body of Patroclus from insult, and carried it out of the moil of battle back to the ships. He was one of those who entered the wooden horse. Upon his return voyage from Troy along with Helen, storms and winds drove a part of his ships to Crete, and five, including his own, to Egypt. He wandered about the Orient for eight years; he was everywhere received with kindness, and finally, in company with Helen, he reached Sparta on the day of the burial of Clytæmnestra and Ægisthus by Orestes. He thereafter lived in peace and comfort. On the occasion of the visit of Telemachus to Sparta Menelaus celebrated the marriage of his daughter Hermione to Neoptolemus, the son of Achilles. When on the island of Pharos he had forced Proteus (*q. v.*) to prophesy to him; he was informed that in view of the fact that he was a son-in-law of Zeus he would not die, but be translated to Elysium. He was more cruel than Agamemnon, and put Deïphobus, the son of Priam, to the most cruel tortures. He stood head and shoulders above Odysseus, spoke little, but always well and to the point. J. R. S. Sterrett.

Menendez de Avilés, Pedro: naval commander; b. in Avilés, Asturias, Spain, in 1519. He distinguished himself in privateering enterprises against the Moors and French; became captain-general in the navy; commanded the fleet which carried Philip II. to England 1554, the one which brought him re-enforcements to Flanders 1557, and that in which he returned to Spain in 1559; was twice general of the West Indian fleet, and acquired great wealth by his voyages; was imprisoned and fined for alleged irregularities in 1560, but regained favor, and in 1565 was named governor of Cuba and Florida, with the agreement that he should colonize the latter country. His preparations were hastened by the news that French Protestant colonies had been established on the Florida coast, and he sailed from Cadiz, June 29, 1565, with nineteen vessels and over 1,500 men. The ships were scattered by storms, and only seven united at Puerto Rico in August. Thence they sailed to Florida, and, after some preliminary skirmishing with the French ships, Menendez founded St. Augustine (now the oldest city in the U. S.) Sept. 8, 1565. Attacks on the post by French ships failed, and on Sept. 30 the Spaniards surprised and captured the French fort on St. John's river, slaughtering most of the garrison, "not as Frenchmen, but as heretics." Soon after the French ships met with repeated disasters, and most of those who had escaped the massacre at the fort gave themselves up, but they were butchered like the rest; in a few months hardly a Frenchman remained in Florida. The Spaniards established two other forts, but during the winter they suffered greatly from hunger and from Indian attacks; about 100 died and 500 deserted and left the colony. Subsequently large re-enforcements were received, and the colony prospered. Menendez made several voyages to Spain to bring over colonists and supplies, and he was active in the government of Cuba. He also pushed explorations northward, established a post on Port Royal Bay, now in South Carolina, visited Chesapeake Bay, and in 1570 sent a party of missionaries up the Potomac river; this mission was destroyed by the Indians, and in requital Menendez ascended the Potomac in 1572, and laid waste some of the Indian villages. In 1573 he finally returned to Spain, and was given command of the immense fleet which Philip was preparing against England and the Netherlands, but died soon after at Santander, Sept. 17, 1574. His letters from Florida to King Philip are extant, and have been used by modern authors. See Barcia, *Ensayo cronológico para la historia generál de la Florida* (1723); Parkman, *Pioneers of France in the New World* (1865); Gaffarel, *La Floride Française* (1875); Shea in *Narrative and Critical History of America*, vol. ii., p. 260, *et seq.*

Herbert H. Smith.

Menéndez y Pelayo, mā-nen'dāth-ee-pā-laa'yō, Marcelino: poet and scholar; b. in Santander, Spain, in 1857. His literary career began when he was less than twenty, with some articles in the *Revista Europea* for 1876, attacking the philosophical tendencies of Germany and the Spaniards who inclined to adopt them. Just before publishing these he had completed his studies in the University of Madrid, and a little later he went to Barcelona and to Paris for a considerable period in order to enlarge his scientific knowledge of literature. On his return to Spain he was appointed Professor of Spanish Literature in the University of Madrid, a special license from the Government being required because of his extreme youth. Soon after (1881) he was elected a member of the Spanish Academy. Menéndez y Pelayo is one of the most brilliant and most prolific writers of modern Spain. Though he has ostensibly allied himself with the conservative and extreme Catholic party, he is essentially a writer of humanistic rather than political or theological interests. A lover of beauty and of style, he returns lovingly to the perfection of the poets of the classical world, and prides himself on belonging to a Latin rather than a Germanic race. The work from his pen that has aroused the greatest discussion is perhaps the *Historia de los heterodoxos españoles* (3 vols., 1880–82), in which he defends the Inquisition and ranges himself among the antagonists of modern liberalism and modern science. This, however, was an immature work in spite of the remarkable erudition

it displays. He is more truly on his own ground when he is dealing with literary matters, and particularly the history of Spanish literature. Here belong *Estudios de crítica literaria* (1884); *Calderón y su teatro* (3d ed. 1885); *Horacio en España* (2d ed. 2 vols., 1885); *Historia de las ideas estéticas en España* (5 vols. in 9, 1884–91); *La ciencia española* (3d ed. 3 vols., 1887–89). In this connection should be mentioned also the *Antología de poetas líricos castellanos*, with learned introductions (1890, *seq.*; 4 vols. to 1893); and the monumental edition of the works of Lope de Vega, which Menéndez y Pelayo is editing for the Spanish Academy (1890, *seq.*). Besides these critical works he has also tried his hand with considerable success at poetry. Though he hardly passes beyond academic excellence here, no connoisseur can fail to be interested by the precision of his touch and the harmony and grace of his style. The best of his verse is to be found in the volume *Odas, epístolas y tragedias*, with an introduction by Juan Valera (1883). Deserving mention is *Horatius: Odas traducidas é imitadas* (1882). A. R. Marsh.

Meneptah [from Egypt. *Mer-n-Ptah*, beloved of Ptah; the *Amenephthes* of Africanus, and the *Amenophis* of Josephus]: the thirteenth son, coregent, and successor of Ramses II., and third king of the nineteenth Egyptian dynasty. The length of his reign is uncertain; monumental evidence does not extend beyond his eighth year. He left his name on many usurped monuments, but did little building of consequence. His only war was with the Libyans, whom he conquered. By many he has been identified with the Pharaoh of the Exodus in spite of chronological difficulties, on account of the fact that the earliest remains found at Pithom, one of the "store-cities" built by the Israelites, belonged to his father Ramses II., who is therefore identified with the Pharaoh of the Oppression. Curiously enough his mummy was not with the others found at Der-el-Bahari. See Her-Hor. Charles R. Gillett.

Menes [from Egypt. *Mena*, steadfast]: the first recognized human King of Egypt, being mentioned first in all the monumental lists of kings. Our information concerning him comes for the most part from Greek sources, as no contemporary monuments have been preserved. His native place was This, or Thinis (*q. v.*), the metropolis of the eighth nomos (district) of Upper Egypt, and he is said to have founded Memphis (*q. v.*). Manetho says that he waged war with the Libyans, and that he was finally killed by a hippopotamus. Herodotus (ii., 99) says that he founded the Temple of Ptah at Memphis; Diodorus (i., 94), that he arranged the worship of the gods; Ælian (*Hist. Anim.*, xi., 10), that he introduced the Apis-cult at Memphis; and Anticlides (cf. Pliny, *Hist. Nat.*, vii., 56–57, §§192–193) that he invented the alphabet. From native sources it is known that he received divine worship throughout almost all periods of Egyptian history, and the nomenclature of the kings as "King of Upper and Lower Egypt" seems to indicate that his special service was in the unification of the government of the whole land. Charles R. Gillett.

Mengs, Raphael: painter; b. at Aussig, Bohemia, in 1728. He formed his style by copying Raphael. His earlier works are in Dresden, but he painted chiefly in Rome and in Spain for Charles III., who appointed him his court painter. Although a foreigner he was elected president of the Academy of St. Luke in Rome. The ceiling of the Sala dei Papiri in the Vatican is one of his most important works. He painted in oil, in fresco, and also used pastel and gouache. D. in Rome in 1779. He was extremely industrious, and left innumerable works, besides many published treatises on art. W. J. Stillman.

Mêng-tse, or **Mŭng-tse**: See Mencius.

Menhaden, men-hā′den, **Moss-bunker**, or **Bony Fish**: a fish of the herring family, scientifically known as *Brevoortia tyrannus*, extensively caught along the Atlantic coast of the U. S. It is full of small bones, and is almost uneatable in the regular way, but for some years it has been the subject of an extensive and growing industry. The fish are put up as sardines, the bones being softened by subjection to steam. They have been long caught for their oil, which is abundant and is used in leather-dressing, rope-making, and for adulterating higher-priced oils. The refuse, called fish-guano, is a valuable fertilizer. The business of making this oil and guano is extensively carried on along the coasts of New England, Long Island, and New Jersey. See Bugfish and Fisheries. Revised by F. A. Lucas.

Meningi'tis [Mod. Lat., deriv. of *meninx*, from Gr. μῆνιγξ, membrane]: inflammation of the membranes enveloping the brain and spinal cord, termed cerebral, spinal, and cerebro-spinal meningitis, according as the inflammatory process is limited to the region of the cerebrum or brain, the region of the cord, or involves both. Acute cerebral meningitis results from injuries of the head, as fractures and diseases of the cranial bones, inflammation and suppuration of the middle and internal ear, from excessive mental labor, from perverted states of the blood, as in acute rheumatism, and from infectious fevers, such as erysipelas, pneumonia, and typhoid fever. The tubercular meningitis of children is the result of infection with the tubercle bacillus and the development of tubercles in the meninges. Spinal meningitis most often follows injury or disease of the vertebræ, less frequently is excited by rheumatic, gouty, and tubercular blood states. It may occur, as among soldiers in the field, from exposure in sleeping on the ground. Cerebro-spinal meningitis is usually epidemic, and is but one manifestation of a malignant febrile disease, the cerebro-spinal or spotted fever. In cerebral meningitis there are intense headache, active delirium, contracted pupil, flushed face, a slow pulse, sometimes convulsions, coma, paralysis, and death, due to exudation of inflammatory products upon the surface or within the ventricles of the brain. Chronic meningitis may be the cause of chronic headache, of epilepsy, idiocy, and insanity. In tubercular meningitis of children delirium may be absent, but the pain in the head is lancinating and intense, causing the utterance of shrill cries, constant motion of the head, sleeplessness, and peevishness. There are automatic movements of the extremities, and convulsions. General emaciation coexists, as this is a disease of delicate and bottle-fed infants or of children tainted with scrofula or actual tuberculosis elsewhere than in the brain. In spinal meningitis movement of the body develops intense pain over the length of the spine and in the extremities, and an incurvation or rigid arching of the back. Epidemic cerebro-spinal meningitis has, in addition to meningeal symptoms, febrile disturbance, great debility, and sometimes a peculiar purple eruption. Acute meningitis is treated locally by cold applications and counter-irritants, internally by remedies reducing the action of the heart. In secondary meningitis we treat the primary disease, the exciting cause. Tubercular meningitis requires improved hygiene, diet, tonics, and alteratives. Cerebro-spinal meningitis requires nourishing diet, tonics, and stimulants to resist the degenerated blood state, and opium to control pain. Revised by William Pepper.

Me'nippée, Satire: See Satire Menippée.

Menip'pus: Greek philosopher of the Cynic school; a native of Gadara in Syria; flourished about 250 B. C. His writings—a satirical medley of prose and verse—are lost, but his name survives as the model of Varro in his *Menippean Satires*, and as the forerunner of Lucian, in whose works he figures, and the title *Satire Menippée* is borne by a famous French work of the sixteenth century. B. L. G.

Menis'cus: a concavo-convex lens. It may be either a converging lens (thicker at the center) or a diverging lens (thicker at the edge). In other words, a meniscus is any lens the centers of curvature of whose faces are both on the same side, and whose two radii of curvature differ in length. See Lens. E. L. N.

Menkara: See Mycerinos.

Menno, or **Menno Simons**: See Anabaptists.

Mennonites: a body of evangelical Christians who, in relation to the constitution of the Church, to baptism, the taking of oaths, church discipline, accepting of civil offices, and the bearing of arms, are either entirely or almost in harmony with Menno Simons, after whom they are named. They are found in Switzerland, Germany, France, Russia, and North America. Originally, the followers of Menno in Holland were called by that name, but they have departed so far from his principles and practices that for more than a century they have preferred to style themselves Doopsgezinden, or persons who lay emphasis upon baptism. The Mennonites arose in Switzerland in 1525, under the leadership of Conrad Grebel at Zurich. Possibly the principles and practices of Grebel may have been in some way connected with those of sects of the Middle Ages, but hitherto no proof of this has been found. The immediate followers of Grebel were aware of no such connection, but asserted that since the days of the apostles true Christianity had not ex-

isted in the world. In the year 1647, more than a century after the death of Grebel, the notion was advanced that the Waldensians were the spiritual progenitors of the Mennonites, but it has now been surrendered by the most competent scholarship of the Doopsgezinden in Holland. Adherents of Grebel shortly appeared in the Netherlands, where they became very numerous. After the catastrophe at Münster in Westphalia, Menno Simons became their chief spokesman, and owing to his wisdom, industry, and prominence the entire party adopted his name. He was not their founder, however; he accepted the principles which the better portion of the brethren had previously defended, and acquired distinction merely by his ability and activity in promoting them.

The persecution that befell the Mennonites in Switzerland was more severe, perhaps, than any they were called to experience elsewhere. It continued through the whole of the sixteenth century. Toward the middle of the seventeenth century it was again renewed and lasted for a period of seventy years. Nearly all the churches were destroyed, and the unhappy Swiss believers were scattered in many lands. In 1682, when William Penn made an offer of religious liberty it was gladly accepted by them. The first society in North America was organized at Germantown, Pa., in 1683, and these were followed by many others from various portions of Germany. Divisions that originated in Switzerland about the year 1620 may be observed in Pennsylvania and other portions of the U. S. The followers of Jacob Amman of the Bernese Alps, who proscribed the use of buttons on clothing and the trimming of the beard and the like, were among the first to seek refuge in the U. S., and they are still a numerous body.

Mennonites exist at Nancy and Toul, in France, and in various towns in the Franche-Comté. In 1783 Mennonites of the German Baltic provinces emigrated in large numbers to Russia upon the promise of the Government that their scruples against bearing arms should be respected. In 1871 that promise was revoked and many of them quitted Russia for the U. S. Some of these are said to practice immersion in baptism, a practice probably due to their lengthy contact with the Greek Church, which still retains this mode. Among all other Mennonite sects the usual mode of baptism is said to be by pouring: the candidate kneels down and the bishop or minister takes water with both hands and pours it upon his head. This seems to have been the mode adopted at the outset.

The census of 1890 occasioned much surprise as to the number of Mennonites in the U. S. Prior to its appearance almost all authorities reported that there were 200,000 in America, of whom 175,000 were found in the U. S. and 25,000 in Canada. The census gives account of only 41,541 all told. It is possible that not more than the half of 25,000 could be counted in Canada. They are divided into twelve sects, as follows: Regular Mennonites, 17,078; Amish, 10,-101; Old Amish, 2,038; Apostolic (Amish), 209; Brueder-hoef, 352; Reformed, 1,655; General Conference, 5,670; Church of God in Christ, 471; Old Mennonites, 610; Bundes Conference der Brueder-Gemeinde, 1,388; Defenseless (Amish), 856; Mennonite Brethren in Christ, 1,113.

The history of these people in Holland, as elsewhere, has been marked by a variety of sects. The first division occurred during the life of Menno, when in 1554 the Waterlanders were excommunicated. The party that drove them out were themselves in 1566 divided into Flemish and the Frisian Mennonites. There were various other schisms until 1632, when Flemish and Frisians were again united. The Waterlanders were not troubled by divisions of this kind. They were the first to disclaim the name of Menno. After the opening of the eighteenth century the differences that had so long existed between the Flemish Mennonites and the Waterlanders began to fade away, and by the year 1800 all parties were again practically united under the designation of Doopsgezinden. In the year 1700 there were 160,000 of these people in Holland; in the year 1800 they had sunk to 30,000; in 1881 there were said to be 47,000. They have been greatly influenced by the progress of modern events. Having entered the current of modern life they retain but few of the peculiarities that distinguished Menno and the early Anabaptists (*q. v.*). Among these may be mentioned opposition to infant baptism; but it is said that the age of eight years has been fixed as the period of adult baptism. Most of their young people are received into the Church at that age. They still decline to make oath in courts of justice, and likewise maintain the congregational method of church government. There are few signs of the former separation from the world. Though the Doopsgezinden constitute only 1 per cent. of the population, they own at least 10 per cent. of the property and contrive to obtain more than 10 per cent. of the offices. Opposition to the bearing of arms was surrendered in the wars against Napoleon I. There has been a marked revival of religious life among them, as among many other churches of the Continent, since 1817. Most of the tendencies of modern theology are represented in their fold.

Literature.—No satisfactory history of the Mennonites has yet been produced. The *Historia Mennonitarum*, by H. Schyn, 1723 and 1729, is nothing but an attempt to prove that the Mennonites were derived from the Waldensians and not from the Anabaptists. Good materials for a history were brought together by Bloupet ten Cate, *Geschiedenis der Doopsgezinden* (1839–47, 5 parts). A useful work is Starck, *Geschichte der Taufe und Taufgesinnten* (1789); Jehring, *Historie von den Begebenheiten unter den Mennoniten* (1720); S. F. Rues, *Nachricht von den gegenwartigen Zustande der Mennoniten* (1720). The best authority is de Hoop Scheffer's article *Mennoniten*, in the second edition of Herzog's *Real-Encyclopaedie*, vol. ix., pp. 566–577.

William H. Whitsitt.

Menominee: city; capital of Menominee co., Mich. (for location of county, see map of Michigan, ref. 3–F); on Green Bay, at the mouth of the Menominee river, and on the Chi., Mil. and St. P. and the Chi. and N. W. railways; 52 miles N. N. E. of Green Bay. It has numerous saw-mills, and is an important lumber shipping-point. There are 2 national banks with combined capital of $200,000, and a monthly and 4 weekly newspapers. Pop. (1880) 3,288; (1890) 10,630; (1900) 12,818.

Editor of "Herald."

Menomoni: See Algonquian Indians.

Menomonie: city; capital of Dunn co., Wis. (for location of county, see map of Wisconsin, ref. 4–B); on Red Cedar river, and the Chi., Mil. and St. P. and the Chi., St. P., Minn. and Omaha railways; 23 miles N. W. of Eau Claire, 60 miles E. of St. Paul, Minn. It contains 7 brick-yards, 3 sawmills, foundry, machine-shop, sash and carriage factories, a national bank with capital of $50,000, 2 private banks, a bi-weekly and 4 weekly newspapers, and is an important shipping-point for lumber, flour, wheat, bricks, and other articles. Pop. (1880) 2,589; (1890) 5,491; (1900) 5,655.

Editor of "Dunn County News."

Men'on (in Gr. **Μένων**): (1) a King of Pharsalus, who was friendly to the Athenians during the Peloponnesian war. (2) A Thessalian, who was a leader of Greek mercenary troops on the expedition of Cyrus against the King of Persia, his brother. After the battle of Cunaxa Tissaphernes treacherously entrapped the Greek generals, and put them to death. Menon was among those who suffered, though he had planned to betray the Greeks.

J. R. S. S.

Menopo'ma [Mod. Lat.; Gr. *μένειν*, remain + *πῶμα*, lid, in reference to the permanent gill clefts]: a tailed batrachian peculiar to the fresh waters of North America (*Cryptobranchus alleghaniensis*), and commonly known as mud-puppy or hellbender. It has a large and flat head; two concentric series of minute teeth in the upper jaw, and one series in the under jaw; a branchial orifice on each side; rudimentary branchiæ; four limbs, the anterior having four and the posterior five short palmated toes; and a loose skin folded on the sides of the body. It attains a length of 18 inches, is dirty yellowish brown with dark mottlings, feeds chiefly on fish, worms, and mollusks, is fierce and voracious, and erroneously regarded as poisonous. It is common in the Ohio and tributaries. The species *C. fuscus* (Holbrook), found in Western North Carolina, is brownish white above and yellowish white below.

Revised by F. A. Lucas.

Menstruation: See Catamenia and Uterine Diseases.

Mensuration [from Lat. *mensura're*, measure, deriv. of *mensu'ra*, a measuring, deriv. of *mēti'ri*, *men'sus*, measure]: that branch of geometry which teaches how to find, by calculation, the lengths of lines, the areas of surfaces, and the volumes of solids. As the first of these cases comes under the head of Trigonometry (*q. v.*), the word mensuration has come to be applied to the measuring of areas and volumes solely. It shows how, by means of certain boundary-lines or dimensions of the figure, we can obtain the required area or volume. Thus if we are given the lengths of the sides of a rectangle expressed in terms of a unit of length, an inch or a foot, etc., the area is equal to the product of these num-

bers expressed in terms of a square inch or square foot, etc. Again, the area of a triangle is equal to half the product of the base into the height. From this we can derive the area of any plane figure bounded by right lines, as such a figure can always be broken up into triangles, the areas of which can be separately calculated. Among curved lines the area of a circle is equal to half the radius multiplied by the perimeter. Certain machines, called planimeters, have been invented for measuring areas on a plane. The best known is that of Prof. Amsler-Laffon. It consists of two rods hinged together. The extremity of one rod is fixed, while the free extremity of the other traces out the boundary of any curve that is limited in size only by the dimensions of the machine. A graduated roller attached to the latter rod gives, by the difference of its readings before and after the tracing has been accomplished, a number proportional to the area that has been gone round. For areas measured on the sphere, see SPHERE and LUNE.

The volume of a rectangular parallelopiped is the product of the length, the breadth, and the depth in terms of the cubes whose sides are units of length; the volume of a pyramid is one-third of the product of its height and the area of its base, from which we can find the volume of any solid bounded by planes, as such a figure can be decomposed into pyramids. In general, the determination of the length of curved lines, the area of plane surfaces bounded by curved lines, of the area of curved surfaces, and of the volume of solids bounded by curved surfaces, requires the aid of the integral calculus. For measurement on the earth's surface, see GEODESY and SURVEYING.

Mental Association: See ASSOCIATION OF IDEAS.

Mental Fatigue and **Mental Hygiene**: See MENTAL HYGIENE in the Appendix.

Mental Philosophy: See PSYCHOLOGY.

Mental Suggestion: See HYPNOTISM.

Mentana, men-taa'nă: a small place with an old castle, 13 miles to the N. E. of Rome, noted on account of the battle which took place here Nov. 3, 1867 (see map of Italy, ref. 6–D). The small army of volunteers under Garibaldi, numbering about 3,500 men, after defeating the papal troops at Monterotondo, was about to attack Rome, when on Oct. 28 and 29 the French fleet landed the detachment of Failly at Civita Vecchia. Garibaldi, who was before the Roman gate of St. Jean on Oct. 30, retreated to Monterotondo and Mentana, and began to intrench the latter position. On Nov. 2 he pushed one detachment toward Correse and another toward Tivoli. This latter fell in with 3,000 papal troops, followed by 2,000 French troops. The volunteers retreated to Mentana, and here began a fight which lasted four hours, in which they were completely defeated by the papal troops, aided by the French. On the retreat the volunteers met with the Italian army, which had entered the Papal States; they were disarmed, and Garibaldi himself was taken prisoner and carried to the fortress of Varignano, near Spezzia. In honor of this victory the pope instituted the Mentana medal, a silver cross with the inscriptions *Fidei et Virtuti* and *Hinc Victoria*, which was given to all who had participated in the battle. A monument was erected at Mentana in 1877 in honor of the Garibaldians who fell in the battle.

Men'tchikof, ALEXANDER DANIELOVITCH, Prince: soldier and statesman; b. in Moscow, Russia, Nov. 6, 1672, in humble circumstances, and apprenticed to a pie-baker; attracted the attention of Lefort by his spirited face; enlisted in the regiment of Preobashenski; discovered a conspiracy among the Strelitzes; distinguished himself at the capture of Azov; accompanied the czar on his journey to Holland and England; gained by degrees his confidence; became after the death of Lefort his most intimate friend and adviser, and was made a prince in 1707 and field-marshal in 1709. He was a man of superior talent, both as a statesman and as a military commander. He won the decisive battle of Kalisz 1706, contributed much to the victory of Poltava 1709, conquered Pomerania in 1712, took Stettin in 1713, and his influence was felt in all branches of the civil government of Russia. His rapacity was amazing; and when in 1713 he abandoned Stettin to Prussia without the consent of the czar, he was tried by a court martial; his general conduct underwent investigation, and he was sentenced to death. The czar changed this verdict to a heavy fine, and even appointed him governor of St. Petersburg, but he had lost his influence. Once more, however, he came into power on the accession of Catharine I. in 1725, and when in 1727 she was succeeded by the young Peter II., he obtained absolute control of the government of Russia. He was just about to marry his daughter to the czar when he was overtaken by a conspiracy headed by the family of Dolgoruki, Sept., 1727; his property was confiscated, and he and his family were banished to Berezov, in Siberia, where he died Jan. 30, 1730. —His great-grandson, ALEXANDER SERGEIVITCH MENTCHIKOF, naval officer, b. in 1787, was aide-de-camp to the Emperor Alexander in 1812–14, governor of Finland in 1831, Minister of Marine in 1836, and commander-in-chief during the Crimean war. He lost the battles of Alma and Inkerman, but defended Sebastopol with success for several months. He retired on account of ill-health, and was succeeded by Gortchakof. In politics he belonged to the Old Russian party, and was averse to all reforms. D. May 3, 1869.

Menton: town in the department of Alpes-Maritimes, France; beautifully situated on a bay of the Gulf of Genoa, and celebrated for its equable climate, being surrounded on the three sides by the Alpes-Maritimes, here between 3,000 and 4,000 feet high (see map of France, ref. 8–J). Although it has no regular harbor, it carries on a brisk trade in fruits, fish, and perfumeries. Pop. in 1896, 9,044. Close by are some famous bone-caves, 88 feet above the Mediterranean, which are rich in prehistoric remains.

Mentz (Germ. *Mainz*, Fr. *Mayence*. Cf. anc. name *Moguntia'cum*): city of Germany and an imperial fortress of the first rank; in the grand duchy of Hesse; on the left bank of the Rhine, nearly opposite the influx of the Main (see map of German Empire, ref. 5–D). It is surrounded on all sides by a system of strong fortifications consisting of fourteen immense bastions and four detached forts, which command both sides of the Rhine. Its streets are generally crooked and narrow, though since the conflagration in 1857 a large portion of the city has been rebuilt in a thoroughly modern fashion. It contains many interesting buildings—among which is the cathedral, a Romanesque structure with many Gothic details, of the fourteenth century—and many beautiful promenades and public places, such as the Gutenberg Place, with the magnificent bronze monument, by Thorwaldsen, of Johann Gutenberg, who was born and died here, and whose house stood until 1894. Among its manufactures, those of carriages, furniture, and musical instruments have great repute, and its trade is very considerable. Mentz was founded in the second century by the Romans and destroyed in the fifth by Attila, but was restored by Charlemagne. It soon became the see of an archbishop, and in course of time the archbishop became one of the three ecclesiastical electors of the empire. During the Thirty Years' war it was taken by the Swedes in 1631, was again captured by the Imperialists in 1635, and by the French in 1644. Pop. (1895) 76,300.

Menu: See MANU.

Menu'ridæ: See LYRE-BIRD.

Menzaleh: the name of a shallow, brackish lake in the northeast of the Egyptian Delta, which covers about 1,000 sq. miles, and abounds in fish. It is bounded on the E. by a part of the Suez Canal. The region was once fruitful, and was intersected by three (the Pelusiac, Tanitic, and Mendesian) branches of the Nile, and contained populous cities like Tanis, Avaris (Pelusium), Daphnæ (Tahpanhes), and Tennis. The obvious sinking of the surface of the ground, as evidenced by these changes, is intimately connected with a corresponding rise at the S. of the isthmus, and this in turn has an important bearing upon the earlier northern extent of the Red Sea and the probable place of crossing by the Israelites under Moses. See MIGDOL.

CHARLES R. GILLETT.

Menzel, men'tsel, ADOLF FRIEDERICH ERDMANN: historical and genre painter; b. at Breslau, Prussia, Dec. 8, 1815; is self-taught; is best known by his illustrations, which are principally pen-and-ink drawings or lithographs, and are of great excellence. His works in oil and in water-color are notable for admirable technical qualities. He is a member of Berlin, Vienna, and Munich Academies; was awarded a grand gold medal at the Berlin Exposition 1856; second-class medal, Paris Exposition, 1867; decoration of the Legion of Honor 1867. Several important works by him are in the National Gallery, Berlin. He is almost unknown in the U. S. Studio in Berlin. WILLIAM A. COFFIN.

Menzel, WOLFGANG: author; b. at Waldenburg, Silesia, June 21, 1798; served as a volunteer in the campaign of 1815; studied philosophy and history at Jena and Bonn;

was an enthusiastic disciple of Jahn, the founder of the German Turners; lived from 1820 to 1824 as a teacher at Aarau, Switzerland, but settled in 1825 at Stuttgart, where he devoted himself exclusively to literature, and died Apr. 23, 1873. His productions are very varied, comprising tales and romances—*Rübezahl* (1829), *Narcissus* (1830), *Furore* (1851); historical and mythological works and traveling sketches, sometimes consisting of several volumes, of which *Geschichte der Deutschen* (History of the Germans, 3 vols., 1824–25) was translated into English by G. Horrocks (London, 1849); and, finally, criticisms in the form of essays in the *Literaturblatt*, which he edited for many years, and also in the form of books, such as *Streckverse* (1823), *Die Deutsche Literatur* (1828), translated by C. C. Felton in Ripley's *Specimens of Foreign Literature* (Boston, 1840). Menzel was neither a great historian nor a great critic. While his historical writings retain a certain value as documents for the development of German patriotism in the nineteenth century, his critical works dealing with German literature are entirely antiquated. He gained for a while great notoriety by his attacks on Goethe and by the denunciation of the members of Young Germany, the sale of whose writings he caused to be prohibited. The religious and patriotic fanaticism of his critical writings prevented Menzel, however, from gaining permanent influence on German literature. Revised by JULIUS GOEBEL.

Mephistopheles: the name of a personification of the principle of evil, first occurring in the popular books and puppet-plays of the Middle Ages. Its etymology is uncertain, but most probably it is derived from a Hebrew root which signifies "one who loves lies."

Mercadan'te, SAVERIO; composer; b. at Altamura, Italy, 1797; was educated at the musical college of San Sebastio in Naples; first attracted attention in 1818 by a cantata performed at Naples; was appointed director of the Italian opera in Madrid in 1827; chapel-master at the Cathedral of Novara in 1833; director of the Conservatory of Naples in 1840; became entirely blind in 1862, and died at Naples, Dec. 18, 1870. He was a prolific composer, vivacious and graceful; none, however, of his fifty operas is now performed; and very few of his sacred compositions are in existence.

Mercantile (or **Commercial**) **Agencies**: institutions established for the purpose of obtaining information as to the character, personal responsibility, and financial standing of individuals, firms, or corporations.

The vast and rapid increase of population and the extension of railway, postal, and telegraphic communications brought new conditions and created the necessity for an organization to do promptly and systematically for the many what had formerly been done imperfectly by the individual merchant or banker receiving or extending credit. Among the earliest organizations to perform the functions of the modern mercantile agency were the Scottish trade protection societies, which began to spring up about the middle of the eighteenth century. These did not, however, aim to give the relative financial standing of merchants, but, like the BLACK LIST (*q. v.*), supplied such information with regard to bankruptcies, insolvencies, etc., as was needed for the protection of their members. The range of information supplied by these and similar organizations in Great Britain has been greatly extended, and includes statistics taken from the public records relating to assignments, trust deeds, bills of sale, judges' orders, protested bills, and other matters of interest to the mercantile community. In addition to this they have undertaken to collect bills and dividends for members, to investigate measures affecting trade, and to promote legislation favorable to commercial interests. These functions, however, are not assumed by mercantile agencies, as the term is understood in the U. S., where the aim is merely to afford means for ascertaining the credit of people engaged in business. The foundation of the system prevalent in the U. S. was laid in New York in 1840. In its assigned place the agency acts as a clearing-house for information affecting mercantile affairs and mercantile credit. The information is obtained from the business community through the same channels, and following, practically, the same system as was previously and still is employed by individual granters of credit, the agency being merely an enlargement of the individual system, but vastly strengthened by the experience of those who devote themselves to the administration of the details. It is essential that the mercantile world should investigate the moral and financial responsibility of those who assume business relations. Credit does not establish itself *per se*; it is determined by human action and personal judgment, but it should be decided by those competent to ascertain and analyze the facts and qualified to express properly the results of their investigations. The information obtained by the agency estimates the character and ability of persons engaged in business, the apparent success with which the undertaking is conducted, the capital invested, and such other conditions as may have a direct bearing or influence on credit. It is not *ex parte*, for opportunity is afforded all persons, firms, and corporations to state their own financial condition. The methods which apply to the obtaining of information in a single instance are practically the same in all, while the recorded information is subject to constant revision in a similar way. From the reports of investigators is deduced what is known and recognized as the "commercial rating." The names of the various merchants, with their business and rating, are issued quarterly in book-form, and are classified first by States and provinces, then by cities and towns, all arranged in alphabetical order.

The service of the agency is principally in the direct interest of its subscribers, who for a moderate consideration receive, upon application, the information desired, and also the use, for a limited time, of the current printed volume containing the names and ratings of those reported. The great agencies of the U. S. comprehend in their work the entire list of names of persons and business organizations known and recognized in the mercantile community, and to the accomplishment of this have established their offices in all commercial centers throughout the country, attaching to each a certain district—first, for the purpose of gathering, formulating, and distributing the necessary information through their own employees and correspondents, and, second, to give merchants in each section of the country equal opportunity to obtain the immediate benefits of the system. Thus a manufacturer in a small city or town in the interior has every facility for learning of the standing of dealers in his particular product in other places as readily as the merchant or banker of the larger city. The entire American continent is covered by these investigations, and through the extension of the system similar information is supplied with regard to the financial standing of those engaged in business in Europe and Australia. C. F. CLARK.

Mercantile Law [*mercantile* is from Lat. *merca'ri*, to traffic, trade]: is the body of special rules which govern merchants as distinguished from persons not engaged in trade, and mercantile as distinguished from ordinary transactions. Mercantile law constitutes a part of the national or municipal law of each state, and its rules are subject to change by local legislation; but historically it is a product of international usage. Its development has been singularly continuous, and its rules, as recognized and enforced by the principal modern states, are strikingly uniform. Many of the rules which govern international trade are regarded and treated as rules of international law (public or private), particularly in the case of maritime law.

The Ancient World.—The commercial customs of the ancient world, as worked out by Egyptians, Phœnicians, Greeks, etc., were incorporated by the Roman prætors into their provincial and city edicts, and were reduced to clear and simple form by the Roman jurists in their "law of nations" (*jus gentium*, see ROMAN LAW). When the Roman law reached its highest development, in the second and third centuries of the Christian era, the *jus gentium* and the older national law of Rome (*jus civile*) were fused into a single system. In this fusion the broader and more flexible rules of the *jus gentium* substantially replaced the strict and formal rules of the *jus civile*; and the Roman empire ceased to have or to require a separate body of commercial law because the whole law of property and of contracts had been *commercialized*—a fact which explains the dominant influence exercised by the Roman law in the development of mercantile law in the Middle Ages.

The Middle Ages.—Commerce, which had sensibly declined in the fourth and fifth centuries, shrank to very narrow proportions after the overthrow of the West Roman empire. During the early Middle Ages Byzantium was its chief commercial center; the "besant" was the European standard of exchange; and in the Byzantine trade between Europe and the East the rules of the Roman law continued to be observed. Toward the close of the ninth century some of the Italian cities began to assume commercial importance;

in the thirteenth century Italian coinage set the standard of value for Europe; Venice became the chief center of commerce with the East, and the trade between the Mediterranean ports and Northern Europe was largely controlled by the merchants and bankers of Lombardy. The mercantile customs of mediæval Italy—formulated by the statutes of the merchant guilds and incorporated in the statutes of the leading Italian cities; accepted by other cities, not only in Italy, but in Spain, Portugal, France, the Netherlands, Germany, and England; recognized and sanctioned in many cases by formal treaties, not only between the Christian states but also with Islam—became the law-merchant (*lex mercatoria, jus mercatorum*) of the mediæval world. From this source is derived the modern law of trade-marks; of partnership, open and silent, and of stock companies; of agency (see MANDATE) and brokerage; of banking, of negotiable papers (bills of lading and bills of exchange), and of bankruptcy; of shipping (maritime law), and especially of maritime loans (bottomry bonds, etc.), and of marine insurance. The institutions and rules of the law-merchant were drawn, in most cases, from the Roman law; but some Teutonic principles found their way (at first through the Lombard law, later through that of Germany and of England) into the general law of Europe; and the Roman rules themselves received important modifications. The most important and permanent changes were due to the fact that Roman commerce was carried on by slave labor, while modern commerce operates with voluntary service and free association. Certain variations from the Roman law, however, were due to the fact that mediæval trade was conducted on a smaller scale and in cruder forms than the commerce of imperial Rome, and in these cases the development of a more extensive commerce with more refined machinery has frequently resulted in a subsequent reception of Roman rules.

Two of the oldest statements of the mediæval law-merchant are (1) the *Charte d'Oléroun* or *Jugemens d'Oléron* (an island near La Rochelle), parts of which date back to the twelfth century, and which was not only received as authority in Flanders, Holland, and England, but was also incorporated in the North German *Waterrecht* (known later as the law of Wisby); and the (2) *Costumes de la mar*, known later as the *Libro del Consolat del Mar*, a compilation made at Barcelona, which was extensively circulated throughout Europe in the fourteenth century (especially in the Italian version, *Il Consulato del Mare*), and enjoyed the highest credit.

Modern Law.—The development of ocean commerce at the close of the Middle Ages relegated the Italian cities to a secondary position, but the law of commerce continued to develop essentially upon the lines of Mediterranean mercantile usage. The modern states of continental Europe have continued to treat commercial law (*droit de commerce, Handelsrecht*) as a distinct branch of the law, and they have generally adopted commercial codes. Such codes usually include maritime law and the law of negotiable papers and of bankruptcy, but in some cases these matters have received separate regulation. The first modern commercial codes were those of Louis XIV. (*Ordonnance de Commerce*, 1673; *Ordonnance sur la Marine*, 1681), which served as a basis for Napoleon's *Code de Commerce* (1808). The present French code has served as a model for the commercial codes of Belgium, Holland, Spain, Portugal, Italy, Greece, Roumania, Servia, and Turkey, and of many of the Central and South American republics. Germany, before 1861, had many separate commercial codes; these were superseded in that year by a federal code, which was introduced into Austria also. The present Russian code is largely based upon older Prussian legislation.

Great Britain and the U. S.—In the English common law, and in the statutes passed by the British Parliament, by British colonial legislatures, and by U. S. legislatures, there exist special rules for special forms of mercantile association (e. g. corporations, stock companies) and for special mercantile transactions; but neither in the British empire nor in the U. S. is there a separate and distinct body of commercial law. No such separate law has been developed, because, as was the case at Rome, the general law has been gradually commercialized. The recognition of mercantile custom in English judicial decisions dates back to a very early period; and the incorporation of the law-merchant into the English common law, although peculiarly associated with the names of Lord Chief Justice Holt and Lord Mansfield, has in fact kept pace with the development of European commerce.

SOURCES AND LITERATURE.—Pardessus, *Collection des Lois maritimes antérieures au XVIII^e siècle* (Paris, 1828–45); Sir Travers Twiss, *The Black Book of the Admiralty* (London, 1871–76); Lyon-Caen, *Tableau des Lois Commerciales en Vigueur* (English trans. 1st ed. London, 1876; 2d French ed. Paris, 1881); Heyd, *Geschichte des Levantehandels* (Stuttgart, 1879; French trans. by Raynaud, Leipzig, 1886); Lattes, *Il Diritto Commerciale* (Milan, 1884); Goldschmidt, *Universalgeschichte des Handelsrechts* (Stuttgart, 1891). England and U. S.: Levi, *International Commercial Law* (2d ed. London, 1863); Slater, *Mercantile Law* (London, 1884); J. W. Smith, *Compendium of Mercantile Law* (American eds. New York, 1871; San Francisco, 1887).

MUNROE SMITH.

Mercap'tan and **Mercaptans** [from Mod. Lat. *mercu'rius*, mercury + Lat. *cap'tans*, pres. partic. of *capta're*, seize, intens. of *ca'pere*, take]: one of a class of compounds first made by Zeise in 1833. On account of its power of forming a well-characterized compound with mercury mercaptan received its name. It contains sulphur, carbon, and hydrogen, and is analogous to ordinary alcohol. If all the oxygen is removed from the latter and sulphur introduced in place of it, the product is mercaptan. The formulas of the two substances show this relation:

C_2H_6O.	C_2H_6S.
Alcohol.	Mercaptan.

Just as alcohol is a hydrate or a hydroxide, so mercaptan has a similar structure, being derived from the hydrocarbon ethane, C_2H_6, by the substitution of the group SH for one atom of hydrogen, as shown by the formula C_2H_5SH, alcohol being C_2H_5OH. Mercaptan is made by distilling a mixture of potassium ethylsulphate and potassium sulphydrate. It is a volatile liquid of extremely disagreeable odor. It has been shown that a quantity as small as $\frac{1}{460000000}$ milligramme of mercaptan can be detected by the olfactory nerves. This substance is now manufactured on a large scale, as it is required in the preparation of sulphonal. IRA REMSEN.

Mercati, mãr-kaa'tēē, MICHELE: physician and author; b. at San Miniato, in Tuscany, Apr. 8, 1541, belonging to a family which through several generations had distinguished itself by learning and literary accomplishments. He studied philosophy and medicine at Pisa, and after taking his degree, in 1561, he obtained employment from Pope Pius V. He founded the museum of natural history in the Vatican and laid out the botanical garden in Rome. When Cardinal Aldobrandini, whom he once accompanied on a mission, ascended the papal throne, under the name of Clement VIII. (1592), he was made his first physician, but died not long after, in Rome, June 25, 1593. He wrote *Instruzzioni sopra la Peste, Podagra, e Paralisi* (Rome, 1576); *Metallo Theca*, a description of the mineralogical department of the museum (published after his death); an essay on the obelisks found in Rome, and other works.

Merca'tor, GERARD (real name KRÄMER): geographer; b. at Rupelmonde, Flanders, Mar. 5, 1512; studied philosophy, mathematics, and the art of engraving at Louvain; first attracted attention by two superb globes he made in 1541 for Charles V.; moved in 1559 to Duisburg, where he was appointed cosmographer to the Duke of Cleve; published several valuable geographical works giving maps and descriptions of the world—Europe, France, Germany, and the British isles. D. Dec. 2, 1594. His principal works are *Tabulæ Geographicæ ad mentem Ptolemæi Restitutæ* (1578) and *Atlas, sive Geographicæ Meditationes* (1595). By those works he exercised a decisive influence, and contributed much to free the student of geography from the yoke which Ptolemy had laid upon him. When he became older, he became theological, and wrote *Harmonia Evangelistarum adversus Molinæum*, and other works which were put on the *Index Expurgatorius*, though they are really insignificant.

Revised by M. W. HARRINGTON.

Mercator, MARIUS: an ecclesiastical writer who flourished in the first half of the fifth century, and played a conspicuous part in the Pelagian and Nestorian controversies. Of his personal life very little is known. He is mentioned only by Augustine (Ep. 193; *Quæst. ad Dulcit.*, 3) and Posidius (*Indic. Lebr. August.*, 4), and it is doubtful whether he was a priest, a monk, or a layman. He was born in Africa. In 418, during the pontificate of Zosimus, he lived in Rome, and, having there become acquainted with the chief representatives of Pelagianism, he wrote two books against them, one immediately after the other. He sent them both to

Augustine, and received praise and encouragement from him; but they seem both to have been lost, unless the *Adversus novos hæreticos* be identical with the *Hypermesticon*, generally printed among the works of Augustine and generally ascribed to him. Ten years later on, in 428, he went to Constantinople—probably on some official mission, perhaps as the agent of Celestine I.—and there he spent a large portion of his life fighting the Pelagians. He wrote in Greek a memoir, *Commonitorium*, which he presented to the Emperor Theodosius II., the result of which was the banishment from Constantinople of Julian of Eclanum, Celestius, and other Pelagian leaders. He continued, however, to write against them, and in 431 they were formally condemned by the synod of Ephesus. He translated into Latin as well his own writings as other documents belonging to the controversy—several sermons by Nestorius, his epistle to Celestine, the *Symbolum Theodori Majis.*, Cyril's *Apologeticus advers. Orientales* and *Apologeticus advers. Theodoretum*, etc.—and those translations are of the greatest importance for the true understanding of the history of the Church during that period. For a long time, however, they were not known at all. It seems that they were used in the ninth century during the controversy between Gottschalck and Hincmar, and in the pseudo-Isidorian fabrications (whence arose the fable of an Isidorus Mercator), but after that time they were entirely forgotten or ignored until Holstenius, in the sixteenth century, again drew attention to them. The best edition of them is that by Baluze (Paris, 1684), reprint in Migne, *Pat. Lat.* xlviii.

Mercator, Nicholas: mathematician and mechanician; b. at Cismar, in Holstein, about 1620; studied philosophy and mathematics in Copenhagen and Rostock; visited England in 1660, and was made one of the first members of the Royal Society in London. He afterward settled in France, and was made superintendent of the construction of the fountains of Versailles, but, as he would not embrace Roman Catholicism, his salary was not paid him. He died in Paris in 1687. He published *Cosmographia sive descriptio cœli et terræ* (Dantzic, 1651); *Trigonometria ephoricorum logarithmica* (Dantzic, 1651); *Rationes mathematicæ subductæ* (Copenhagen, 1653); *Hypothesis astronomica* (London, 1664); *Institutiones astronomicæ* (London, 1676); besides several essays and memoirs in the *Transactions Philosophiques*. He also published a new edition of Euclid.

Mercator's Projection: that kind of projection used in making a chart in which meridians are represented by parallel straight lines, and circles of latitude by lines perpendicular to the meridians. Longitudes are plotted from a scale of equal parts, and latitudes from a varying scale so adjusted that the plot of a ship's course or of a rhumb shall be a straight line making with the meridians an angle equal to the course or the angle of the rhumb. The result is that the scale of the map increases from the equator toward either pole. The principle on which the projection is made is as follows: The length of a minute of longitude in any latitude is equal to the length of a minute of longitude at the equator multiplied by the cosine of that latitude. The length of a minute of longitude being represented by a constant distance, the length of a minute of latitude must be represented by the same distance multiplied by the secant of the corresponding latitude. A scale constructed according to this law is called a scale of meridional parts. (See Meridional Parts.) In projecting a chart of this kind, the earth is supposed to be a perfect sphere, and one minute of longitude at the equator, or one geographic mile, is taken as a unit. The parallels of latitude at the bottom and top, beginning at some meridian, are divided into equal parts, each of which contains some convenient number of minutes; the extreme meridians are divided into parts which continually increase in passing from the equator toward the pole, in accordance with the law heretofore explained; these parts are taken from a table of meridional parts (table iii., Bowditch's *Navigation*), each division corresponding to a convenient number of minutes, usually the same number that is employed on the parallel of latitude; the corresponding points are united by straight lines, and the outlines of continents, islands, oceans, and the like are then laid down from their known geographical positions, with such other information as may be useful to the navigator. If any two points on such a chart are joined by a straight line, and a right angle formed by drawing a meridian through one extremity, and a parallel of latitude through the other extremity, we shall have the triangle of Mercator's sailing. The side parallel to a meridian is the augmented latitude, the other side about the right angle is the longitude, and the angle at the base is the course. Revised by S. Newcomb.

Merced: city: capital of Merced co., Cal. (for location of county, see map of California, ref. 8–D); on the S. Pac. Railroad; 152 miles S. E. of San Francisco. It is in an agricultural and fruit-growing region, and has a large fruit-cannery, grain warehouses, planing-mill, machine-shops, 2 State banks with combined capital of $126,000, and a daily and 3 weekly newspapers. Pop. (1890) 2,009; (1900) 1,969.

Mercedes, mār-sā′dās: a town of the province of Buenos Ayres, Argentina; on the Western and Pacific railways; 61 miles W. of Buenos Ayres (see map of South America, ref. 8–E). It is the center of one of the richest sheep-grazing regions of the republic, and has a large trade in wool, etc.; there are several steam-mills, good schools, St. Patrick's College, etc. The town was originally a military post, established in 1779. Many of the inhabitants are descended from Irishmen who settled here in 1822. Pop. (1892) about 12,000. H. H. S.

Mercer: borough (founded in 1804); capital of Mercer co., Pa. (for location of county, see map of Pennsylvania, ref. 3–A); on the Neshannock creek, and the W. U. Y. and Pa. and the Pitts., Shen. and Lake Erie railways; 60 miles N. by W. of Pittsburg. It contains 2 public-school buildings, 3 national banks with combined capital of $250,000, and 2 weekly newspapers, and is in an agricultural, mining, stock-raising, and natural-gas region. Pop. (1880) 2,344; (1890) 2,138; (1900) 1,804.

Mercer, Hugh: military officer; b. at Aberdeen, Scotland, about 1721; was educated at the University of Aberdeen; became a physician, and served as assistant surgeon in the army of Prince Charles Edward, the Young Pretender, in 1745. In consequence of the failure of the rebellion he emigrated to America in 1747. He took part in Braddock's campaign, and was wounded in the battle of the Monongahela. He received a medal from the corporation of Philadelphia for his courage upon this expedition. In 1758 he was made lieutenant-colonel; accompanied Gen. Forbes to Fort Duquesne (Pittsburg), and commanded that post for some time. He then settled as a physician at Fredericksburg, Va.; was actively engaged in drilling and organizing the minutemen of Virginia in 1775 and the militia in 1776; was appointed colonel of the Third Virginia Regiment Feb. 13, 1776, and at Washington's request was chosen by Congress brigadier-general June 5, 1776. He commanded the attack at Trenton, and advised the night-march upon Princeton, in which he led the advance. He was mortally wounded Jan. 3, 1777, and died a few days later, Jan. 12.

Mercer, Jesse: b. in Halifax co., N. C., Dec. 16, 1769; moved to Georgia, and after being ordained to the Baptist ministry took pastoral charge of a church in Wilkes County in 1789; was an eloquent preacher, and perhaps did more to build up his denomination in the Southern States than any other one man. His collection of hymns, in a volume entitled *Mercer's Cluster*, is still in use in Southern Baptist congregations; wrote *History of the Georgia Baptist Association* (1836) and edited for many years *The Christian Index* of Georgia. He was one of the most prominent and useful members in the Constitutional Convention of 1798. Having acquired a considerable estate, and being without children, he founded by a liberal donation an institution of learning which was named Mercer University. This was at first established at Pennfield, but has since been moved to Macon, Ga. D. Sept. 6, 1841. See his *Memoir*, by C. D. Mallory. Revised by W. H. Whitsitt.

Mercersburg Theology: the name given to the movement within the German Reformed Church of the U. S. because it originated in the theological seminary of that body situated at Mercersburg, Pa., which grew out of the ideas and doctrines embodied in Dr. Schaff's inaugural address, as theological professor there, on the *Principles of Protestantism*, which was translated and indorsed in an introduction by the other theological professor, Dr. J. W. Nevin (1845). Its distinctive points were: 1. The Christo-centric idea of theology. 2. The Church, the body of Christ, like the human body, passes though various stages of development, in each of which it properly discards features of the previous stage (in this way mediæval Romanism was justified, and likewise its rejection by the Reformers). 3. A liturgical worship was commended. See *Life of John Williamson Nevin*, by Theodore Appel (Philadelphia, 1889).

Mer'cia: the largest and most powerful of the seven Saxon kingdoms in England; comprised the central part of the conntry from the Thames to Yorkshire. It was an independent state from 585 to 825, with the exception of a short period when it was subdued by Northumbria. In 825 it was conquered, and merged into the kingdom of Wessex.

Mercier, măr'si-ā', Honoré, LL. D.: politician; b. at St.-Athanase, Province of Quebec, Canada, Oct. 15, 1840; was educated at St. Mary's College, Montreal; and called to the bar in 1867. He edited *Le Courrier de St.-Hyacinthe* 1862–64; sat in the Dominion Parliament 1872–74; was solicitor-general, Province of Quebec, 1879; and on resignation of the Taillon administration, Jan. 27, 1887, formed an administration, in which he held the offices of Premier, president of council, commissioner of agriculture, and attorney-general. From 1883 till 1887 he was the head of the Liberal party. In 1891 he became commissioner of agriculture. He was member for St.-Hyacinthe in the Legislative Assembly 1879–90; and was member for Bonaventure County in the Legislative Assembly since 1890. He was appointed a Knight Grand Cross of the Order of Gregory the Great (Roman) 1888 and a Count of the Holy Roman Empire in 1891; also was an officer of the Legion of Honor, commander of the Order of Leopold, and received the degree of LL. D. from St. John's College, New York, Loyola College, Baltimore, Md., and Laval University, Quebec. D. in Montreal, Oct. 30, 1894. Neil Macdonald.

Mercier, Louis Auguste, M. D.: surgeon; b. at Plessis-Saint-Jean, Yonne, France, Aug. 21, 1811; graduated M. D. at the École de Médecine, Paris, in 1839; he devoted himself to the surgery of the urinary organs. Among his publications are *Recherches anatomiques, pathologiques et thérapeutiques sur les maladies des organes urinaires et génitaux* (Paris, 1841); *Recherches sur le traitement des maladies des organes urinaires* (Paris, 1856). S. T. A.

Merck, Johann Heinrich: critic; b. at Darmstadt, Germany, Apr. 11, 1741; studied at Altdorf and Göttingen; traveled extensively, and subsequently held several important positions in the civil and military service of his native country. Owing to the failure of some of his mercantile enterprises and to the sudden loss of five of his children he became despondent, and committed suicide June 27, 1791. In 1772 Merck founded the *Frankfurter Gelehrte Anzeigen*, a critical journal to which young Goethe and Herder contributed numerous reviews, and was one of the best contributors to Wieland's *Merkur* and Nicolai's *Allgemeine deutsche Bibliothek*. A man of highly refined literary taste, he exerted as a critic great influence not only upon Goethe, but also upon other contemporary writers and the development of German literature in general. See Merck's *Ausgewählte Schriften zur schönen Lit. und Kunst*, edited by Ad. Stahr (1840); *Briefe an und von J. H. Merck* (1838).
Julius Goebel.

Mercur, James: military officer and scientist; b. at Towanda, Pa., Nov. 25, 1842; graduated at U. S. Military Academy, and was promoted second lieutenant of Engineers, U. S. A., June 18, 1866; first lieutenant Mar., 1867, and captain Dec. 9, 1875; served as assistant engineer on the survey of the Northern and Northwestern lakes 1866–67; at the Military Academy as acting assistant and Assistant Professor of Natural and Experimental Philosophy 1867–72; with the engineer battalion as adjutant and commanding company 1872–76; as assistant engineer to Gen. Newton in removing the obstructions at Hell Gate, and upon other river and harbor works 1876–81; and charged with various works of river and harbor improvements and surveys in the Southern States and in New York harbor and vicinity 1881–84; Professor of Civil and Military Engineering at West Point from 1884 till his death, at Fort Monroe, Va., Apr. 21, 1896. He revised and enlarged Mahan's *Permanent Fortification* (1887), and is the author of *Elements of the Art of War* (1888), and *Military Mines, Blasting, and Demolitions* (1892).

Mercury: See Hermes.

Mercury [named from the god Mercury]: the planet which travels nearest to the sun at a distance of nearly four-tenths that of the earth. When near its greatest eastern elongations, which occur at intervals of four months, it may be seen in the west half an hour to an hour after sunset. Telescopic observation of Mercury has revealed very little of interest. Schröter, by careful study of the phases, concluded that the planet rotates on its axis in about 24h. 5m. 30s., but very little reliance can be placed either on this result or on the supposed inclination of the axis of Mercury to the plane of its orbit. Still, it is worth mentioning that in 1801 Harding discovered a streak on the southern hemisphere of Mercury, the careful observation of which resulted in his obtaining a rotation-period almost identical with Schröter's. The figure of Mercury shows no sensible compression. If Schröter's observations can be trusted, one mountain on Mercury has a height equal to $\frac{1}{125}$ of the planet's radius, or to about 12 miles; but later observers, using telescopes of the best modern construction, have failed so completely in recognizing the marks described by Schröter that great doubt necessarily rests on the accuracy of his conclusions. Mercury passes between the earth and sun more than three times in each year, and when, during one of these passages, Mercury is near his nodes he appears to pass across the face of the sun. Such an occurrence is called a transit of Mercury, and, though less important than a transit of Venus, is yet of interest to astronomers. Transits of Mercury occur at intervals of 13, 7, 10, 3, 10, 3, etc., years, always either in May or November. The following table shows the transits that will occur during the next half century, and the Atlantic times of middle of transit:

1894, Nov. 10	1h. 36m. P. M.
1907, Nov. 14	7h. 7m. A. M.
1914, Nov. 7	7h. 5m. A. M.
1924, May 7	8h. 34m. P. M.
1927, Nov. 10	45m. A. M.
1940, Nov. 11	6h. 22m. P. M.

Revised by S. Newcomb.

Mercury, or **Hydrar'gyrum** [*mercury* is so named from the god Mercury (*q. v.*), perhaps in allusion to the quickness and ease with which it flows in any direction; *hydrar'gyrum* is Mod. Lat., from Lat. *hydrar'gyrus* = Gr. *ὑδράργυρος*, mercury, quicksilver, liter., water silver; *ὕδωρ*, water + *ἄργυρος*, silver]: the only simple metal which is liquid at the ordinary temperatures. It occurs as a native metal, like gold, silver, copper, etc., and has been known to mankind from time immemorial. Its chlorides were also known of old—*corrosive sublimate* and the *red oxide* to the Arabians, and *calomel* to the alchemists. Its sulphide, *cinnabar*, has been used as a pigment from the most ancient times.

Occurrence and Preparation.—Besides the native metal, it occurs chiefly as cinnabar, its most abundant ore. The most famous localities in the U. S. are in California, New Almaden and New Idria, named after the two most productive European localities, Almaden in Spain, and Idria in Carniola. There are, however, numerous other undeveloped cinnabar-bearing regions in the Pacific States. Cinnabar is reduced to metallic mercury either by distilling with lime to combine with the sulphur, or by simply distilling in a current of air, which oxidizes the sulphur to sulphurous acid gas, leaving the mercury free. Metallic iron has also been used to combine with and retain the sulphur. The reduced liquid metal is sent into commerce in bottles of wrought iron closed with screw stoppers, containing about 75 lb. each.

Chemical and Physical Nature.—Pure mercury is almost silver-white, of mirror-like luster, which luster it preserves perfectly in air free from sulphur. Like silver, it is tarnished superficially by sulphurous emanations. Dust also may adhere and tarnish it, but it is readily restored to perfect brilliancy by straining, or even by pouring through a glass funnel, to which the dust or tarnish-films will adhere. The worst enemies to its purity are *other metals*, and ignorance of this fact often leads to the ruin or great deterioration in value of large amounts of mercury. No metal should ever be allowed to touch it except iron or platinum. The smallest proportion of some common metals, especially lead, tin, and zinc, and even copper to a less extent, causes it to tarnish constantly and lose its luster, and injures its perfect liquidity, making it somewhat viscous and adherent to other bodies, so that it will "drag a tail" behind when flowing over a surface, rendering it useless for nearly all its practical applications without purification by processes which are none too easy. In such cases, however, if the amount of base metal is minute, it may be removed by agitating with a diluted solution of perchloride of iron for some time. The mercury is thus "floured" or finely divided into globules, extending its surface so greatly that the base metal is soon converted into chloride and dissolved out. On washing then repeatedly with clean water, the globules will usually coalesce again. If some of them refuse to do so, it is best to add a minute quantity of amalgam of

sodium, which causes instant coalescence of the minutest globules. Mercury which gets into this state of fine division, so that it will not run together spontaneously, is lost in immense quantities in mining countries by being washed away in suspension in water and mingled with sand and "tailings." Mercury when pure has a density of 13·596 at 0° C. (32° F.). When it is frozen, which requires a reduction of temperature to about 39° F. below zero, according to Hutchins (= − 39·44° C.), it forms a tin-like mass, which is crystalline, but nevertheless malleable. It boils, when pure, at 357·25° C. (675° F.), yielding a transparent, colorless vapor 6·7 times as heavy as air. When exposed to the air at or near its boiling-point, it is slowly oxidized to the red oxide, which, when exposed again to a still higher heat, is decomposed into its elements.

Uses of Mercury.—The most important of these is in the working of the ores of Gold and Silver (*qq. v.*). It is also used in the amalgamation of the zincs of voltaic batteries, in making looking-glasses, in barometers, thermometers, steam-gauges and other pressure-gauges, in dental amalgams (with copper). In the laboratory it is a valuable agent in eudiometry (for confining gases), in mercurial pumps, and in other ways. It is used for preparing several important medicinal compounds.

Compounds of Mercury.—Several of the amalgams, or compounds of mercury with other metals, are useful substances. The dental amalgam, with copper, has already been mentioned. That with *tin* forms the coating on looking-glasses. Sodium-amalgam is used in the laboratory for a multitude of purposes, and in the arts in the amalgamation of the ores of the precious metals, and in the recovery of mercury which has been employed for this purpose. The two chlorides of mercury are known commercially as Corrosive Sublimate and Calomel (*qq. v.*). The protoxide or red oxide of mercury, known as *red precipitate* in medicine, is formed both by heating mercury in the air and by applying heat to the nitrate. The only other compound of importance is the sulphide, which, when artificially prepared, forms the beautiful pigment known as *vermilion*, and as found native is the mineral Cinnabar (*q. v.*).

Revised by Ira Remsen.

Medicinal Uses of Mercury vary in accordance with the different physiological effects of different preparations. These have therefore to be studied *seriatim*. There is, however, a general affection of the system called mercurialization, induced by the steady impregnation of the blood with the metal, which is essentially the same whatever be the preparation of mercury used. This will, then, first be considered. Physiologically, the symptoms of mercurialization are briefly as follows: There are first a metallic taste in the mouth, a soreness of the gums, with swelling and redness of the same, and a peculiar fetor in the breath. Next comes a tendency to increase of the secretions, especially of the saliva, to be followed by a general inflammation of the structures of the mouth, swelling of the salivary glands, excessive and foul-smelling salivary secretion, and accompanying fever. If the poisoning continue, this condition, known as salivation, may lead to most disastrous consequences. Ulcers, gangrene, caries of the teeth, and hæmorrhages may occur in the affected parts; and now also the general nutrition of the body will be profoundly disturbed. Diarrhœa, emaciation, grave impoverishment of the blood, with absorption of newly formed tissues, may result, establishing a state of general devitalization, from which the sufferer will but slowly recover. While in this condition the internal organs are liable to inflame, or, in common parlance, the individual is apt to "take cold." If the poisoning has resulted from breathing mercurial vapors, as in the case of artisans working with mercury, the symptoms of the mercurial infection are somewhat different. Salivation does not occur, but the poison attacks the nervous system, producing a peculiar trembling of the limbs, called "mercurial tremor." This may be so severe as to render the sufferer unable to stand, or even to use the hands for any useful purpose. Therapeutically, the induction of moderate grades of general mercurialization was formerly one of the commonest practices of the physician, being systematically resorted to in almost all inflammations, under the idea that thereby the inflammatory process could be checked, or at least controlled in severity, and the absorption of its morbid products hastened; but of late years this practice has been steadily losing favor, the treatment of inflammations without mercury apparently giving even better results than the mercurial system. Very many physicians therefore limit the medicinal use of general mercurialization to the single disease syphilis, in which its extraordinary power has been overwhelmingly demonstrated, but even here the old habit of continuing the use of the drug up till the production of actual salivation has been wholly abandoned, and the development of a slight sponginess and tenderness of the gums is recognized as the utmost physiological limit of therapeutic mercurialization.

Other special properties and uses of mercurial preparations are as follow: In general, the soluble or mercur*ic* compounds are intensely irritant, corrosive, and highly poisonous to all forms of life, animal and vegetable. When swallowed in poisonous dose they produce intense gastro-intestinal inflammation, with extremely severe burning pain, vomiting, purging, cramps, excessive prostration, and death. If the sufferer lives several days, salivation from absorption of the mercurial may occur. The antidote in mercuric poisoning is some form of albumen, as white of egg, milk, flour and water, but as the insoluble albuminates thus formed are again redissolved if left in the alimentary canal, the poison must be got rid of by emetics. The effects on the system are to be treated on general principles. The mercuric compounds used internally in medicine are mercuric chloride (corrosive sublimate), mercuric iodide (red iodide), and mercuric cyanide. These are employed in minute dose, largely diluted, to induce therapeutic mercurialization in syphilis, and in weak solution or in ointment as external applications in many forms of chronic skin disease, especially where depending on the presence of a parasite. Corrosive sublimate in exceedingly small doses is also used internally in certain digestive derangements with diarrhœa. In striking contrast with the mercuric are the mercurous compounds and preparations of the metal itself. Those used internally in medicine are mercurous chloride (calomel), mercurous iodide (green iodide), blue pill or blue mass (metallic mercury thoroughly rubbed into a pasty mass with confection of roses and liquorice-root), and mercury with chalk or "gray powder" (metallic mercury rubbed into a grayish powder with prepared chalk). These preparations have not the corrosive and poisonous properties of the higher compounds—a fact probably largely due to their great insolubility. Given in small repeated dose they are in some way slowly dissolved in the juices of the alimentary canal, become thus absorbed, and readily induce general mercurialization. They are accordingly much employed for this purpose in syphilis. In single large dose the tendency of the present group is to a cathartic effect, strongest in the case of calomel, weakest in mercury with chalk. When so operating the mercurial is itself discharged before there is time for its solution and absorption, and hence this mercurial purging is unattended by any general infection with the metal. The stools produced are yellow and green, apparently from the presence of bile—an indication that the cathartic action extends to the duodenum, and thus the bile contained in that part of the intestine is discharged *per rectum* instead of being reabsorbed. Calomel is much used, either alone or with other cathartics, as a purgative, and calomel, blue pill, and mercury with chalk often prove curative in many intestinal derangements, especially in that condition commonly called "biliousness"; but the philosophy of their curative action is not fully made out. Many other preparations of mercury are used for certain special purposes. Mercurial or blue ointment (metallic mercury rubbed thoroughly with lard and suet) is much used as a means of producing general mercurialization in syphilis, a small piece of the ointment being rubbed into the skin daily. It is also employed for purely local purposes in many skin diseases, and for the killing of parasites. A solution of mercuric oxide in oleic acid forms a more elegant preparation for the same purposes. Mercurous oxide (black oxide) and mercuric sulphide (cinnabar) are sometimes used to mercurialize in syphilis by the process of "fumigation," the compounds being volatilized by heat and allowed to precipitate upon the naked skin of the patient; calomel is also used for the same purpose. Mercuric oxide and ammoniated mercury (white precipitate) are used only externally as gently irritant applications to sluggish sores. *Citrine ointment*, containing mercury in the form of nitrate, is used for the same purposes. An acid solution of mercuric nitrate is a powerful caustic. Finally there should be mentioned the yellow sulphate, or "turpeth mineral," which is a prompt and non-nauseating but harsh and unequal emetic.

Revised by H. A. Hare.

Meredith, Edmund Allen: See the Appendix.

Meredith, George: novelist and poet; b. in Hampshire, England, Feb. 12, 1828; was educated in Germany; studied law, but early devoted himself to literature; has published novels and stories, including *The Shaving of Shagpat: an Arabian Entertainment* (1855); *Farina: a Legend of Cologne* (1857); *The Ordeal of Richard Feverel* (1859); *Evan Harrington* (1861); *Emilia in England*, now called *Sandra Belloni* (1864); *Vittoria* (1866); *Rhoda Fleming* (1865); *The Adventures of Harry Richmond* (1871); *Beauchamp's Career* (1875); *The Egoist* (1879); *The Tragic Comedians* (1881); *A Diana of the Crossways* (1885); and *One of Our Conquerors* (1890); also *Poems* (1851); *Modern Love and Poems of the English Roadside with Poems and Ballads* (1862); *Poems and Lyrics of the Joy of Earth* (1883); *Ballads and Poems of Tragic Life* (1887); and *A Reading of Earth* (1888). He succeeded Lord Tennyson as president of the British Society of Authors in 1892. See Le Gallienne, *George Meredith: some Characteristics* (with bibliography, 1890). Revised by H. A. Beers.

Meredith, Louisa Twamley: author; b. at Birmingham, England, July 20, 1812; received an artistic education; published in 1835 a volume of poems, and in 1836 *The Romance of Nature, or the Flower Seasons Illustrated*, both illustrated by her own pencil. In 1839 she married her cousin, Charles Meredith, and went to Australia. Five years later they settled in Tasmania. D. Oct. 21, 1895. She published *Notes and Sketches of New South Wales* (1844); *My Home in Tasmania* (1852); *Some of My Bush Friends in Tasmania* (1859); *Over the Straits* (1860); and *Loved and Lost*, a volume of verse, illustrated by herself.

Meredith, Owen: See Lytton.

Meredith, William Ralph: See the Appendix.

Meres, Francis: author; b. in England about 1565; was author of *Tamia Palladis, or Wit's Treasurie* (1597); *Wit's Academy: a Treasurie of Goulden Sentences, Similies, and Examples* (1634); and of a translation of the *Sinner's Guide*, by Fray Luis de Granada (1598–1614). The first-named work was a "comparative discourse of our English poets with the Greek, Latin, and Italian poets," which became popular as a schoolbook, and is celebrated as containing the earliest critical references to Shakspeare. Meres died Jan. 29, 1647.

Merganser [Mod. Lat., from Span. *mergánsar*; *mergo*, diver (<Lat. *mer'gus*, diver) + *ánsar*, goose < Lat. *anser*]: a name given to several birds of the family *Anatidæ*, differing from the true ducks in having a slender bill, slightly hooked at the tip, armed with little recurved processes which serve as teeth. This style of bill has earned for the mergansers the popular name of saw-bill. Another common name in the U. S. is sheldrake. The mergansers are expert divers and feed on fish. The males are handsome birds with a striking plumage of black and white. The largest species is the goosander (*Mergus merganser*), common to the Old and New Worlds. The handsomest species is the hooded merganser (*Lophodytes cucullatus*), in which the male has a large, compressed fan-shaped crest of black feathers, with a triangular white mark on the hinder portion. The females are more or less brown in plumage. F. A. Lucas.

Merger [O. Fr. infin. of verb, from Lat. *mer'gere*, sink, cause to be swallowed up]: in law, the absorption or extinguishment of one estate, right, or interest by another of a higher grade, when both become vested in the same person in one and the same right. The doctrine finds its principal application in the law of real estate. Whenever a greater and a less estate unite in the same person, without any intervening estate, the lesser estate is absorbed by, or swallowed up in, the greater. Thus if a tenant for years or for life acquire the reversion in fee simple, the estate for life or years is merged in the fee and disappears forever. What remains is only the fee simple, not at all enlarged or altered in character, it is true, by the absorption of the particular estate. (See Landlord and Tenant.) So if the mortgagee of an estate acquires the equity of redemption, merger will take place and he will become vested with the entire estate. The same result will follow if the mortgagor takes an assignment of the mortgage or becomes otherwise vested with the mortgagee's interest. It is a general principle that whenever a legal and an equitable estate in the same land unite in the same person, the latter is extinguished. In courts of equity, however, the doctrine will be ignored whenever a merger would work injustice or frustrate the lawful intentions of the parties. If the several estates by act of the law unite in the same person, but not in the same right or interest, no merger will occur. If, therefore, an executor who has a reversion in his own right acquire a term of years in his capacity as executor, the two estates will not merge.

Instances of the application of the doctrine of merger occur also in other branches of the law. Thus if a contract of specialty, as a bond, be given by a debtor, binding him to the payment of a debt founded upon simple contract, the remedy upon the specialty supersedes or extinguishes that upon the original agreement, inasmuch as the substituted obligation is of a higher nature. For a like reason the recovery of judgment upon a claim arising out of simple contract extinguishes the original ground of indebtedness, and the only subsequent remedy available is an action upon the judgment; but no merger will take place when both securities are of the same character or degree. Thus one chattel-mortgage would not extinguish another.

The term "merger" is also employed in the English law in a somewhat different sense from those which have been hitherto illustrated. Thus it is there a rule that when a felony has been committed which entitles the party injured to bring a civil action for redress, as well as to institute a criminal prosecution, the remedy by action is merged in the remedy by prosecution, or, as it is briefly expressed, the trespass is merged in the felony; but this does not mean that the civil remedy is extinguished, but only that it is superseded or postponed until the criminal proceedings are terminated. After the end of the prosecution the action is maintainable. This rule is established in order that the party injured may be induced to prosecute the public offense, which he might avoid doing if he were first permitted to recover satisfaction for his private injury. The fact that private persons generally act as criminal prosecutors in England makes this rule important. In the U. S., where the prosecution of criminal offenses is generally committed to special public officials, the English rule has been generally abolished.

In criminal law it was formerly held that a merger would occur where the same act was within the definition both of a misdemeanor and a felony, or both of a felony and of treason. In such cases the lower offense was said to merge in the higher, so that the act could be punished only as a felony in the one case or as treason in the other. This doctrine has, however, been very much restricted in England, where it originated, and it has at present little or no place in the U. S., where the distinction between felonies and misdemeanors has been generally broken down by statute. On the general subject, see *American and English Encyclopædia of Law*, article *Merger*. George W. Kirchwey.

Mergui, or **Merghi**; the southernmost district of Tenasserim, Burma, British India; consisting of a territory stretching along the coast of the Bay of Bengal from lat. 9° 58′ to 13° 24′ N., and an innumerable multitude of small islands known as the Mergui Archipelago. The islands are all high and mostly naked, but rich in edible birds' nests, tortoise-shell, and pearls. The territory of the mainland produces sapan-wood and ivory, and is rich in tin and zinc. It is occupied by two mountain ranges which run nearly parallel to each other, and between which the Tenasserim winds its way to the sea. The coast-land between the sea and the mountains presents in some places fine rice-plains, but is mostly mangrove swamps. The mountain country may be described as one continuous forest. Of the total area of the province, 7,810 sq. miles, only 73 sq. miles are under cultivation. Pop. 60,000. The capital is Mergui, situated on an island in the delta of the Mergui river, in lat. 12° 26′ N. It has a good harbor and some trade, but with the exception of the house of the governor, the hospital, and the barracks, it contains only miserable houses. Pop. 12,000, consisting of Burmese, Siamese, and Chinese settlers.

Merian, Maria Sibylle: naturalist and artist; b. at Frankfort, Germany, Apr. 2, 1647. She was the daughter of a Swiss engraver, and in 1665 married an artist of Nuremberg named Graff; but she is universally known as Madame Merian. She early distinguished herself for her knowledge of botany and entomology, and especially for her studies of insect life and drawings illustrating the metamorphoses of various species; in this she was assisted by her two daughters. In company with one of these she visited Surinam, 1699–1701, bringing back large collections of drawings; the daughter made a second trip to that country in 1702. In 1705 she published *Metamorphoses insectarum Surinamensium*, with numerous large plates of South American insects in different stages. This was republished in French after

her death, together with a similar work on the insects of Europe. Madame Merian's drawings were, for the time, remarkably accurate, and many of her observations, which had been questioned, have since been confirmed. D. at Amsterdam, Jan. 13, 1717. HERBERT H. SMITH.

Merian: the name of a family of artists: (1) MATTHÆUS "the elder," b. at Basel, 1593; studied at Zurich and traveled in the west of Europe; married a daughter of Dirk de Bry, a famous engraver of Flanders. At about the age of thirty he settled in Frankfort as engraver on copper, and afterward started a publishing-house, which was continued by his heirs. Among his works are seventy-eight plates of the ceremonial of *Baptism of Frederick of Wurtemberg*; 400 *Emblematic Plates*, with flowers and landscapes; *Bible Stories*, 200 plates; *The Dance of Death*, from paintings at Basel. His most important work is the immense series of plates of the cities, towns, villages, and castles of Germany and France, known with the accompanying text as Zeiller's *Topographiæ*. The twenty volumes of this work contain hundreds of plates of great merit, as simple renderings of fact, interesting for their historical record, and of value as specimens of simple art. The great Hollar is said to have worked on this series, and his own large topographical landscapes (see HOLLAR) are only the perfecting of the style which Merian introduced. D. at Schwalbach, 1650.—(2) MATTHÆUS "the younger," son of the above; b. at Basel, 1621. He was rather a painter than an engraver, but seems to have aided his father, and to have managed the business after his death.—(3) CASPAR or GASPAR, son of Matthæus the younger. He was an engraver, and signed some of the large plates of Zeiller's *Topographiæ* as above.—(4) MARIA SYBILLE, daughter of Matthæus the elder. (See separate article on this artist.)—(5) JAN MATTHÆUS, son of Matthæus the younger, miniature-painter.—(6) DOROTHEA MARIA GRAFF, daughter of Maria Sybille; b. 1678; painter of flowers and insects. D. 1741.—(7) JOHANNA MARIA HELENA, sister of the last; painter of flowers and insects. RUSSELL STURGIS.

Mer'ida (anc. *Augus'ta Eme'rita*): town in the province of Badajoz, Spain; on the Guadiana; 36 miles by rail E. of Badajoz (see map of Spain, ref. 17–C). During the Roman empire it was the capital of Lusitania and a magnificent city; it is still interesting for its remains of that time, among which are the superb bridge over the Guadiana, 2,575 feet long and containing eighty-one arches, and the triumphal arch of Trajan in the middle of the city. Of the magnificent aqueduct from the laguna of Albuera thirty-seven enormous piers are still standing, with ten arches in three tiers built of brick and granite. Of the circus, measuring 1,356 by 335 feet, eight rows of seats still remain. Pop. 7,390.

Merida, mā'-rĕĕ-dăă: a city of Venezuela; capital of the state of Los Andes; on an elevated plain partly surrounded by peaks of the Sierra Nevada; 310 miles W. S. W. of Caracas and 5,300 feet above the sea (see map of South America, ref. 1–C). Two small rivers, one on each side of the city, unite below to form the Chama, which flows to Lake Maracaibo. The scenery is extremely grand, varying from the luxuriant green of the plateau to rugged mountains, some of which are crowned with snow. The climate, owing to the elevation, is temperate (mean temperature, 61° F.) but subject to frequent and rapid changes. Merida has a lively trade, the principal exports being coffee, cacao, and sugar. The so-called University of Merida, founded in 1810, is properly a theological seminary. The city dates from 1558; it was partially destroyed by earthquakes in 1644, 1812, and 1894. Since 1778 it has been a bishop's see. Pop. (1891) 10,747. HERBERT H. SMITH.

Merida: capital of the state of Yucatan, Mexico; on a plain, 22 miles by railway from its port of Progreso on the Gulf of Mexico (see map of Mexico, ref. 7–K). It was founded by Francisco de Montejo in 1542, on the site of the Maya city of Thó; the latter is still the Maya name of the place. The cathedral, several monasteries, now used for secular purposes, and many dwellings date from the sixteenth century, and were built from material furnished by Maya structures. The city is laid out with straight and wide streets, and has a central square or park. The climate is hot, and at times unhealthful; yellow fever is a frequent visitor. From an early period Merida has been a noted intellectual center; at present it has faculties of theology, law, medicine, etc., forming a university, and numerous other educational institutions. Its modern commercial activity is largely due to the trade in sisal hemp. Pop. (estimated, 1892) 53,000. HERBERT H. SMITH.

Meriden: city; New Haven co., Conn. (for location of county, see map of Connecticut, ref. 10–G); on the N. Y. and N. E. and the N. Y., N. H. and Hart. railways; midway between New Haven and Hartford. It is noted for its manufactures, which include silver-plated ware, Britannia metal goods, hardware, cutlery, steel pens, glassware, cabinet organs, malleable iron, iron and brass castings, machinery, etc. The census returns of 1890 showed that 236 manufacturing establishments (representing 52 industries) reported. These had a combined capital of $13,695,409; employed 7,655 persons; paid $4,191,536 for wages and $4,883,757 for materials; and had products valued at $11,933,992. The city is the seat of the State Reform School, and has 3 libraries (High School, State Reform School, and Y. M. C. A.) with over 12,000 volumes, 3 national banks with combined capital of $1,400,000, 2 savings-banks, a trust and safe-deposit company, and 1 monthly, 2 daily, and 2 weekly periodicals. Pop. (1880) 15,540; (1890) 21,652; (1900) 24,296; town, including city (1890), 25,443; (1900) 28,695. EDITOR OF "JOURNAL."

Meridian: city; capital of Lauderdale co., Miss. (for location of county, see map of Mississippi, ref. 7–H); on the E. Tenn., Va. and Ga., the Mobile and Ohio, and the Queen and Cresc. railways; 85 miles E. of Jackson, 135 miles N. by W. of Mobile, Ala. It is in an agricultural region, chiefly producing cotton; contains Meridian Academy (Methodist Episcopal), Meridian Normal College, and East Mississippi Female College (Methodist Episcopal South); and has 2 national banks with combined capital of $230,000, a savings-bank with capital of $50,000, 2 daily, 5 weekly, and 2 monthly periodicals, and several large factories. Pop. (1880) 4,008; (1890) 10,624; (1900) 14,050.

Meridian Circle: See TRANSIT.

Meridian of a Place [*meridian* is from Lat. *meridia'nus*, pertaining to noon, deriv. of *meri'dies*, midday, noon]: the intersection of the earth's surface with a plane passing through the place and the earth's axis. It is a N. and S. line. If the plane of the meridian of a place is prolonged to intersect the celestial sphere, the line in which it cuts that sphere is the celestial, or astronomical, meridian of the place. The *magnetic meridian* of a place is the intersection of the earth's surface with a vertical plane passed through the axis of a freely suspended magnetic needle at the place. The angle between this meridian and the true meridian is called the *declination* or *variation* of the needle. See EARTH.

Merid'ional Parts: parts of the meridian, as used in Mercator's system, extending from the equator, and computed for all latitudes differing by a minute up to some limit, usually 83°. These parts are tabulated, and are used in this form for projecting charts and for solving problems in Mercator's sailing. The method of computing a table of meridional parts is as follows: Starting from the equator and taking a geographical mile as a unit, the length of the first minute of latitude is the natural secant of 1′, the length of the next minute is the secant of 2′, the length of the next minute is the secant of 3′, and so on; hence the distance from the equator to lat. 2′ is equal to sec. 1′ + sec. 2′, the distance from the equator to lat. 3′ is equal to sec. 1′ + sec. 2′ + sec. 3′, and so on. The results obtained in this way are only approximate, and the process of computation is somewhat tedious. Other methods of computation have been devised that are more accurate, and at the same time of easier application; but the method just given shows more clearly the nature of the table in question. The best method of computing a table of meridional parts is from the formula

$$M = 7915'\cdot70447 \log \cot \tfrac{1}{2}(90° - L),$$

in which L is any latitude, and M the corresponding meridional part. See Coffin's *Navigation*.

Mérimée, mā'rĕĕ'mā', PROSPER: author; b. in Paris, Sept. 28, 1803; studied law and was admitted to the bar, but did not practice; held various positions in the civil service; succeeded M. Vitet in 1831 as inspector of the archæological and historical monuments of France; entered the Academy in 1844; was made senator in 1853. Besides a number of traveling sketches, originally reports to the minister of his professional researches, such as *Voyage dans le Midi de la France* (1835), *Voyage dans l'Ouest de la France* (1836), *Voyage en Auvergne et dans le Limousin* (1838), and *Voyage en Corse* (1840), he wrote several valuable archæological and historical works—*Monuments Historiques* (1843), *Pein-*

tures de l'Église Saint-Savin (1844), *Histoire de Don Pedro I., Roi de Castille* (1843), *Épisode de l'Histoire de Russie* (1854), *Mélanges Historiques et Littéraires* (1855). He made his appearance in literature in 1825 with *Théâtre de Clara Gazul*, which was followed in 1826 with *La Guzla*, a collection of lyrical poems. Both were published simply as translations, the former from the Spanish, the latter from the Illyrian, and for many years the secret remained undiscovered; but their influence in propagating the taste and the ideas of the romantic school in France was nevertheless considerable. Afterward followed a series of novels or small romances, often based on some historical data, and delineating the character of the nation and the age with wonderful precision and vividness. *Colomba* and *Carmen* (1840) may be mentioned as his masterpieces in this style. He died Sept. 23, 1870. After his death a very intimate but somewhat peculiar correspondence with an unknown lady was published, under the title *Lettres à une Inconnue*; an autobiography was also found. See A. Filon, *Mérimée et ses amis* (1894). Revised by A. G. Canfield.

Merino Sheep: See Sheep.

Meri'ones (in Gr. Μηρίονης): a son of Molus and grandson of Deucalion. He went as lieutenant to his uncle Idomeneus, the commander of the eighty ships that formed the Cretan contingent in the war against Troy. He was one of the bravest of the heroes; he was the possessor of the helmet of Amyntor, and excelled especially in archery and spear-casting. On his return from Troy his ship was driven by storms to Sicily, but in time reached Crete, where he was worshiped as a hero. J. R. S. S.

Mer'ioneth: county of North Wales; bordering on Cardigan Bay. Area, 669 sq. miles. It is covered with mountains, the highest peak of which, Arran Mowddy, rises 2,955 feet. The soil is poor, and suited only for pasturage, but some lead and copper are found, and considerable limestone and slate. Pop. (1901) 48,786. Capital, Dolgelly.

Merivale, Charles, D. D., D. C. L., LL. D.: historian; b. in Bloomsbury, London, Mar. 8, 1808; was educated at Harrow, Haileybury, and St. John's College, Cambridge, where he was a fellow and tutor; graduated in honors 1830, and was university preacher (1839–41), Hulsean lecturer (1862), and Boyle lecturer (1864–65); rector of Lawford 1848–70; chaplain to the Speaker of the Commons 1863–69; and in 1869 became Dean of Ely. He wrote *The Fall of the Roman Republic* (London, 1853); *History of the Romans under the Empire* (1850–62, 7 vols.; latest ed. 1890, 8 vols., a standard work); *Conversion of the Roman Empire* (1864); *Conversion of the Northern Nations* (1865); a translation of the *Iliad* in rhymed verse (1869); *A General History of Rome* (1875); and *Lectures on Epochs of Early Church History* (1879), etc. D. at Ely, Dec. 27, 1893.
Revised by S. M. Jackson.

Merivale, Herman, C. B., D. C. L.: statesman and author; elder brother of Charles Merivale; b. in 1806; was educated at Harrow and Trinity College, Oxford, and graduated with high honors in 1827; became a fellow of Baliol College; was called to the bar at the Inner Temple 1832; was Professor of Political Economy at Oxford 1837–42; Under Secretary for the Colonies 1848–60; was perpetual Under Secretary for India; author of *Five Lectures on the Principles of a Legislative Provision for the Poor in Ireland* (1838); *Lectures on Colonization and Colonies* (London, 1841, 2 vols.), the most elaborate and complete work on the subject; *Historical Studies* (1865); *Life of Sir Henry Lawrence* (1873). D. in London, Feb. 9, 1874.

Meriwether, Lee: See the Appendix.

Merle: See Blackbird.

Merlin: a little hawk of Europe, *Falco æsalon*. It is swift and courageous, as well as docile in confinement, and hence it was once extensively employed for hawking at small game. It is represented by the pigeon-hawk in the U. S. See Falcon.

Merlin, Ambrosius: an ancient Welsh prophet and enchanter, traditionally stated to haved lived in the fifth century A. D. The legendary history of Merlin is given by Geoffrey of Monmouth in his *Historia Brittonum*, where he is represented as having sprung from the intercourse of a Welsh princess with a demon, and to have been the adviser of Kings Vortigern, Uterpendragon, and Arthur. He figures largely in all the Arthurian poems from Spenser to Tennyson. A collection of prophecies ascribed to him was printed in French in 1498, another in English in 1529, and a third in Latin at Venice in 1554.—Another Merlin, called *Caledonius*, or "the Wild," was said to have lived at Strathclyde in Scotland in the sixth century, and his grave is still shown at Drummelzier on the Tweed, where he was killed on returning from an incursion into Northumbria. He seems to have been a copy of his Welsh prototype, and his prophecies are almost identical with those of the former. An ancient metrical *Life* of this Merlin, consisting of 1,500 lines, was published by the Roxburghe Club.
Revised by H. A. Beers.

Mermaid [M. Eng. *mermayde*; *mere* < O. Eng. *mere*, lake, sea + *mayde* > Mod. Eng. *maid*]: an imaginary marine being, having the form of a woman to the waist, and ending in the tail of a fish. Mermen, the males of this supposed species, are also described. The probability is that the appearance of the dugong or some other marine animal in places where it was not well known may have given rise to the stories regarding this fabulous being. The sirens, nereids, and water-nymphs of poetry are all forms of the same creature.

Merobau'des, Flavius: a poet; flourished in the fifth century. He was a Spaniard and a Christian, and from an inscription of the year 435 (Corpus VI., 1724) we learn that he was a distinguished soldier and rhetorician and a privy councilor of the emperor. Four of his poems, formerly attributed to Claudian, can be found in Jeep's edition of Claudian, vol. ii., pp. 201–208 (Leipzig, 1879). See also Teuffel, *Römische Lit. Gesch.*, p. 464. M. W.

Meroë: the name given by Cambyses to the Ethiopian city Saba in honor of his sister who died there. It was situated on the Nile, between the fifth and sixth cataracts, in Upper Nubia (16° 44′ N. lat.). (Cf. Josephus, *Antiq. Jud.*, ii., 10; Strabo xvii., i., 5.) After the decay of Napata (*q. v.*) to the N., it became the Ethiopian capital, the chief place of an independent kingdom, in the tenth and ninth centuries B. C. The Greek tradition that Meroë furnished the original of Egyptian civilization is wrong, being based, probably, on limited observation and temporary relations. Amenophis I. (Amenhotep) of the eighteenth dynasty led a warlike expedition into Nubia, and penetrated as far as Meroë. The pyramids of the region were of late construction, dating from 600 to 100 B. C., and are simply formal imitations of those of Egypt. The name was also applied to the ancient kingdom of which Meroë was the capital, and whose kings, "So" and Tirhaka, invaded Egypt. It also survives as the name of a wretched village on the ancient site. The Isle of Meroë is the name of a tract in South Nubia, having an area of 577,480 sq. miles, between the Nile and its tributary, the Atbara. See Lepsius, *Letters from Egypt*, Eng. trans., p. 150. Charles R. Gillett.

Me'rom: the biblical name (Josh. xi. 5) for *Huleh*, a lake in Northern Palestine; triangular in form, the apex pointing S., about 4 miles long, and at its greatest breadth 3½. The best description of it is in Macgregor's *Rob Roy* (1866).

Merop'idæ [Mod. Lat., named from *Me'rops*, the typical genus, from Lat. *me'rops* = Gr. μέροψ, bee-eater]: a family of birds, popularly called "bee-eaters." (See Bee-eater.) They have the head moderate; the bill longer than the head, curved, and acutely pointed at the tip; the gape is not deep; the nostrils are basal, rounded, and partly hidden by the short bristles; the tarsi are very short; the toes long; the tail is long and broad. The species comprises tropical or sub-tropical birds, confined to the Old World. Three genera are generally recognized—viz.: *Merops*, with about twenty species; *Melittophagus*, with six species, peculiar to Africa; and *Nyctiornis*, with seven species, in the Indian mainland and archipelago, as well as Africa. They feed upon insects generally. Revised by F. A. Lucas.

Merostom'ata: the group of Arthropods which includes the Horseshoe Crabs (*q. v.*) and their fossil allies, the Eurypterida. They derive their name from the fact that the basal joints of the legs are used as chewing organs. These forms have the body divided into an anterior cephalothorax and a posterior abdomen. The former bears two pairs of eyes and six pairs of walking legs, some or all of which terminate in pincers. The abdominal appendages are adapted for respiration. Formerly classed with the Crustacea, these forms are now known to be more closely allied to the scorpions and spiders. For the most recent discussion of their affinities, see Kingsley, *Embryology of Limulus* in *Journal of Morphology* (1893). J. S. Kingsley.

Merovin'gian: the first Frankish dynasty in Gaul. The name is derived from Merwig or Merovæus, who was supposed to have founded a Frankish empire on the soil of Gaul in the middle of the fifth century, which Clovis (*q. v.*) or Chlodwig greatly extended and perfectly consolidated. The most characteristic events in the history of the Merovingian dynasty are the perpetual division and subdivision of the empire in Austrasia and Neustria; the horrible feuds originated by the rivalry and hatred of Brunehild and Fredegonda, and so vividly depicted by Augustin Thierry in his *Récits Mérovingiens* (1839); and the establishment of a peculiar office, that of *major domus*, which occasioned the overthrow of the dynasty. In 752 Pepin the Short, *major domus* to Childeric III., confined the king in a monastery and seated himself on the throne by the aid of the pope. Pepin was a man of enormous energy, of great courage, and with a subtle understanding of time and circumstances. He felt that the dire emergencies of the country demanded a vigorous ruler, and he understood that in the eyes of the people the clergy could legitimatize even a revolution. He consequently induced Pope Zacharias to become a member of the conspiracy, and Boniface crowned and consecrated him. Thus the Carlovingian succeeded the Merovingian dynasty. See Franks, The.

Merriam, Augustus Chapman, Ph. D.: scholar; b. at Locust Grove, N. Y., May 30, 1843; was educated at Columbia College, where he has filled successively the positions of tutor of Greek and Latin, Adjunct Professor of Greek, and Professor of Greek Archæology and Epigraphy. He was director of the American School of Classical Studies at Athens 1887–88, and during that time the excavations under his direction determined the birthplace of Thespis. In 1890 he was elected president of the New York Society of the Archæological Institute. D. at Athens, Greece, Jan. 19, 1895. His principal works are *The Phæacians of Homer* (1880); *The Greek and Latin Inscriptions on the Obelisk Crab in Central Park* (1883); *The Sixth and Seventh Books of Herodotus* (1885); *Law Code of Gortyna in Crete, Text, Translation, Comment* (1886); report as director of Athens school (1889). C. H. Thurber.

Merriam, Clinton Hart, M. D.: naturalist and biologist; b. in New York city, Dec. 5, 1855; was educated at the Sheffield Scientific School of Yale University; was appointed naturalist of the Hayden survey in 1872, and assistant U. S. fish commission in 1875; since 1886 has been chief of the division of ornithology and mammalogy, U. S. Department of Agriculture. In 1891–92 he was one of the Bering Sea commissioners. He has devoted himself particularly to the study of the geographic distribution of animals and plants in North America, and is the leading authority on North American mammals. His work, which has consisted largely in accumulating facts bearing on the subjects above named, is not to be measured by his published works. Since 1883 he has described about 125 new species of mammals from North America. Among his papers are *Birds of Connecticut* (1877): *Mammals of the Adirondacks* (1884); *Biological Survey of the San Francisco Mountain Region and Painted Desert of Arizona* (1890); *Geographic Distribution of Life in North America* (1892); and *Results of the Death Valley Expedition* (1893). F. A. Lucas.

Merriam, Henry Clay: See the Appendix.

Merrill: city; capital of Lincoln co., Wis. (for location of county, see map of Wisconsin, ref. 3–D); on both sides of the Wisconsin river, and on the Chi., Mil. and St. Paul Railway; 20 miles N. of Wausau. It contains a high school, 4 grammar schools, 11 churches, free public library with 5,000 volumes, 2 national banks with combined capital of $160,000, and 3 weekly and 2 monthly periodicals. It is in an agricultural and hardwood-timber region, and is principally engaged in lumber-manufactures. Pop. (1890) 6,809; (1900) 8,537.

Merrill, Frederick J. H.: See the Appendix.

Merrill, George Edmands: See the Appendix.

Merrill, George Perkins, M. S., Ph. D., F. G. S. A.: geologist; b. at Auburn, Me., May 30, 1854; was educated at the Maine State College and Wesleyan University, Middletown, Conn.; was assistant in Chemistry in Wesleyan University 1879–80; became curator of geology, National Museum, Washington, D. C., in 1880; has been Professor of Geology and Mineralogy in the Corcoran Scientific School of Columbian University, Washington, D. C., since 1893. He is the author of *Stones for Building and Decoration* (New York, 1891); *Handbook and Catalogue Collection of Building and Ornamental Stones in the United States National Museum*; *Report of Smithsonian Institute* (1885–86); *Handbook for the Department of Geology, United States National Museum*; *Report of the Smithsonian Institute* (1890); and numerous scientific papers.
C. H. Thurber.

Merrill, Selah, D. D., LL. D.: explorer; b. at Canton Centre, Conn., May 2, 1837; entered the class of 1859 at Yale College, but did not graduate; received, however, the honorary degree of M. A. from the same institution; preached in several places; was chaplain in the civil war (1864–65); has been specially active in explorations in Palestine, being archæologist of the American Palestine Exploration Society (1874–77) and U. S. consul in Jerusalem (1884–86, 1890–93), the results of which he has incorporated in numerous articles and in several works, including *East of the Jordan* (New York, 1881; 2d ed. 1883); *Galilee in the Time of Christ* (Boston, 1881); *Greek Inscriptions Collected in the Years 1875–1877 in the Country East of the Jordan, etc.* (New York, 1885); *The Site of Calvary* (1886). G. P. F.

Merrill, Stephen Mason: See the Appendix.

Merrimac: town; Essex co., Mass. (for location of county, see map of Massachusetts, ref. 1–I): near the Merrimack river, and on the Boston and Maine Railroad; 6 miles N. E. of Haverhill, 46 miles N. by E. of Boston. It is connected with Amesbury, Haverhill, and Newburyport by electric railway; has a public library founded in 1876, and a weekly newspaper; and is principally engaged in the manufacture of carriages and felt boots. Pop. (1880) 2,237; (1890) 2,633; (1900) 2,131. Editor of "Budget."

Merrimack River: a stream of New Hampshire and Massachusetts; formed by the union of the Pemigewasset and Winnipiseogee at Franklin, N. H. It flows southward into Massachusetts, where it curves toward the N. E., and reaches the ocean in lat. 42° 48′ 27″ N., lon. 70° 48′ 46″ W. On its banks are the thriving cities of Concord, Manchester, and Nashua, N. H., and Lowell, Lawrence, Haverhill, and Newburyport, Mass. It is a navigable tidal stream as far as Haverhill, 15 miles. At its mouth there is a shifting bar which impedes commerce. The river below the dam at Lawrence has valuable fisheries, but its chief industrial importance is from the immense water-power it affords.

Merriman, Mansfield: civil engineer; b. in Southington, Conn., Mar. 27, 1848; graduated in 1871 at the Sheffield Scientific School of Yale College, which also conferred upon him the degree of C. E. in 1872, and of Ph. D. in 1876. From 1872 to 1875 he was engaged in surveying and engineering work: from 1875 to 1878 he was instructor in the Sheffield Scientific School; from 1878 to 1881 Professor of Civil and Mechanical Engineering, since 1881 has been Professor of Civil Engineering in Lehigh University, Pennsylvania. During 1880–85 he was acting assistant, U. S. Coast and Geodetic Survey, having charge of triangulation in Pennsylvania. He is the author of the following books: *Continuous Bridges* (1876); *Elements of the Method of Least Squares* (1877); *The Figure of the Earth* (1881); *Text-book on the Method of Least Squares* (1884); *The Mechanics of Materials* (1885); *A Text-book on Roofs and Bridges* (1888); *Treatise on Hydraulics* (1889); *A Text-book on Retaining Walls and Masonry Dams* (1892); and *Introduction to Geodetic Surveying* (1892).

Merritt, Anna Lea: See the Appendix.

Merritt, Wesley: soldier; b. in New York city, June 16, 1836; graduated at the U. S. Military Academy, and entered the army as brevet second lieutenant of dragoons 1860; was appointed captain Second Cavalry 1862. In the early part of the civil war he had much valuable experience on the staff of cavalry commanders, and in Apr., 1863, accompanied Stoneman's raid to Richmond; was appointed a brigadier-general of volunteers in June, and breveted major U. S. army the week following for Gettysburg, where he commanded the reserve cavalry brigade, as also in the subsequent operations up to Apr., 1864. In the Richmond campaign of 1864 he commanded a division under Sheridan, participating in all the battles of that campaign, and was breveted lieutenant-colonel for gallant and meritorious services at Yellow Tavern, and colonel for the same at Hawes's Shop, Va. In command of a cavalry division in the Shenandoah campaign, he took part in various skirmishes and the battles of Opequan, Cedar Creek, Winchester, and Fisher's Hill, where he won the brevet of major-general; again at Five Forks, Sailor's Creek, and final surrender was distinguished, and promoted

to be major-general from date of Five Forks; and was breveted brigadier and major-general, U. S. army, Mar., 1865. He served in various departments till Feb., 1866, when he was mustered out of the volunteer service; became lieutenant-colonel July, 1866; colonel July, 1876; brigadier-general Apr., 1887; superintendent of U. S. Military Academy 1882–87; commanded the department of the Missouri 1887–91 and 1895–97, the department of Dakota 1891–95; major-general Apr. 24, 1895; in command of the East Apr. 11, 1897; commanded U. S. forces in the Philippines in 1898, and on his return again assigned to the department of the East.

Merry, Robert: poet; b. in London in Apr., 1755; was educated at Harrow and at Christ's College, Cambridge; studied law at Lincoln's Inn; bought a commission in the Guards in 1775, but soon sold it; lived from 1784 to 1787 at Florence, Italy, where he became a member of the famous Della Crusca Academy; contributed to *The Florence Miscellany*, and returning to London began to publish plays and poems under the pseudonym *Della Crusca*. Their style was imitated by many writers, and thus gave occasion to Gifford to satirize the "Della Cruscan school" in his *Baviad*. Merry married in 1791 Miss Elizabeth Brunton, an actress, with whom he went to the U. S. in 1796. He brought out in Philadelphia a play entitled *The Abbey of St. Augustine* (1797). D. in Baltimore, Dec. 14, 1798.

Revised by H. A. Beers.

Mersey: a river of England which rises in the north part of the county of Derby, flows in nearly a westerly direction, expanding at Runcorn into a broad estuary, on the north side of which is Liverpool; below this it joins the Irish Sea. This estuary is from 1 to 3 miles broad, and is about 16 miles long; on its Cheshire side is the entrance to the Manchester Ship-canal, and underneath it is a tunnel connecting Liverpool and Birkenhead by railway, which has been in operation since Jan. 20, 1886. The Mersey, with the estuary, has an entire length of about 70 miles, and is navigable to its junction with the Irwell, its principal affluent.

Mersin: chief port of Southeastern Asia Minor; in the vilayet of Adana (see map of Turkey, ref. 6–G). Its roadstead is exposed and has a shifting bottom. The town is attractive, with wide, clean streets; water abounds, and in the environs are numerous gardens and villas. Its exports of carpets, cotton, wool, sesame, linseed, and castor-beans are important. Pop. 8,000. E. A. G.

Merson, mãr'sōṅ', Luc Olivier: historical painter; b. in Paris, May 21, 1846; pupil of Pils; was awarded the Grand Prix de Rome in 1869; a first-class medal at the Salon of 1873; first-class at the Paris Exposition of 1889; received the decoration of the Legion of Honor in 1881. His compositions are most artistically conceived, and his work possesses qualities of a high order. *St. Isidore* (1879) is one of his finest works, and *Repose in Egypt*, the Holy Family resting by night in the desert—exhibited at the Salon of 1879—is owned by S. A. Coale, St. Louis, Mo. Studio in Paris. William A. Coffin.

Mer'thyr Tyd'vil: parliamentary borough and market-town of South Wales; on the borders of the counties of Brecknock and Glamorgan; on the Taff; 24 miles N. by W. of Cardiff, its port (see map of England, ref. 11–E). It is for the most part meanly built, but since 1850 it has been greatly improved. The industries arise entirely from the collieries and iron-works in the vicinity, as Merthyr is the center of the Glamorganshire coal-fields. Pop. (1891) 58,080.

Merton, Walter, de: founder of Merton College; b. at Merton, in Surrey, England, or at Basingstoke, Hampshire, early in the thirteenth century; was educated at the priory at Merton; took holy orders; obtained several benefices; was appointed Lord Chancellor 1261; deprived of his office by the barons 1263; reappointed 1272, but resigned in 1274, having been appointed Bishop of Rochester. He was reputed a man of great learning. D. Oct. 27, 1277, and was buried in Rochester Cathedral. Chancellor Merton established at Basingstoke, where his parents were buried, a hospital for poor travelers and indigent ministers, and founded Merton College at Oxford (Jan. 7, 1264), gave it a further endowment in 1270, and saw it completed in 1274. Its distinctive feature was that it was a literary, not a sacerdotal, institution, and that the students were prohibited from taking vows. It became the archetype upon which most subsequent colleges at Oxford were modeled, and celebrated its sex-centenary in 1864.

Meru, or **Sumeru** [Sanskr.]: in Hindu mythology, a fabulous mountain which forms the central axis of the universe and round which all planets revolve. It is 84,000 yojanas (about 1,344,000 miles) high, is wider at top than at bottom, is the abode of Brahmã, and supports the Devalokas (*q. v.*) and the Brahmalokas. Its eastern side is composed of gold, its southern side of lapis lazuli, its northern of crystal, and its western of silver, and each is the abode of one of the four regents or kings who ward off the assaults of the Asuras or demons who live beneath the mountain. The Ganges flows from heaven on its summit, and thence descends in four streams to the surrounding worlds. Mt. Meru plays an important part in the Buddhist cosmogony. R. L.

Mer'ula (*Marlani*), Georgios: classical scholar; b. at Alessandria, near Milan, 1424; was educated by the famous Philelpho; opened a school in Venice in 1464; was called back to Milan by Louis Sforza in 1482, occupying the post of historiographer of the city. D. Mar., 1494. He was a man of excessive vanity, and engaged in polemical controversies with his contemporaries, notably Politiano. He issued the *editio princeps* of Martial (1470); *The Comedies* of Plautus (1472); edited Cicero, *de finibus*, *pro Ligario*; and wrote learned commentaries to Juvenal, Statius, Ausonius, and others. Alfred Gudeman.

Merula (*van Merle*), Paul: classical scholar; b. at Dordrecht, Holland, Aug. 19, 1558; was a member of a very distinguished family; after several years of travel he practiced law at The Hague. He succeeded in 1592 to the chair of History at the University of Leyden, made vacant by Justus Lipsius, and was appointed librarian in 1598, after the death of Douza. He retired to Rostock because of ill-health, but died soon after his arrival July 20, 1607. He was the first editor of the fragments of *Ennius*, with valuable notes (1595); of *Eutropius*; author of a *Life of Erasmus*, and of many geographical works and treatises on Roman antiquities. Alfred Gudeman.

Merv (anc. *Margiana*): oasis in the province of Transcaspia, Russian Central Asia; situated in lat. 37° 30′ N. and lon. 62° E.; 250 miles N. of Herat and 360 miles S. of Khiva; area, 2,000 sq. miles; pop. 150,000 to 200,000; formed by the Murghab, and surrounded W., N., and E. by the most arid parts of the Kara-Kum desert, while to the S. it communicates with the valley of the Herirud of Afghanistan. The Murghab rises on the northern side of the Paropamisus, runs parallel to the Tejend, and likewise loses itself in the Kara-Kum desert, having spent its waters on the formation of Merv. The inhabitants of this oasis are Turcomans of the Tekke tribe. The great fertility of the country made Merv at times a marvel of prosperity, but at present the Tekkes feel it necessary to add to the productions of their agriculture and manufactures (arms, silverware, superior carpets, felts, coarse cloths, etc.) by pillaging their neighbors. In ancient times the oasis contained a wealthy and extensive city, as shown by its ruins. The present town of Merv has sprung up since the extension of the Transcaspian railway through the oasis. It is the railway station, and has a population of 3,000.

Revised by M. W. Harrington.

Méry, mā'ree', Joseph: poet and satirist; b. at Aygualades, near Marseilles, Jan. 21, 1798; was educated at a seminary, but was expelled on account of his atheistical opinions, and after a reckless and quarrelsome career, in the course of which he fought in duels, violated the press laws, and spent some time in prison, he went to Paris in 1824 and published in collaboration with Barthélemy *La Villéliade*, a satire on the Villèle ministry, and a number of verses dedicated to the Bonaparte family. He also worked on the *Némésis*, a satirical journal, and produced a variety of romances, dramas, and poems, some of which acquired great popularity. D. in Paris, June 17, 1866. Among his poetical works are *Mélodies poétiques* (1853) and *Napoléon en Italie* (1859). Of his romances may be mentioned *Scènes de la vie Italienne* (1837); *Les Nuits de Londres* (1840); *Un amour dans l'avenir* (1841); *Héva* (1843); and a collection of *Nouvelles nouvelles* (1853). His dramatic writings include *L'essai du mariage* (1855); *Les deux Frontins* (1858); *La fiancée aux millions* (1864); and many others, together with librettos for several operas. F. M. Colby.

Meryon, mā'ri-ōṅ', Charles: engraver; b. in Paris, France, Nov. 23, 1821; entered the naval school at Brest, and in 1839 began a naval career of seven years, during which he rose to the rank of lieutenant. In his voyages in the Medi-

terranean and the Pacific he had used freely a natural power of drawing from nature, and from 1846 to 1850 he studied art in a formal way, but gave up painting because his eye for color was defective. He began to make careful engravings of the buildings of old Paris, selecting those remarkable for picturesque effect, but not treating them in the swift and suggestive way common to etchers; his work was rather severe and exact than free, and it is difficult to say how far he used the burin to help out the effect of his etchings. His work obtained little recognition, and he could hardly support life by it. Melancholy and despondency overcame him; in 1858–59 he was confined in the asylum for the insane at Charenton, near Paris; and in 1866 his mind had failed so much that it was necessary again to confine him. He died at Charenton, Feb. 14, 1868. His chief work is contained in a series of *Eaux-Fortes sur Paris*, twelve large plates, with a number of smaller decorative pieces. The best known of these twelve plates are *La Morgue*, *L'Abside de Notre Dame*, *Tourelle de la Rue de la Tixéranderie*. Besides these he made other etchings of Paris, some from buildings in Bourges, some after drawings which he had brought home from Greece and from New Zealand and other islands of the Pacific, and a very few to order, of which much the most important is a panoramic view of San Francisco made from small daguerreotypes. RUSSELL STURGIS.

Merzlïakov', ALEKSEÏ FEDOROVICH: poet; b. in Perm, Russia, in 1778. In 1793 he was sent to Moscow, where he studied at the university at which he afterward taught, in time becoming full professor of Russian eloquence and poetry. His first verses appeared in print as early as 1794, and for the rest of his life he continued to contribute to different papers and reviews. Although in theory he was a strict adherent of the so-called classic school, the simplicity and feeling in some of his shorter poems have kept them popular to the present day. He was also the author of religious odes, many of which possessed merit, as well as of a number of translations, chiefly from the Latin and the Greek, likewise from Tasso, Alfieri, and other Italian poets. See his complete works (2 vols., Moscow, 1867). D. July 26, 1830. A. C. COOLIDGE.

Mesa, La: See LA MESA.

Mescala, or **Mezcala**, māz-kaa'lăă: a river of Mexico; rising in the state of Tlaxcala, flowing through Puebla and Guerrero, and lower down forming the boundary between Guerrero and Michoacan; its general course is westerly, but on reaching the Sierra Madre it turns suddenly southward through that range and reaches the Pacific near lon. 102° W. It takes various local names, as *Atoyac* in Puebla, *Rio de las Balsas* in Guerrero, and *Zacatala* near its mouth, where it is navigable for some distance; the entrance, however, is obstructed by sandbars, and the little port of Zacatala has no commercial importance. The Mescala has comparatively few dangerous rapids, but the current is very swift and strong; various plans have been proposed for its canalization. At present it is important only for gold washings along its lower course, and locally for its fisheries. It gives its name to the small town of Mescala in Guerrero. HERBERT H. SMITH.

Mescalero: See ATHAPASCAN INDIANS.

Mescalpa: See GRIJALVA.

Mesenceph'alon: See BRAIN.

Mes'entery [Gr. *μέσος*, mid, middle + *ἔντερα*, intestines, bowels]: a double fold of the peritoneum which attaches the small intestine to the spinal column, but so loosely as to allow much freedom of motion. The corresponding support of the large intestine is the *mesocolon*, with the *mesorectum*. The mesentery contains between its folds numerous blood-vessels, nerves, lacteals, and lymphatics, and the ganglia known as mesenteric glands, which are connected with the lymphatico-lacteal system. It is about 4 inches wide, and extends nearly the whole length of the intestine. See PERITONITIS.

Me'sha: King of Moab in the reigns of Ahab, Ahaziah, and Jehoram, tributary to the kingdom of Israel, to which he annually paid "a hundred thousand lambs (2 Kings iii. 4) and a hundred thousand rams with their wool." On the death of Ahab (i. 1; iii. 4) he revolted, and Jehoram made an alliance with Jehoshaphat, King of Judah, against him. The two kings overran Moab with the exception of one stronghold, which Mesha successfully defended after offering his first-born son as a burnt-offering to his god Chemosh (iii. 27). An inscribed tablet of this king, the MOABITE STONE (*q. v.*), which commemorates the deliverance hinted at in 2 Kings iii. 27, was discovered in 1868 at Dibon.

Mesh'ed, or **Mashhad**: the capital of the province of Khorassan, Persia; on an elevated but fertile plain in lat. 36° 17′ N. and lon. 59° 37′ E. (see map of Persia and Arabia, ref. 2–J). To some extent Meshed derives its importance from the circumstance that it contains the mausoleum of Imâm Riza, who was the founder of the great Mohammedan sect of the Shiites. This mausoleum and the mosque built over it, with its gilded domes and minarets, its doors of silver, its rails of gold, and forests of columns of marble and porphyry, is among the most magnificent buildings of the East, and is annually visited by thousands of pilgrims. Besides being a so-called holy city, Meshed is a great trade-center. Caravans are coming and going every day, carrying loads of costly merchandise from India, China, Persia, Arabia, and Europe. In several branches of industry its own manufactures are celebrated; its carpets, shawls, light silks, and sword-blades have a high reputation; also certain kinds of earthenware, glass, and porcelain. Pop. estimated at from 50,000 to 80,000. Revised by M. W. HARRINGTON.

Mes'mer, FRANZ, or FRIEDRICH ANTON: physician; b. at Itzmang, on the Lake of Constance, May 23, 1733, or, according to others, at Meersburg, in Suabia, in 1734. He was educated at Dillingen and Ingolstadt, studied medicine at Vienna, took the degree in 1766, and began his famous magnetic cures in 1772; went to Paris in 1778; made an enormous sensation and a great fortune, but lost his reputation here by the unfavorable report made on his method by a royal committee of the greatest French physicians and scientists; practiced for some time in London, though with less success; returned to Germany, and died almost entirely forgotten at Meersburg, Mar. 5, 1815. Mesmer gave his name to the whole class of phenomena now known under the term HYPNOTISM (*q. v.*), the older term mesmerism having covered a great number of theories and supposed facts, which only the recent scientific work in hypnotism has put in order. Revised by J. MARK BALDWIN.

Mesmerism: See HYPNOTISM.

Mesocarp: See DRUPE.

Mesonero Romanos, RAMON, de: writer and scholar; b. in Madrid, Spain, July 10, 1803; d. there in Apr., 1882. He began life by succeeding to his father's business in Madrid, but his literary instincts were strong, and he gradually gave way to them. In 1831 he made his literary *début* with a *Manual de Madrid* (3d ed. 1844), at once a guide to the topography and monuments of the city, and a collection of remarkably skillful pictures of the peculiar life there. This had appeared under the pseudonym *El Curioso Parlante*; and under the same name he published his *Panorama matritense* (2 vols., 1832–35); *Escenas matritenses* (4 vols., 1836–42); *Tipos y carácteres* (1843–62). In 1836 he founded, and for some years conducted, the *Semanario pintoresco español* (8 vols.). In 1842 he published *Recuerdos de viaje por Francia y Bélgica*. In 1845 he was attached to the Biblioteca Nacionál in Madrid, and from that time on turned more and more to scholarly labors. He edited several volumes of the dramatists for Rivadeneyra's *Biblioteca de Autores Españoles*, and contributed critical or biographical notices to several others. In 1861 he published a scholarly history of early Madrid, *El antiguo Madrid*. After his death a volume of his literary remains appeared, *Algo en prosa y verso* (1883). A collected edition of his works, *Obras*, was printed in Madrid in 1881. A. R. MARSH.

Mesopota'mia [= Lat. = Gr. *μεσοποταμία* (sc. *γῆ*, land), the country between the rivers; *μέσος*, mid, + *ποταμός*, river]: the name generally applied since the third century B. C. to the territory inclosed between the Tigris and Euphrates, and 33° 30′ and 37° 30′ N. lat. It is called by the Arabs *el Jezireh*, *the Island*. The whole region is now part of Asiatic Turkey, constituting the vilayet of Mesopotamia. The northern part is rendered hilly by spurs of the Taurus; all the rest is a low, level plain, consisting mainly of dry steppes. The soil is fertile along the rivers where irrigation is employed, but elsewhere affords scant pasturage. Kurds inhabit the north, but the great majority of the inhabitants are Arabs. Anciently it was well cultivated and prosperous, being traversed by the main commercial routes uniting Central and Western Asia. E. A. GROSVENOR.

Mesothorax: See ENTOMOLOGY.

Mesozo'a [Mod. Lat., from Gr. μέσος, middle + ζῷον, animal]: a name introduced by van Beneden for certain problematical animals, from the fact that he regarded them as occupying a position intermediate between the Protozoa, or single-celled, and the Metazoa, or many-celled animals. The forms included are almost microscopic in size, and are either thread-like or spindle-shaped. They live as parasites in cuttle-fishes, Echinoderms, and certain worms. The bodies are remarkable in consisting of very few cells, and these are arranged as an outer layer covering a central mass of one or several inner cells. All organs, except cilia for locomotion, are lacking. They have neither mouth, nervous system, nor muscles. The central cells produce the eggs which go through quite a peculiar history. As to the position of these forms opinions differ, but the weight of the evidence goes to show that they must be regarded, not as primitively simple forms, as thought by van Beneden, but as degenerate worms, coming from that group which naturalists call Plathelminthes. Two distinct groups are recognized, the Orthonectida and the Dicyemida. None has been found in America. J. S. Kingsley.

Mesozo'ic Era [*mesozoic* is from Gr. μέσος, middle + ζωή, life]: the second of the three great divisions of geologic time characterized by known forms of life. It was preceded by the Palæozoic era and followed by the Cenozoic, and has sometimes been called the era of reptiles. In the chronologic system of most European geologists, it includes the Triassic, Jurassic, and Cretaceous periods; in the system adopted by the U. S. Geological Survey it includes the Jura-Trias and Cretaceous periods. See Geology and Paleontology. G. K. G.

Mesquit-grass: a name given in the Western U. S. to rich pasture-grasses of the genera *Bouteloua*, *Aristida*, and some others. They are of great value to stock-raisers, but are of less value for hay-making.

Mesquit-tree: a small, thorny and gnarled tree of Texas, New Mexico, Arizona, and Mexico, the *Prosopis juliflora* of the family *Leguminosæ*. Its hard wood affords good fuel, and its branches yield abundantly a gum which is a good substitute for gum arabic. It appears sparingly in commerce, and is called mesquit-gum. The long pods abound in a thick, sweet, edible pulp. Both bark and wood are rich in tannic acid, and are excellent materials for use in tanning hides. Another mesquit is the *Prosopis pubescens* (screw mesquit); its beans are eaten by the Indians, and the wood is of great value on the southwestern desert plains. It is a shrub or small tree, considerably resembling the above.
Revised by Charles E. Bessey.

Messalina: See Claudius.

Messa'na (in Gr. Μεσσήνη, now *Messina*): a city on the eastern coast of Sicily, near the straits that bear its name. In 729 B. C. Chalcis in Eubœa sent a colony to the place, whose old name Zancle or Danele they retained. In 494 B. C. exiles of Miletus and Samos were invited to settle in Zancle, but by the advice of Anaxilas, tyrant of Rhegium in Italy (colonized partly by Messenians), the newcomers took possession of the city, which soon thereafter came into the power of Anaxilas who, being a Messenian, renamed it Messene (Doric Messana) after his unfortunate mother-country. It later became Messina (*q. v.*). J. R. S. Sterrett.

Messapian Language: a language which survived in Calabria, Southeastern Italy, until the first century B. C., and is known to us through a few inscriptions written in a special form of the Greek alphabet. It belongs to a group of languages which in early times occupied the entire southern and southeastern part of Italy, and was spoken by a population known under the various names Messapii, Iapygii, Pœdiculi, Peucetii, Dauni, Sallentini, Bruttii, etc. The most probable view concerning the historical connection of this group associates it with the Illyrian (Albanian) of the opposite shore of the Adriatic. See Th. Mommsen, *Unteritalische Dialekte* (1850); *History of Rome* (vol. i.); W. Deecke, *Zur Entzifferung der messapischen Inschriften* (*Rhein. Mus.* vols. xxxvi., xxxviii., xl.); H. Nissen, *Italische Landeskunde* (vol. i., 1883). See Italic Languages.
Benj. Ide Wheeler.

Messe'ne (in Gr. Μεσσήνη): a city in Messenia founded by the Thebans, under the lead of Epaminondas, in 369 B. C., at the foot of Mt. Ithome, after the power of Sparta had been finally broken. The new city was peopled by the descendants of those who had emigrated 300 years before, and the country flourished anew as an independent state until conquered by the Romans in 146 B. C. The ruins of the walls are universally admired. J. R. S. S.

Messe'nia (in Gr. Μεσσηνία): a state of ancient Greece embracing the southwestern part of the Peloponnesus; bounded on the N. by Elis and Arcadia, on the E. by Laconia, and on the S. and W. by the sea. See Messene and Messenian Wars. J. R. S. S.

Messenian Wars: wars between Messenia and Sparta. *First War* (from 743–724 B. C.).—Spartan maidens who were visiting the temple of Artemis on the frontier were carried off by Messenian youths, and when Teleclus, King of Sparta, demanded them back, he was killed. About the same time the herds of the Messenian Polyehares were driven off and his son was slain. Then, as the Spartans refused to deliver up the flocks, Polychares killed every Spartan he could find. The war began by the massacre of the inhabitants of the frontier town Ampheia by the Spartans. A pitched battle was of uncertain issue, though the Spartans gradually forced the Messenians to fortify themselves on Mt. Ithome. The Delphic oracle promised victory to the Messenians if a virgin of royal blood should be sacrificed. Aristodemus slew his own daughter, became king, and for a while was victorious over the Spartans, who by bribery obtained another oracle favorable to themselves, whereupon Aristodemus killed himself upon the grave of his daughter and Ithome fell. Many of the Messenians escaped to foreign countries, but those who remained were reduced to the condition of serfs and ground down by taxes. *Second War* (from 685–668 B. C.).—It was caused primarily by the hard lot of the Messenian serfs or Perioeci. The leader was Aristomenes, a man of royal blood, who from Mt. Eira made repeated invasions into Spartan territory, and distressed the Spartans so much that they applied to Athens for a leader. The Athenians sent the poet Tyrtæus, whose martial songs revived the drooping courage of the Spartans. Aided by the treachery of Aristocrates, King of Arcadia and ally of the Messenians, the Spartans won a decided victory (see Aristomenes), and most of the Messenians emigrated to Rhegium in Italy, and afterward possessed themselves of Zancle in Sicily. (See Messana.) *Third War* (from 464–455 B. C.).—A terrible earthquake in 464 B. C. gave the oppressed Messenian serfs a coveted opportunity for insurrection. Once again they fortified themselves on Mt. Ithome. At the request of Sparta the Athenians sent troops under Cimon to aid in putting down the insurrection, but after a time the Athenians were rudely dismissed by the Spartans. After a long siege the Messenians were allowed to withdraw on condition of perpetual exile. The Athenians located the most of them in Naupactus.
J. R. S. Sterrett.

Messiah [from Heb. *māshi'aḥ*, anointed (deriv. of *māshaḥ*, anoint), hence Messiah, Christ, whence Gr. Μεσσίας, whence Lat. *Mes'sias*, Messiah]: the name in the sacred Scriptures and in the usage of Jew and Christian ascribed to that holy Person in whom the hopes of redemption center. מָשִׁיחַ in the Old Testament, used as an adjective, is applied to the high priest (Lev. iv. 3; vi. 22, etc.) as the one anointed with the holy oil; but as a substantive, to the theocratic king (1 Sam. ii. 10; Ps. xviii. 50, etc.), and so by the reflection of the poets to the patriarchs as the ancestors of the theocratic king (1 Chron. xvi. 22; Ps. cv. 15); and thus by eminence to that Person in whom the functions of priesthood and royalty culminated (Ps. ii. 2; cx. 1, 4; Dan. ix. 26). In the New Testament, ὁ Μεσσίας is used in John i. 42; iv. 25, but generally מָשִׁיחַ is rendered by its Greek equivalent Χριστός, which with the article refers to Jesus as the expected Messiah, but without the article, especially in the Epistles, became a proper name of Jesus Christ, the historical Messiah. In the New Testament it is easy to separate the person of Christ from his redemptive work and the last things; but this can not be carried out in the Old Testament, because the person of the Messiah is ever involved in the future redemption, and the last things embrace both advents. Hence we must treat of the Messiah under the more general head of *Messianic Prophecy*, which may be defined as the prediction of the fulfillment of redemption through the Messiah or the divine ideal of redemption presented in the Old Testament. This ideal or prediction was gradually unfolded, and is associated with historical epochs and great names in Israel's history. It is found not only in utterances respecting the future, but also in divine words subsequently revealed in reference to the past, in ideal statements concerning the present, and in institutions.

Primitive Messianic Ideas.—(1) Gen. i. 26–30 states that mankind was made in the divine image with the destiny of dominion over nature—the goal of creation was a godlike race inhabiting and subduing the earth. The whole plan of the world's history, which includes redemption after sin entered, is here indicated. Ps. viii. 3–9 repeats this idea. The fulfillment is realized through Christ, the Son of man, through whom mankind attains the original end of creation (Col. iii. 10; Eph. iv. 24; Heb. ii. 5–10). (2) Gen. iii. 15, the Protevangelium, predicts the ultimate victory of the seed of the woman over the serpent, but not without suffering. This victorious seed primarily is the human race, and this promise is the *Magna Charta* of human history. The seed, however, culminates in Christ, the representative of the race, through whom the victory is attained. The serpent and his seed represent all forces of evil (John viii. 44; Rom. xvi. 20; 1 Cor. xv. 25; Rev. xii. 9 f.; xx. 2 f.). (3) After the flood, in the promise and covenant with Noah, hope for the future is assured (Gen. viii. 21–22; ix. 8–11); mankind is not again to be cut off; the conditions necessary for man's destiny or redemption are thus guaranteed. (4) In Gen. ix. 25–27 is set forth the threefold development of the human race, determined by their descent from Noah's sons. To the descendants of Ham is given servitude; to those of Japheth, wide dominion; to those of Shem, the blessing or special favor of God. This last is unfolded in the choice of Israel and culminates in Christ. If v. 27 represents God dwelling in the tents of Shem (so many commentators) then the divine line of Messianic promise here begins, a line promising the advent of Jehovah, which is carried forward in the manifestations of the Angel of Jehovah, in Jehovah's dwelling above the cherubim, and in the predictions of Jehovah's coming in judgment and to abide with his people. The fulfillment is in the incarnation (John i. 14; Eph. ii. 22; Rev. xxi. 3). (5) Abraham's blessing (Gen. xii. 1–3; xiii. 14–17; xv. 4–5; xvii. 6–8; xxii. 15–19), renewed to Isaac and Jacob (xxvi. 3–5; xxvii. 27–29; xxviii. 13–15), unfolds the Protevangelium. It is a divine call with the institution of a covenant relation and a promise which includes a promised seed, a promised land, and a blessing to all nations. The seed—a generic term representing the seed of the woman—in its unity is fulfilled in Christ (Gal. iii. 16), but as a collective, with a multitude of members, nations, and peoples, like the stars and sand, it is fulfilled in the children of Abraham by faith (Rom. iv. 6; Gal. iii. 29). The land was primarily Canaan, but ultimately it is the spiritual Canaan, the heavenly Jerusalem (Heb. xi. 10, *seq.*; Rev. xxi.). The blessing is realized in salvation through Christ. (6) The patriarch Jacob on his death-bed divides the promised land among his sons, singling out Judah as the one through whom the covenant blessings especially unfold (Gen. xlix. 8–12). He will be of resistless might against his enemies, receiving also the homage of his brethren. The peoples will obey him as ruler, while he enjoys the luxuries of peace. The fulfillment began in the leadership of Judah in the conquest of the land, and was continued in the glory of the Davidic dynasty, but is fully realized only in the Lion of Judah (Rev. v. 5), who is the great conqueror (Eph. iv. 8; Col. ii. 15), to whom all will render homage (Phil. ii. 10 f.), and who will be enthroned amid the glories of eternal peace in heaven (Rev. xxi.–xxii.).

Messianic Prophecy of the Mosaic Age.—(1) In Ex. iv. 22 f. Israel is placed in the endearing relationship of sonship, even that of first-born son, to Jehovah. This idea, repeated in Deut. xxxii. 6–10 and Hos. xi. 1, is unfolded in the promise made to David where his seed is placed in a similar relation (2 Sam. vii. 14; comp. also Ps. ii. 7), and is fulfilled in Jesus, the well-beloved and only begotten Son of God (Matt. iii. 17; John iii. 16, *et al.*), and through him it becomes the blessed right of all believers (John i. 12; 1 John iii. 2). (2) In Ex. xix. 3–6 the foundation of the idea of the kingdom of God is laid, and the third element of Abraham's blessing is unfolded. Israel redeemed from Egypt is constituted by a covenant relation a kingdom of priests and a holy nation unto Jehovah. Priesthood and royalty thus are given to the people. The former finds representation in the Levitical and Aaronic priesthood (Num. xxv. 12, *seq.*). They unite in fulfillment in the Priest-King, the Messiah, and through him they become the inheritance of each believer in the Church (1 Pet. ii. 9; Rev. i. 6; xx. 6). (3) The prophecies of Balaam (Num. xxiii.–xxiv.) picture Israel as a unique nation dwelling apart, of countless numbers, irresistible in might, and enjoying rich and beautiful possessions, with God for their King, directly revealing his will among them. Out of Israel emerges a victorious royal dynasty, indicated in a star and scepter, permanent and enduring, while other nations crumble and pass away. These prophecies prefigure the glory and triumph of the Messianic kingdom, and by implication the sovereignty of the Messiah (Rev. xxii. 16). (4) In Deut. xviii. 15–18 there is the promise of a prophet like unto Moses, unto whom Jehovah will give his words and require that he be obeyed. According to some, the context demands that *prophet* should be taken as a collective noun, referring primarily to a line of prophets; others find reference only to a specific prophet. In either case the idea here set forth finds full realization only in Christ, through whom came "grace and truth" (John i. 17), and who fulfilled both the law and the prophets, saying, "But *I* say unto you" (Matt. v. 17, 21, 27, 34, 39), and the New Testament properly finds this prophecy fulfilled in him (Acts iii. 22–26). (5) In addition to these words associated with the patriarchal and Mosaic periods of history, there are also the sacrificial institutions, which typified a means of reconciliation with God, and are fulfilled in the priestly and atoning work of Christ (1 Cor. v. 7; Eph. ii. 14, 16; Heb. viii.–ix.; 1 Pet. i. 17, *et al.*).

Messianic Prophecy of the Time of David.—A new era begins with the organization of the kingdom of David, and the establishment of the religious and political center at Jerusalem. The desire of David to build Jehovah a house is the occasion of a fundamental prophecy (2 Sam. vii. 12–16). The promise to or covenant with David is that his seed shall be established as a house or dynasty, to whom will be granted, (1) to build a house for Jehovah; (2) to have an everlasting kingdom; (3) to be a son to Jehovah, chastised for sin and yet retained with everlasting mercy. In the first of these is involved the promise of the dwelling of God in the tents of Shem (if we adopt that reading, see above), the Shekinah of the tabernacle, and the fulfillment is in Solomon's temple (1 Kings v. 5), in the incarnation (hence Christ calls his body the temple, John ii. 19–21), and in the abiding presence of Christ and the Holy Spirit in believers or the Church (Matt. xxviii. 20; 1 Cor. iii. 16; 2 Cor. vi. 16; Eph. ii. 20); in the second is taken up Jacob's prediction concerning Judah and Balaam's of the star and scepter, and it forms the basis of all subsequent expectations concerning the personal Messiah, in whom and in whose kingdom it finds its ultimate fulfillment; in the third is infolded the sonship of the people (see above, Ex. iv. 22, 23), and the fulfillment is that already mentioned (see above) with the aditional idea of mercy and chastisement, relatively realized in God's dealings with Solomon and subsequent kings, but ultimately in the suffering Messiah, through whom mercy was first made sure forever, when he received the chastisement of his Father God for the redemption of his race (2 Cor. v. 21; Gal. iii. 13; 1 Pet. ii. 24). In David's last words (2 Sam. xxiii. 1–7) is expressed the confidence of the full realization of this covenant.

Based upon this Davidic covenant are certain passages in the Psalter which express the idea of its fuller realization, and thus are prophetic of the future. (1) Ps. xviii., describing the special interposition of God in behalf of David, and then his exaltation and the subjugation of his enemies, the extension of his rule to distant nations and the praise of God among them for the wonders he has wrought, foreshadows typically a future divine purpose through a king that is Christ and a kingdom under his rule here on earth (Rom. xv. 9). (2) Ps. cx. cites a divine oracle and oath, and upon these as a basis represents the Messiah going forth to battle, engaged in the struggle, and triumphant. He is a priest-king after the order of Melchizedek, the Lord of David exalted to a position of peculiar dignity at Jehovah's right hand, while he subdues all his enemies under his feet. The priesthood and royalty of the people here unite and find representation in a single person (see above, Ex. xix. 3–6). The fulfillment is in the priestly and kingly rule of Christ (Matt. xxii. 41–45; Acts ii. 34–36; Heb. i. 13; vii. 17, *seq.*; x. 12–13; Eph. i. 20; 1 Cor. xv. 25; Rev. xix. 11–16). (3) Ps. ii. represents a conspiracy against Jehovah and his anointed, who is established by Jehovah as King of Zion and according to divine decree recognized as his son, and to whom is promised worldwide dominion and the complete subjugation of enemies. The fulfillment is in the triumph of Christ, even through death, over those who conspired against him (Acts iv. 25–28), in his resurrection (Acts xiii. 33), in his heavenly enthronement (Heb. i. 5), and in the extension of his kingdom even now being realized. (4) In Ps. xlv. the king is represented as of divine majesty and as espousing a royal bride, a daughter of the nations.

This is typically prophetic of the exaltation and divine sonship of Christ (Heb. i. 8–9), and of his relation to his Church (Eph. v. 25; Rev. xix. 7–9). (5) Ps. lxxii. expresses aspirations for the king and their realization in righteousness. Mercy and peace everywhere prevail; the kingdom extends over the whole earth; the soil yields its abundance; and all nations unite in grateful tributes of praise and adoration. (6) Ps. xvi. unfolds the idea of the ideal man (see above, Gen. i. 26) as one who, having Jehovah as his portion, will triumph over death. This is actually realized in Christ's resurrection (Acts ii. 27).

Messianic Ideas of the Prophets.—After the death of Solomon, owing to the division of the kingdom and the degeneracy of the people, the prophets recognize that the purpose of Israel's choice can not be realized without a divine chastisement or judgment. This appears in various calamities, and especially in present or impending foreign invasion and captivity. After the judgment the redemption of a chosen remnant is announced, a saved and spiritually transformed community of reunited Judah and Ephraim, gathered to their land, which likewise is transformed, becoming most blissful, a paradise, where all dwell in everlasting security, with Jehovah in their midst, and where also Gentiles share in their blessings. Guilt, judgment, and redemption are the elements of the prophetic messages. These appear in the blessings and curses of the Pentateuch (Ex. xxiii. 20–33; Lev. xxvi.; Deut. xxvii.–xxviii.); and the Song of Moses (Deut. xxxii.) is a prototype of all propheey. The future redemption is accomplished by the advent of Jehovah, the work of his Spirit and the personal Messiah. The fulfillment is in the person and work of Christ, and extends from the first to the second advent. Temporal features usually typify spiritual. The eaptivity typifies the bondage of the race in sin. The saved community are the redeemed of the New Testament, and the land is the heavenly Canaan. The prophets vary in their outward presentation of Messianic ideas according to their individual character and historical circumstances. After the exile, while the notion of a judgment is still prominent, the thought of a captivity has disappeared. We give the prophets and contemporary Messianic Psalms in chronological order (there is not, however, entire agreement among scholars in reference to the date and division of some of these).

Pre-exilian Prophets.—(1) Joel (we follow Briggs, Delitzsch, and Orelli in placing Joel earlier than Amos; many modern critics, with much probability, regard his prophecy as post-exilian). The prophet declares the advent of Jehovah (*a*) (ii. 28–32) in the outpouring of the prophetic spirit, with wonders in heaven and on earth heralding judgment, and with deliverance in Jerusalem for all calling upon his name. (*b*) The advent in judgment is described (chap. iii.) as an assembly of all nations with confusion of multitudes and fearful natural phenomena, with the result of Jehovah's dwelling on Mt. Zion, Jerusalem being inviolable, the land of marvelous fertility, a fountain coming forth from the temple; likewise there shall be signal divine forgiveness. In the New Testament fulfillment is claimed for the day of Pentecost (Acts ii.), and the words and imagery are applied to the Gospel call and salvation (Rom. x. 12, 13), and to Christ's second advent (Matt. xxiv. 29). These New Testament applications show clearly that Christ assumed the place of Jehovah. See also Rev. vi. 12; xiv. 14 ff.; xvi. 16; xxii. 1.

(2) Amos (chap. ix.) sees judgment about to befall Israel, after which a remnant will be sifted out; the ruined house of David will be restored; the old or promised territory will be repossessed: and the land will be of wonderful fruitfulness, where Israel shall abide forever. Acts xv. 16 sees a fulfillment in the erection of the kingdom of Christ and the gathering of the Gentiles.

(3) The ideal of Hosea is that after severe chastisement and rejection set forth in the parable of the adulterous wife and her children (i.–iv.), and figured even under death (vi. 1; xiii. 14), the people of God, in great multitudes (i. 10) united under David, their king (i. 11; iv. 5), shall return unto Jehovah (iii. 5; v. 15–vi. 3; xi. 10 f.; xiv), becoming his faithful bride (ii. 16, 19 f.), and enjoying a land from which the curses of sin—war, wild beasts, and unfruitfulness—have been removed (ii. 18, 21–23). The apostle Paul (Rom. xi. 25 f.) sees a fulfillment in the reception of the Gentiles into the Church (comp. also 1 Pet. ii. 10). The bride of Jehovah reappears in the Church as the bride of Christ (Eph. v. 22, *seq.*; Rev. xxi. 9).

(4) The author of Zech. ix.–xi. (probably a contemporary of Hosea) represents the Messianic king as meek and lowly, and yet victorious; the weapons of war are destroyed and the king reigns in peace over the earth (ix. 9 f.; comp. Matt. xxi. 5). Ephraim and Judah are restored by Jehovah in exultation to their own land, where they walk in the name of the Lord (ix. 9–x. 12). In xi., under the transactions of the shepherd, is symbolized the mutual rejection of Jehovah and Israel by each other, which typifies the rejected Messiah of the New Testament. Comp. Matt. xxvii. 5.

(5) Isaiah (ii. 1–5 and also Micah iv. 1–7) represents the temple mount as exalted, and as a source of divine instruction sought by all nations with the result of universal peace. In iv. 2 ff. the land becomes wonderfully fruitful; Jerusalem is thoroughly cleansed from all iniquity, and is the abiding-place of Jehovah, who creates a refuge for his people, the holy remnant. A corner-stone is likewise laid there worthy of all confidence (xxviii. 16). Zion is the quiet habitation of Jehovah, the glorious judge, warrior, and king, who is its protection in the place of streams and navies, against all hostile powers (xxxiii. 10–24). On the temple and Jehovah dwelling on Mount Zion, see above, 2 Sam. vii. 12, *seq.* On the corner-stone, comp. Ps. cxviii. 22, and see Matt. xxi. 42; Acts iv. 11; Rom. x. 11; 1 Pet. ii. 6, *seq.* Jehovah's dwelling upon Mt. Zion is based upon the placing of the ark there by David, which is commemorated by Ps. xxiv. 7–10, a typical prophecy, further unfolded by Isaiah. Ps. xlvi. and xlviii. belong to the period of Isaiah and express similar thoughts of the security of Mt. Zion. The Messianic person is distinctly brought out by Isaiah—(*a*) vii. 14–16, as a wonderful child, called Immanuel, the bearer of the divine deliverance, but until his maturity distress will continue in the land. (Comp. Matt. i. 20–25.) (*b*) ix. 1–7. A wonderful light shines on the northern frontier, which exalts that people as highly as they had previously been brought into contempt as the first of the Jews to go into exile; a great deliverance, transcending that of Gideon in the day of Midian, is wrought, a child of the house of David is born, named Wonderful Counselor, Divine Hero, Everlasting Father, Prince of Peace, who reigns on the throne of David in righteousness for ever. (Comp. Matt. iv. 15–16; xi. 23; Luke x. 15.) (*c*) xi. A twig comes forth from the stump of Jesse; a shoot from his roots bears fruit. The sevenfold gift of the Spirit rests upon him, endowing him to fulfill his work of judging the poor with spiritual discernment and the wicked with the word of his mouth. Girded with righteousness and faithfulness, he establishes universal peace in the earth, in which the animal kingdom shares. He becomes the standard of the nations; a deliverance like that of Egypt takes place; the ransomed assemble from all lands, marching up on highways of redemption. Matt. ii. 23 applies the נֵצֶר of our passage with the corresponding צֶמַח of Jer. xxiii. 5; xxxiii. 15; Zech. iii. 8; vi. 12, to the Nazarene, as the one who grew up in that obscure place to which the line of David had wandered as a shoot from a neglected stump. (Comp. John. i. 32; xii. 32; Rom. viii. 22; xv. 12; Rev. i. 16.) The nations share in Messianic blessings. Chap. xviii. 7 points to the conversion of Ethiopia; xix. 18–25 represents Egypt and Assyria as united with Israel as the people of God, speaking the holy language and serving Jehovah with altar and sacrifices; xxiii. 18 predicts the consecration of the merchandise of Tyre.

(6) Micah, with predictions of divine judgment upon Israel, announces the elevation of the temple mount (iv. 1–4; see Isa. ii.), and the restoration of the scattered of Israel (ii. 12; iv. 6, *seq.*, 10; vii. 12), who will be purified (v. 10–15) and their sins forgiven (vii. 18, *seq.*), and who will be a blessing and destruction among the nations (iv. 13; v. 7–9), and over whom Jehovah will reign in Mt. Zion forever (iv. 7). Micah presents the Messianic king after the manner of Amos, referring to the exaltation of the Davidic dynasty (iv. 8); after the manner of Hosea, placing a leader at the head of the returning people (ii. 13); after the manner of Isaiah, in the ruler, the great deliverer, in whom the ancient promises will be fulfilled, coming forth from little Bethlehem (v. 2–6. See for fulfillment Matt. ii. 5, *seq.*).

(7) Zephaniah announces after the judgment the deliverance of a purified remnant in whose midst is Jehovah as a king rejoicing and resting in love (iii. 17). This remnant also will be a name and a praise among all the peoples of the earth (iii. 19, *seq.*) and nations from the most distant parts of the world will worship Jehovah (iii. 9, *seq.*). With Zephaniah belong Ps. lxxvii., describing the adoption of the nations into the city of God, and Ps. lxxx., a prayer for protection.

(8) The Messianic prophecies or ideals of Jeremiah are as follows: (1) Ch. iii. 14–17, Jehovah the Saviour marries his exiled people, selecting one from a city and two from a tribe, restores them to Zion, setting over them shepherds after his own heart. (Comp. John xxi. 15–17.) Rachel, weeping for her children (xxxi. 15, *seq.*), is comforted with the promise that they will come again out of the land of the enemy (Matt. ii. 18). Jehovah will sow both the house of Judah and the house of Israel in their own land again (xxxi. 27, *seq.*; comp. Hos. ii. 23). They will come together out of the land of the north, and inherit the goodly heritage of the host of the Gentiles (iii. 18; comp. Hos. i. 11). Jehovah makes with them a new covenant (xxxi. 31, *seq.*), the law being written in the heart, so that all shall know him. (Comp. Hos. ii. 18, *seq.*) New institutions are established (iii. 17), entire Jerusalem is called the throne of Jehovah instead of the ark, and all nations gather into it (Rev. xxi. 2; xxii. 3, *seq.*). The whole city and suburbs become holy as the temple (xxxi. 38–40), even the hill Gareb, the abode of the lepers, and the valley of Hinnom, the place of refuse. (2) The sprout of Isa. xi. 1, *seq.*, is taken up and clothed with new ideas. He is called the righteous branch, Jehovah our righteousness (xxiii. 5, *seq.*), as the bearer of divine righteousness, and so the New Jerusalem bears the same name as the divine throne (xxxiii. 16; comp. Isa. vii. and Ex. xvii. 15). The exodus from Egypt is no more remembered for the greater exodus from all countries of the dispersion to the land of their inheritance. Jehovah will surely fulfill his covenant with David and the Levites; the monarchy and priesthood will become eternal (xxxiii. 17, *seq.*). With Jeremiah belong Ps. lxxxix. and cxxxii., which set forth the inviolability of the Davidic covenant.

The Exilian Prophets.—(1) Ezekiel presents many of the same elements as his forerunners. Jehovah as a faithful shepherd will accomplish a restoration (xi. 17; xxxiv.) which is likened to a transplanted cedar twig becoming an immense tree (xvii. 22, *seq.*), to a resurrection of the dead (xxxvii. 1–14; see above, Hosea); Ephraim and Judah will be united (xxxvii. 15–22). The people will be purified, receiving a new and obedient heart (xi. 19; xxxvi. 26–29; comp. Jer. xxxi. 31, *seq.*). David will be their king (xxxiv. 24; xxxvii. 24). A new covenant of blessings will be made and all ills banished from the land (xxxiv. 25–31; xxxvi. 35; comp. Hos. ii. 18–21, *seq.*; Isa. xi. 6–9, *et al.*), and Jehovah will dwell among his people (xxxvii. 27). The powers of the world—Gog and Magog—will vainly endeavor to destroy them (xxxviii.–xxxix.; comp. Rev. xx. 7–10). There is a prolonged description of a new temple, a new arrangement of worship, the wonderful fertility of the land, and division of territory among the tribes (xl.–xlvii.; comp. Rev. xxi.–xxii.). Sodom and Gomorrah will also find a place with the people of God (xvi. 53–63).

(2) Isa. xxi.–xxvii. These chapters present a divine judgment upon the world and the redemption of God's people, who, restored to Mt. Zion, will unite with all nations in a feast provided by Jehovah (xxv. 6; xxvii. 12, *seq.*). The pious dead will be raised (xxvi. 19); death and sorrow will be abolished forever (xxv. 7, *seq.*; comp. Rev. xxi. 4; 1 Cor. xv. 54). The feast is the prototype of the Gospel feast of the New Testament. Isa. xxxiv.–xxxv. belongs also here, describing the removal of all physical and moral evils at the advent of Jehovah.

(3) In the Psalter is a group of Psalms (xxii., xl., lxix., and lxx.), typically prophetic of Christ, describing suffering. These most probably are based upon the experience of faithful persecuted servants of God like Jeremiah, and especially those of the period of the exile. The most important of these is Ps. xxii. The Messianic features of these Psalms taken together are: (*a*) Cruel reproaches of malicious enemies (Ps. lxix. 26; xli. 7–8; xxii. 7–8; comp. Matt. xxvii. 39, *seq.*). (*b*) He is persecuted because of his consecration to the divine will as the acceptable sacrifice (Ps. xl. 6–8; comp. Heb. x. 8, *seq.*; Ps. lxix. 7–12; comp. Matt. xxvii. 27–30; John ii. 17; vii. 5; Rom. xv. 3). (*c*) The sufferings are the stretched body, feverish frame, intense thirst, offering of gall and vinegar, division of his garments, agonizing cry, and broken heart (Ps. xxii. 1, 12–18; lxix. 20–21; comp. Matt. xxvii. 39, *seq.*). (*d*) Notice also the traitor and his doom (Ps. xli. 9; comp. John xiii. 18; Ps. lxix. 23, *seq.*; comp. Acts i. 20 and Ps. cix. 8). (*e*) Observe also the praise of the delivered one and the worldwide significance of the sufferings (Ps. xxii. 22; comp. Heb. ii. 12; Ps. lxix. 30, *seq.*; xl. 9; comp. John xvii. 4). These Psalms prepare the way for the suffering servant of Isa. liii.

(4) Isa. xl.–lxvi., belongs to the period of the exile. These chapters form an organic whole, into which are woven previous Messianic references about the person of the Servant of Jehovah. This Servant, like the Seed and the Son of the Pentateuch and Psalter, is a generic term referring primarily to Israel, but culminating in the Messiah. Jehovah calls him from the womb to be his servant, and anoints him with his Spirit. He is the gentle preacher and saviour of the poor, the meek, and broken-hearted. He restores the remnant of Israel, is a covenant of the people, a light of the Gentiles, Jehovah's salvation to the end of the earth (xlii. 1–9; xlix. 5–8; lxi. 1–3; comp. Matt. xii. 17–21; John viii. 12; Heb. viii. 6; ix. 15; Luke ii. 32; iv. 18, *seq.*). He is a suffering servant (chap. liii.), without form or majesty, despised and rejected of men, a man of sorrows and acquainted with grief. He is a sufferer, bearing his people's sorrows, pierced for our transgression, crushed for our iniquities, and his stripes were for our healing and peace. (Comp. Ps. xxii. 16; lxix. 26; Zech. xii. 10; Gal. iii. 13; 1 Pet. ii. 24.) All were wandering sheep. Jehovah laid on him, the uncomplaining lamb, the iniquities of all. (Comp. John i. 29; Acts viii. 32; 1 Pet. i. 19; Rev. v. 6; vii. 14, etc.) His contemporaries did not consider this, but assigned him his place with the wicked and with the rich in his death. (Comp. John xix. 38–41. He suffers as a substitute, a trespass-offering, and then reaps his reward in his exaltation, his spoils of victory, and his prosperous ministry. (Comp. Heb. ii. 10–13; Matt. xx. 28; John x. 11–17; Rev. i. 18; Heb. xii. 2.) Chap. lv. gives the Messianic invitation to the free grace of the Gospel (Rev. xxii. 17). The sure mercies of David, the everlasting covenant, are offered in him who is the witness, prince, lawgiver of the people. (Comp. John xviii. 37; Rev. i. 5; iii. 14; Acts v. 31; xiii. 34.) The seed of the righteous servant enjoy the riches of the Gentiles as they become the priests of Jehovah and minister clothed in the garments of salvation; righteousness and praise spring forth before all nations (lxi. 9–11), who come up to the holy places from the most distant parts (xlix. 12). Hunger and thirst, the violent heat of the sun, together with all sorrow and mourning, are banished from the land (xlix. 10; lxi. 3; comp. iv. 3; Rev. vii. 16–17).

The advent of Jehovah is no less prominent. In xl. 3–11 we see the herald of the advent. Zion and Jerusalem become evangelists. Jehovah comes as the gentle shepherd. This is applied to the Baptist and Jesus in Matt. iii. 3. (Comp. John x. 1–18; Luke xv. 3–7.) In liv. 5, *seq.*, and lxii. 5 Jehovah takes Israel as the wife of his youth and rejoices over her as his bride; and in lx. 1, *seq.*, he becomes the light and glory of his people, instead of the sun and moon (Rev. xxi. 23–26). So in lxii. 1, *seq.* the righteous of Zion and her salvation becomes a bright and shining light to the nations; she is called by a new name (Rev. ii. 17), becomes a crown of glory in the hand of the Lord, and is named Hephzibah and Beulah. Jerusalem is rebuilt with precious stones (liv. 11, *seq.*; comp. Rev. xxi. 18–21); her walls are salvation and her gates praise; they are open day and night, while kings and nations enter therein (lx. 11, *seq.*; Rev. xxi. 25), and great is the peace of her children as they are taught of Jehovah (liv. 13; comp. John vi. 45; 1 Thess. iv. 9; 1 John ii. 20). In lix. 15–18 Jehovah appears as a warrior armed with vengeance for his enemies and redemption for his people. He pours out his Spirit as water upon the offspring of the people (xliv. 3–5; comp. lix. 21), and puts his words in their mouth for ever, and they spring up as willows by the watercourses, while the Gentiles claim to belong to Jehovah and enroll themselves as his people. The call goes forth to the ends of the earth, and the oath is sworn "that unto me every knee shall bow and every tongue shall swear" (xlv. 22, *seq.*), and the sons of the stranger come to the holy mount, offering their sacrifices in the house of prayer for all nations (lvi. 6, *seq.*; comp. Rev. viii. 3–5; Heb. xiii. 15, 16). Chap. lxv. 17–27 predicts the creation of a new heaven and earth, as well as of a new Jerusalem, in which there is no more weeping or crying, but length of days, prosperity, and communion with God, in which the animal kingdom shares (2 Pet. iii. 13; Rev. xxi. 1). Ch. lxvi. now describes the final catastrophe and glories. On the one side all flesh assemble in one immense congregation every Sabbath, as at the great feasts, before the throne (Rev. v. 11, *seq.*; vii. 9–12, etc.); on the other side, the carcasses of transgressors are cast out into the unquenchable fire and to the never-dying worm. Comp. Matt. xxv. 41, *seq.*: Rev. xx. 10, *seq.*; xxi. 8, *seq.*

The Post-exilian Prophets.—(1) Haggai predicts that heaven and earth will be shaken, kingdoms overthrown, and

the instruments of war destroyed (ii. 6, 22). The nations will bring their choicest treasures into the house of Jehovah, and the latter glory of the house will be greater than the former (ii. 7–9). Zerubbabel, the servant of Jehovah, will become his signet (ii. 23).

Ps. xciii.–xcix. are probably to be connected with the building of the second temple, and thus with Haggai and Zechariah. Their theme is the advent or reign of Jehovah, and they belong to the divine line of prophecy which finds fulfillment in Christ.

(2) Zechariah (i.–vii.) presents Jehovah as a wall of fire round about Jerusalem, and a glory in her midst (ii. 5, *seq.*; comp. Isa. iv. 5; Jer. iii. 17). Jehovah dwells in the midst of Jerusalem, which is inhabited by old men and little children (viii. 3, *seq.*). The prophet develops also the thought of the future personal Messiah, whom he calls the Branch (iii. 8; vi. 12; comp. Isa. xi. 1; Jer. xxiii. 5). In his day the iniquity of the land will be removed (iii. 9); in him the priestly and royal offices will unite, and he will be the source of the divine Spirit (vi. 9–15 compared with iv.).

(3) In Zech. xii.–xiv. Jehovah's shepherd is smitten by the sword (xiii. 7–9), in consequence of which Jehovah's hand is turned in protection over the little ones (Matt. xxvi. 31–32; Mark xiv. 27; John x. 15); while the house of David and the inhabitants of Jerusalem upon whom the spirit of grace and supplication has been poured, looking upon Jehovah's representative whom they have pierced, mourn greatly (xii. 10–14). A fountain for sin and uncleanness is opened in that day, and the land is purified (xiii. 1, *seq.*). Nations besiege Jerusalem, and are overthrown through disease, panic, and divine intervention (xii. 1–9; xiv. 1–15; comp. Joel iii.; Ezek. xxxviii.–xxxix.). The remnant of the nations goes up yearly to worship Jehovah the King at the Feast of the Tabernacles (xiv. 16). Even the bells of the horses and every vessel in Jerusalem will be as holy as the high priest's tiara, and no unclean person will enter it any more (xiv. 20, *seq.*; comp. Jer. xxxi. 38–40; Rev. xxi.–xxii.).

(4) Malachi introduces the herald of the advent, "my messenger" (iii. 1), "Elijah the prophet" (iv. 5)—who is John the Baptist, according to Matt. iii. 1–12; xi. 10; xvii. 11; Luke vii. 27—turning the hearts of parents and children to one another. The coming one is הָאָדוֹן (the Lord), and the Malakh Jehovah, both terms referring to Jehovah, the divine Messiah. The advent is in judgment as the refiner's fire and fuller's lye, purging the sons of Levi, to offer acceptable sacrifices. It is a day of fire, burning up the wicked as stubble, while to the god-fearing the Sun of righteousness arises with healing in his wings. (Comp. Ps. lxxxiv. 11; Isa. lx. 19; Deut. xxxii. 11.) This divine Messiah is Jesus Christ (Matt. iii. 11–12).

(5) Daniel (whose book in its final form belongs to the Maccabean period) describes the Messianic kingdom, the stone cut out of the mountain, as destroying and supplanting the kingdoms of the world (ii. 25–44), and the Messiah in the form of "one like unto the Son of man" receiving everlasting dominion and glory and the homage of all nations (vii. 13, *seq.*). Daniel likewise typically predicts the cutting off of the Messiah, the ending of the Old Testament worship, and the destruction of Jerusalem (ix. 26, *seq.*; comp. Matt. xxiv. 15). He also declares that there will be a resurrection of the dead, and a day of judgment when the righteous shall receive their inheritance and shine as the stars forever and ever (xii. 2–4; comp. Rev. xx. 12–15).

The fulfillment of these prophecies in their final or Messianic meaning began with the birth of Jesus Christ, and continues throughout these latter days of the dispensation of grace until the second advent in glory at the end of the world. This distinction of advents is not made in the Old Testament, but first by the advent itself and the prophecies of Christ and his apostles. Hence while the first advent fulfills all those references on the divine side to the outpouring of the Spirit, the establishment of a new covenant with new institutions of salvation, and the growth of the kingdom under Jehovah's favor, and on the human side to the more humble features, as of the prophet-like Moses, the suffering servant of Jehovah, etc., yet the great mass of Messianic prophecy is referred by the New Testament writers to the second advent—on the divine side in judgment, on the human side in glory, and yet the human and the divine lines, which in the Old Testament remain ever apart, converge in Jesus Christ the God-man at his first advent, who in his first state of humiliation and his final state of glory either has fulfilled, or is yet to fulfill, all the law and the prophets.

LITERATURE.—Recent works on this subject especially to be mentioned are Briggs's *Messianic Prophecy* (New York and Edinburgh); von Orelli's *Old Testament Prophecy of the Consummation of God's Kingdom* (trans. from Germ., Edinburgh); Delitzsch's *Messianic Prophecies in their Historical Succession* (trans. from Germ., New York and Edinburgh); Riehm's *Messianic Prophecy* (trans. from Germ., New York and Edinburgh). This last contains a full list of recent literature on the Messiah. C. A. BRIGGS.
Revised by EDWARD LEWIS CURTIS.

Messi'na: province of Sicily. It occupies the northeastern corner of the island, and has an area of 1,246 sq. miles, with 500,000 inhabitants. It is mountainous, but the valleys are very fertile, and produce excellent wheat, flax, hemp, wine, oil, and fruit. Sulphur abounds.

Messina: a large seaport-town in the province of Messina, Sicily. It lies in lat. 38° 17′ 38″ N., lon. 15° 35′ E., and rises amphitheater-like from the sea, backed by the rocky extremity of the Siculo-Calabrian Apennines (see map of Italy, ref. 9–G). The harbor of Messina, the largest and safest in the kingdom of Italy, is deep, spacious, well furnished with quays, and defended by a fort and citadel. The annual amount of shipping it receives is over 4,000 vessels, of 1,130,000 tons burden, the imports being wheat, cotton, and woolen goods, hardware, etc.; the exports, fruit, wine, oil, essences, and silks. Messina, having suffered so often from earthquakes and bombardments, now consists in the main of fine new buildings, with well-paved streets and spacious squares, flanked by stately palaces and adorned with fountains and statues. The university was founded in 1549. There are many noteworthy churches, and the old cathedral is one of the most interesting monuments of the city, the exterior being very quaint and curious, and the interior decorated with the rarest marbles, porphyry, jasper, lapis-lazuli, etc. The city is the seat of an archbishopric, and has a university founded in 1549. For the earliest history of Messina, see MESSANA. It suffered severely during the Punic wars and during the Roman civil wars, also from the Goths and the Saracens, the latter being expelled by the Normans in the eleventh century. In 1282 12,000 Frenchmen perished here in the terrible Sicilian Vespers. In 1783 the town was almost totally destroyed by an earthquake. In 1848 Messina threw off the Bourbon yoke, but was reduced to submission after an obstinate and destructive resistance. In 1860 it was freed by the forces of Garibaldi. The climate of Messina is delightful, and the views are magnificent. Pop. of commune (1892) 141,000; of city proper, about 90,000.

Messina, Strait of (Ital. *Faro di Messina*, Lat. *Mamerti'num Fre'tum*): a narrow channel of water connecting the Ionian and the Tyrrhene seas, and dividing Sicily from Calabria. Its length is 26 miles, its greatest width 12 miles, its least 2 miles. The tide is most irregular in this strait, the eastward current being vastly stronger than the westward, and the flood and ebb succeed each other with great rapidity. For a curious phenomenon witnessed here, see FATA MORGANA. See also SCYLLA.

Messis, Metsys, or Matsys, QUINTYN: painter; b. at Antwerp in 1450. He began by working in iron. The gates of a well near the cathedral at Antwerp first attracted attention to his talent. The College of Louvain then ordered a balustrade of him, but the immense fatigue of this work proved too much for a fragile constitution, and, being confined to his bed, he occupied himself by painting images for distribution to the lepers. He afterward taught himself the art of painting in order to marry a woman who was unwilling to wed any one but a painter. A triptych painted for the wood-carvers' guild in Antwerp, representing Christ surrounded by holy women, with the martyrdom of St. John the Evangelist, and Herodias with the head of St. John the Baptist, on the side compartments, is one of his principal works. His portraits were highly prized; those of Erasmus and of Egidius are especially good. He died in 1529. His son John, also a painter, was his pupil. W. J. STILLMAN.

Messiter, ARTHUR HENRY: See the Appendix.

Mestizo, mes-tee'zō [= Span.: Fr. *métis* < Vulg. Lat. **mixti'cius*, deriv. of *mix'tus*, mixed]: in Spanish America, a half-breed, the offspring of a white father and an Indian mother. The white characters usually predominate. The offspring of an Indian father and a quadroon mother (three-fourths white, one-fourth Negro, the latter by the female side) or a quinteroon mother produces what is called a brown

mestizo. A mestizo-claro is the offspring of an Indian father and a mestizo mother.

Mészáros, măs'aar-osh, Lazar: soldier: b. at Boja, Hungary, Feb. 20, 1796; was educated first for the Church, then for the bar, but followed in 1813 the summons of the emperor, Francis I.; entered the Austrian army as a volunteer; served in the campaigns of 1814–15; rose slowly, but acquired a solid reputation in the army, and was made a colonel in 1844. When, in 1848, Count Batthyani formed a separate Hungarian ministry, he chose Mészáros as head of the military department, and although he at first opposed the separation of the Austrian and Hungarian armies, he organized the Hungarian army with great rapidity and skill when the decision was taken. After the declaration of independence (Apr. 14, 1849), he left the ministry and received an active command, and after Görgey's surrender at Vilagos (Aug. 13, 1849) he fled to Turkey; was sentenced to death by an Austrian court martial, and hanged in effigy at Vienna. He afterward lived in France, England, and the U. S. D. at Eywood, Herefordshire, England, Nov. 16, 1858.
Revised by J. J. Král.

Meta, mā'tăă: a river of Colombia and Venezuela, rising in the Eastern Cordillera and flowing E. N. E. to the Orinoco; length about 750 miles, of which about 180 miles are in Venezuelan territory. The Meta is properly formed by the confluence of the Humadea, Negro, and Upia, almost directly E. of Bogotá. It is navigable for steamboats to Cubuyaro, over 400 miles; portions of its lower course are a mile wide. H. H. S.

Metaline: a substance intended for application to all kinds of machinery where friction is encountered, obviating the necessity of oil or other lubricant. Its appearance is that of a soft, dark, metallic compound. It is prepared originally in the form of a fine powder, and is then molded into any shape required by hydraulic pressure. After molding it may be cut or turned to suit any form of application. It is usually applied to journal-boxes in the form of cylindrical plugs or disks from $\frac{1}{8}$ to $\frac{5}{16}$ of an inch in diameter, inserted in holes bored near together over the whole inner surface. In small bearings, such as spindle-bolsters and the journals of sewing-machines, it is pressed into longitudinal slots or creases. Several varieties of metaline are manufactured, differing in composition and adapted to use under the various conditions encountered in running machinery, such as steel on brass, steel on cast iron, etc.
Revised by Ira Remsen.

Met'allurgy [from Gr. *μεταλλουργός*, working in metals, miner; *μέταλλον*, mine, metal + *ἔργον*, work]: the science and art of preparing metals from their ores. In very ancient times the word probably included all the operations of mining, smelting, and the subsequent manufacture of the metal into articles of use. Mining has for many centuries been recognized as an entirely distinct and different calling, though metal-working, such as copper-beating and founding, gold and silver smithing, and blacksmithing, continued for a much longer time to be regarded as metallurgical. As these became more commonly practiced, they were looked upon as mechanical trades, each of which, with the expansion of metal-working, attained a separate existence and took a separate name. As the word is now used by those who follow the calling, the metallurgist is strictly one who prepares metals from their ores, and performs in addition such other operations as are necessary to the production of a finished raw material. Thus in the metallurgy of iron is included not only the smelting of the ores, but also the manufacture of wrought iron and steel from the first product, and such processes of refining as are necessary to obtain the different marketable grades of iron and steel. Only in a few instances does the metallurgist carry his work so far as to produce a finished article ready for immediate use, thus adding metallurgical engineering to the productive branch of his calling. These exceptions are nearly all confined to the manufacture of bulky and low-priced goods, when economy requires the immediate union of the smelting-works and the finishing-shop. The production of railway iron is the most prominent example of this practice. On the other hand, true metallurgical establishments are frequently producers of finished articles which properly belong to chemical manufactures and other branches of technical industry, such as sulphuric acid, arsenic, paints, etc., but these are by-products, obtained from substances occurring in the ore which yields the metal, and their manufacture belongs to other branches of technology than metallurgy. From the foregoing it will be seen that while the meaning of the word metallurgy has in the process of time become restricted to the mere production of metals, instead of its old application to all the arts of working in metals, the practice of the metallurgist has extended so as to embrace the work of the chemist and the manufacturer of products which in former times were not classed as metallurgical.

The minerals from which the useful metals are obtained form only a very small part of the earth's mass, so far as known. The basic elements of the remainder include such metals as sodium, potassium, etc., which, though employed to a limited extent, are not technically classed among the useful metals. The list of the latter has, however, been greatly extended by the increasing use of metals in modern civilization. At present, iron, copper, lead, zinc, tin, silver, gold, mercury, nickel, antimony, aluminium, bismuth, and perhaps platinum, may, either on account of common use, employment as currency, or importance of application, be ranked among the useful metals; while cadmium, arsenic, potassium, sodium, and magnesium have found some application, though a very limited one in the case of the last. Other metals, like cæsium, cerium, etc., have been made for the purposes of chemical study or for cabinet curiosities.

The science of metallurgy includes the processes for obtaining all the metallic elements, but in practice the *art* of metallurgy is restricted to the production of the useful metals alone, the preparation of the others being the work of chemical manufactories. Those minerals which contain enough metallic base to make its extraction profitable are called *ores*, and as the question of profit is dependent upon local circumstances, a given mineral may be an ore in one country and not in another. It is rare to find an ore consisting entirely of the metal-bearing mineral, other non-metalliferous minerals being nearly always mixed mechanically with it. This oreless rock is technically known as the gangue, and it plays a very important part in metallurgy, frequently compelling the choice of operations that are not favorable to the complete extraction of the metal, or that are costly for some other reason. Two general kinds of gangue are distinguished: First, earthy gangue, which is either acid, from a preponderance of silica, or basic, when lime, magnesia, alumina, and iron most frequently occur. In this case two methods of removing the associated rock may be used. One is mechanical, the ore being crushed fine and passed through machines which cause a separation of the heavy ore from the lighter gangue by virtue of their different specific gravities; or by subjecting the crushed ore to some uniform force which affects the two minerals differently. This work, however, is usually allotted to mining operations, and is one of its important auxiliary operations called ore-dressing. The smelter receives the dressed product. The other mode of separating the gangue is by fusion with fluxes. A flux is any substance which will make the ore fusible and fluid at temperatures which are within our control. Practically, the operations of the metallurgist are confined to the treatment of compounds containing silica for the acid, and usually lime, magnesia, alumina, or iron for the base. Other acids and bases occur, but they play a very subordinate part, and are always accompanied by one or more of the above. The art of fluxing therefore simply consists in adding silica when the bases predominate in the ore, and one of the above bases when the contrary is the case. Its difficulties lie entirely in the fact that the proportions must be properly adapted to the metal under treatment and the temperature required. The second kind of gangue is one that consists of a metal-bearing mineral, with which is associated the mineral containing the object of the metallurgist's labors. A distinction has to be made between these two sorts of gangue—partly for the reason that the latter is always basic, and partly because it is often impossible to separate the two metalliferous minerals by mechanical means; and these ores therefore usually come into the metallurgist's hands just as they are received from the mines. Many type-processes of metallurgy have been invented to surmount the difficulties presented by such a metalliferous gangue. Among metals occurring in this manner the most frequent examples are tin, copper, lead, nickel, gold, silver, and others in pyrite (a bisulphide of iron). Most ores consist of both earthy and metalliferous minerals, and therefore require both mechanical and chemical processes for their treatment. While the ores present a great variety of combinations, three general classes may be

recognized by the character of the negative element combined with the metal. They are—(1) Native metals, in which no acidifying element occurs, the metal itself being found uncombined in nature. These native metals are, however, rarely pure, but are generally alloyed. They are gold, silver, copper, platinum, and bismuth. (2) Sulphides, or compounds of the metal with sulphur as the negative element; and in this class may be ranked the compounds in which arsenic and antimony occur, as they come under the same general mode of treatment. Copper, lead, silver, mercury, antimony, nickel, and zinc form such compounds. (3) Oxides, which form the largest and most important class. Iron, copper, lead, tin, zinc, and all the rarer metals belong to it. Many metals occur in two or in all three of these classes, and the division here made refers only to their common occurrence and the mode of treating their ores. The general character of the processes by which a metal is extracted from its ores is not governed by the metal itself, but by the negative element with which it is combined. The metal may decide the adoption of a particular class of operations or apparatus, but the native metals may all be obtained by mechanical dressing or by simple fusion; the sulphides must all be melted with some substance that will combine with the sulphur and leave the metal free, or else they must be roasted and then treated like oxides; and the oxides of the useful metals are all reducible to metal by heating them with carbon or other reducing agents. In carrying out these different processes a great variety of reactions are employed, but only those of a general character will be spoken of here. Three grand modes of producing these reactions are employed, the dry, the wet, and electrolysis. In the first the fluidity necessary for the free action of the substances employed is obtained by heat; in the second by solution in a liquid; and in the third by the electric current. Two of these modes are frequently combined in the treatment of an ore. So far as is known, the dry method is the oldest; the wet followed as the more progressive part of the art, having grown out of the establishment of chemical science; while the employment of the electric current has developed from the creation of the application of electric science to technical work. It has created a new branch of metallurgy called electro-metallurgy, which occupies a conspicuous place in the production of copper and aluminium, and has some promise with zinc. The wet modes of operation simply repeat the reactions of the laboratory, and are therefore more under control and better understood than those of the dry method.

The metallurgy of the native metals consists usually in a combination of mechanical and chemical processes. When the ore occurs in a vein, as copper, and sometimes gold and silver, the vein-rock must be crushed fine; and the most common apparatus for this work is the stamp-mill. A stamp is a heavy pestle, of which the head is iron and the stem may be either iron or wood. It is supported between guides, and rests upon an iron seat or die placed in a mortar, and the crushing is performed by raising the stamp and allowing it to fall upon the ore, which is introduced upon the die, while a constant stream of water passes through the mortar. Stamp-mills form a very important part of the metallurgical apparatus used in the western part of the U. S., and their management includes many important questions of theory and practice. The side of the mortar contains a sieve of the proper degree of fineness, and as soon as the ore has been sufficiently crushed it is carried through the sieve by the water-current. It now consists of metallic grains mixed with, but no longer attached to, particles of rock. The succeeding operations are intended to effect the separation of the metallic grains, either by means of gravity or by taking up the metal (in the case of gold and silver) in mercury. Several modes of utilizing the force of gravity are employed. One of the most common is to run the stream of slime (the ore and water) over coarse blankets. The metal, being heavier than the rock, sinks to the bottom of the stream, and is caught in the meshes of the blankets, from which it is afterward removed by washing them in a tank of water. A similar separation will be obtained if the slime runs over a flat, shallow trough without blankets, provided the force of the current is not sufficient to wash off the metal after it has once settled upon the trough. Many other mechanical methods of separation are employed. When mercury is used, as in the case of gold and silver ores, the operation is known as amalgamation; and it is not yet positively decided whether this is a mechanical or a chemical act, but it is probable that both of these forces are included. The mercury may be used either as a shallow bath, into which the gold sinks by virtue of its greater specific gravity, or it may be distributed in a thin layer over copper plates. The former method is most employed in Europe, and the latter in America. Agitation of the mercury and slime by a percussive movement of the vessel which contains them, or by causing ripples and low falls in the stream, is thought to increase the efficiency of the operation. A large part of the gold and all of the platinum obtained is found in sands and deposits of gravel. In this case the stamp-mill is not needed, the mining being so managed that the sand is conveyed in a current of water through the separating or amalgamating machinery. Platiniferous sands are first concentrated on blankets, as above described; the concentrated sand is carefully washed by hand: the gold removed by amalgamation; and the product, which contains about 75 per cent. of platinum, is sold to manufacturing chemists, who prepare the marketable metal. Of the metals so far considered, native copper and platinum are obtained only by washing, gold and silver by washing or amalgamation. Bismuth differs from the foregoing in having so low a fusing-point that it is more economical to melt the metal out of the ore by the operation called "liquation" than to crush and dress it. The ore is therefore placed in inclined iron tubes holding about 25 lb., and heated to redness, when the metal flows out.

Next to these processes in point of simplicity is *the metallurgy of the oxides.* These ores include the most important metals known, such as iron, copper, lead, tin, and zinc. With the exception of iron, all of these are used pure in the arts, and the mode of treating the ores is to heat or fuse them in direct contact with the fuel. The affinity of carbon for oxygen is so strong at high temperatures that the elements in the ore are dissociated, the oxygen uniting with the fuel and passing off as a gas, leaving the metal to run out in a fluid state, or in the case of zinc allowing it to escape volatilized, to be subsequently condensed. This simple operation is one of the oldest in the art, and the time of its discovery is unknown. It is certain, however, that one of the oldest form of metallurgical apparatus is the shaft-furnace, which is especially adapted to satisfy the conditions of this operation. A shaft-furnace is either round, in section, or consists of four vertical walls containing within them a space which is usually much higher than it is wide or deep. Fire being made within it, the ore fluxes, and fresh fuel are thrown in at the top, and combustion is maintained by driving a steady current of air in at the bottom. The especial characteristic of this apparatus is that the ore and fuel being in immediate contact, and the amount of air being limited, the carbon of the fuel must satisfy its affinity for oxygen by extracting and combining with that contained in the ore, producing the reaction known as reduction. This affinity is so strong that most ores give up their oxygen at comparatively low temperatures, and reduction occurs while they are still in the upper part of the furnace. As the materials at the bottom are melted by the higher heat there and flow out, the reduced ore descends by its own weight until it is in turn melted and collected in the bottom of the furnace, from which it is removed by tapping or opening a small hole in the furnace-wall. Oxides of copper, lead, and tin may be smelted in one operation to metal in furnaces of this kind, which vary from 2 to 30 feet in height. Ores of iron, which are more refractory—that is, do not give up their oxygen with the same ease—require higher furnaces, technically called blast furnaces, the extreme limits of which, in civilized countries, are 25 and 100 feet, while barbarous nations still employ very rude furnaces of 2 or 3 feet in height. See BLAST FURNACE.

Zinc differs from the other oxides in being volatilizable at high temperatures, and it is therefore obtained by distillation. The ore is ground fine, mixed with a pure carbon-fuel, like coal or anthracite, and placed in a tube made of fire-clay. This is heated to whiteness, at which temperature the carbon attracts the oxygen of the ore, leaving the zinc to distill off as metal. In front of the tube are placed condensers of clay and sheet-iron, in which the metal collects.

The metallurgy of the sulphides is more complicated than that of either of the above classes. The metals of this class are (1) volatilizable and (2) non-volatilizable. The former include mercury and zinc. The compound of mercury and sulphur—cinnabar—is not stable at high temperatures if sufficient air is present, the sulphur oxidizing and leaving

the metal free. The ore is therefore heated to redness with access of air, when the mercuric sulphide distills off, and in doing so breaks up into mercury and sulphurous acid. The vapor is passed through large chambers, where the metal condenses and runs out. Sometimes the dissociation of the mercury and sulphur is aided by mixing iron or lime with the ore, as these have a stronger affinity for sulphur than the metal. The sulphide of zinc, called blende, is converted to oxide by roasting, which consists in heating it in contact with the air, whereby the sulphur is driven off as sulphurous acid. In some metallurgical processes, however, the aim of roasting is to produce a sulphate, which may be subsequently extracted by leaching. It is then treated like the oxide, as above described. In the treatment of the non-volatilizable metals three general processes are followed: (1) Roasting and reaction; (2) roasting and reduction; (3) precipitation. The first two depend upon the removal of the sulphur by roasting; and this operation has a furnace especially adapted to its requirements which is in all respects the exact opposite of the shaft-furnace, although in a modified form the latter is also occasionally employed in roasting operations. The apparatus usually employed is called a reverberatory furnace, and consists of a horizontal chamber with a low roof, having a fireplace on one side and a chimney on the other. The ore is placed in the chamber, which is called the hearth. The flames produced in the fireplace pass through this chamber, and are deflected by the low, arched roof upon the ore. Openings are made in the sides for the admission of air and for the purpose of working the charge. In this furnace the amount of air is in excess of that required by the fuel, so that the ore is subjected to oxidation. The oxide of sulphur, being a gas, passes off, leaving the remainder of the ore as a solid oxide. Various modes of utilizing this reaction are in use, depending upon the individual characteristics of the metals. When pure sulphide of silver is roasted, metallic silver, and not the oxide, remains; but in the majority of other cases the residue is partly or wholly an oxide. Roasting and reaction is performed by interrupting the oxidation when only partially finished, thoroughly mixing the half-roasted ore, piling it up, closing the furnace-doors to prevent the entrance of air, and heating the charge to such a temperature that the sulphur still remaining will combine with the oxygen absorbed by the ore. In this way both the sulphur and the oxygen are removed without giving the metal an opportunity to reoxidize, and metal is accordingly the result. Lead and copper ores are treated in this way. Roasting and reduction consists in allowing the oxidation of the ore to become complete, and then treating the product as above described for the oxide class. Lead, copper, antimony, and nickel are obtained by this method. Precipitation consists in melting the sulphide ore with some substance which has a stronger affinity for sulphur than the metal already combined with it. Lime, zinc, and iron are such substances, but the first requires too high a temperature for perfect action, and the second is too dear. Iron is the only reagent that is of universal application for this purpose. It may be used either as metals, oxide, or silicate, and the cinder made in iron-works is frequently employed. The unroasted ore is melted with the iron or cinder and the fluxes necessary to make the gangue fusible. A shaft-furnace is theoretically the best apparatus for the work, since no waste of iron by oxidation can take place in it. The reverberatory is frequently used, because in it the sulphur can be partly removed by roasting at a low heat, and the operation finished by melting the residues with iron.

The outline of metallurgical practice here given relates only to the most general principles. It is rare that an ore can be smelted at once to metal of purity sufficient for its immediate use in the arts. Sometimes the baser metal contains considerable quantities of the precious metals, which must be separated by further working. A refining process is almost always applied to the crude metal obtained from its ores; and very often the process of smelting is lengthened by making each operation incomplete, and thus obtaining the metal by a gradual elimination of the elements combined with it. The reason for this is that the impurities are always more volatilizable or more oxidizable, or their oxides are more reducible, than the metal itself, and by repeatedly subjecting the compound to operations which affect its constituents in different degrees a complete separation is effected. It is found to be much easier to eliminate these impurities from some compound of the metal than from the latter when fully reduced. For this reason the metal is often combined with some element that admits of perfect subsequent separation; and this compound is then passed through the purifying operations, in which there is a gradual concentration of the metallic base. The element employed for this purpose is sulphur. Oxides of copper are often turned into sulphides by adding some sulphide ore, like pyrite, to them, instead of reducing them at once to metal, which would not only cause serious loss in the slag, but also give an impure product in the case of impure ores. The general belief that sulphur is the smelter's greatest enemy is therefore unfounded. It is often his chief dependence, and purposely added in his operations. A rich ore is usually smelted without concentration. Of poor ores there are two kinds. The ore may contain a rich mineral mixed with a great preponderance of gangue; and when mechanical concentration is not admissible, such ores are usually melted raw, with fluxes to make the gangue fusible. The product is the metalliferous mineral without the gangue, and the process can then proceed on this rich product with greater care. The other case is that of an ore which contains a great deal of metalliferous mineral, but of low grade. Such ores are usually subjected to some process like roasting, by which part of the mineral is obtained in a condition that will admit of its removal by the fluxes in the first fusion.

The products of the fusion of an ore are threefold: (1) That containing the metal. This may be either metallic or a "matte" when it contains sulphur, or "speise" when it contains much arsenic or antimony. (2) That containing the gangue and fluxes; it is the stony part of the ore melted to a glass, and is called slag when the bases are chiefly non-metallic, and cinder or scoria when the base is chiefly a metallic oxide. (3) The gaseous products, which, besides the products of combustion, contain the oxygen of the ore and such other constituents of it as are volatile.

Metallurgy is rapidly advancing as a science in consequence of the great aid given by the progress of chemistry. At the present day the most prominent question is the use of the electric current and the economical use of fuels. The best construction of furnaces, the use of gaseous fuel (which permits the employment of refuse carbonaceous materials), the heating of the blast to increase the effect of the fuel used, the utilization of the half-burned carbon which exists in furnace-smoke, and the direct production of metals from their ores in one or two operations, are all phases of this important problem; and these things are now chiefly occupying the attention of metallurgists. Great care is also taken in large works to make useful every element in the ore that has a market value. To this end metallurgical establishments are now large manufactories of sulphuric acid, arsenic, iron and copper vitriol, such paints as zinc white, smalt, etc. The most noticeable instance of this economy is the manufacture of sulphuric acid from pyrite, which is a bisulphide of iron. No less than 1,500,000 tons of this ore are burned for this purpose yearly in Europe, producing about two-thirds its weight of acid. Pyrite almost always contains at least a trace of silver, and in England large quantities of the burned ore are treated for silver, of which it contains about three-fourths of an ounce per ton. After extracting the silver, a moderate part of the residue is sold to the iron-works and made into iron. This is probably the most complete utilization of an ore known.

The *wet method* of treating ores consists in bringing the metal into solution, and then precipitating it by some agent. When the ore is an oxide or contains a native metal, the solution may be effected by treating it with an acid which will dissolve the metal; sulphides may also be treated in this way by first roasting them. Sulphuric and hydrochloric acids are those usually employed, but they are too dear in most localities, and the use of purchased acid is limited. Examples of such treatment are mostly confined to the metallurgy of gold, platinum, copper, and bismuth. The acidification of the metal is sometimes accomplished by heating it with some substance containing the acid. Thus silver is frequently chlorinated by heating the roasted ore with salt, which contains chlorine. The resulting chloride of silver may then be extracted by solution in strong brine, or it may be treated with iron, which reduces the chloride to metal, and mercury, which amalgamates the metal as fast as formed. The most usual mode of accomplishing solution is employed with the sulphides, which are carefully roasted in such a manner that the product is not an oxide, but a sulphate of the metal to be extracted. This is accomplished by regulating the temperature employed,

and when the material operated on contains sulphides of several metals, a proper management of the operation will give a product containing oxides of the metals which are not desired, and a sulphate of the one which is to be extracted. The roasted material is then treated with water which dissolves the sulphate, leaving the oxides; and the metal is then precipitated by some reagent. Copper precipitates silver, and iron precipitates copper. This operation is employed in the metallurgy of silver when the ores are pure; but the ore itself is not treated directly in this way, the gangue being first removed by fusion, and the roasting applied to the resulting matte. Copper, silver, and nickel are the metals most frequently extracted by the wet way, but it is also applied to gold, platinum, and bismuth. For poor ores it is usually much cheaper than the dry method, but when the ore is rich, or if the gangue is a substance soluble in acid, the use of acid and labor may be so great as to make the dry method preferable.

In *electro-metallurgy* the electric current is utilized for the reduction of ores or the separation of metals. Its widest application in the former direction is in the manufacture of aluminium (see ALUMINIUM), where the introduction of electrolytic methods has so cheapened cost that the metal is now available for common use. The most conspicuous example of the separation of metals is furnished by modern copper metallurgy. In many ores copper is associated with a small quantity of the precious metals. The ordinary wet methods did not admit of paying separation of the silver from the metallic copper produced unless the latter contained more than 30 oz. of silver to the ton. The electrolytic method is much cheaper, and therefore adds a somewhat important source to silver production. The crude metallic copper as it comes from the hands of the copper-smelter—being in recent years the product of the Bessemer converter—is cast into flat slabs or anodes, which, after being covered with bagging, are suspended in vats containing an acidulated solution of sulphate of copper. Copper sheets are alternately hung between the argentiferous copper anodes, they acting as cathodes. By the passage through the vats of an electric current the copper is dissolved from the anodes, and is redeposited on the cathodes, the silver remaining behind with whatever impurities the coarse copper may have contained. Very large quantities of argentiferous copper are annually treated by this method in the U. S. and in Europe.

The electrolytic method is also rapidly becoming the standard in the refining and parting of silver, the process being based on the selective power of nitric acid, by which the silver is dissolved and reprecipitated with less electromotive force than the usually accompanying metals, bismuth, lead, and gold. The silver to be treated is cast into plates which are covered with linen bags, and are introduced as anodes into the vats containing dilute nitric acid. Rolled plates of fine silver are used as cathodes. The current causes the silver to dissolve, and it is deposited on the cathodes at the rate of 4·2 lb. per hour per electric horse-power. The current used has an electromotive force of $1\frac{1}{3}$ to $1\frac{1}{2}$ volts for each vat. The two works at St. Louis and Pittsburg alone treat together daily 70,000 oz. of silver.

Revised by CHARLES KIRCHHOFF.

Metals [from Lat. *metal'lum*, metal, mine = Gr. *μέταλλον*, mine, metal; the most probable source of the word is the Semitic, cf. Heb. *mātal*, to forge]: elementary bodies especially characterized by their peculiar and generally high luster, known as the metallic luster; by very great opacity; and, with few exceptions, by their high specific gravity. The *opacity* of even the thinnest films is perfect, except in the case of gold, which is so malleable that it can be beaten into films through which a greenish light is found to pass. The *color* of the metals is generally white, although of various tints; zinc and lead having a bluish, bismuth a reddish, and calcium a yellowish tint. Gold is yellow, and copper red. The metals have generally a high *specific gravity*, but potassium, sodium, and lithium are lighter than water, while magnesium and aluminium have a specific gravity of 1·75 and 2·56 respectively. Of the others, the more important vary from arsenic at 5·88 to platinum at 21·5 in the form of fine wire. The specific gravity of malleable metals is decidedly increased by compression. *Malleability*, or the property of flattening more or less under pressure of blows, is possessed by a large number of the metals. Gold has been beaten into films only $\frac{1}{200000}$ of an inch thick; silver is also very malleable, and so are copper, tin, and platinum, although in an inferior degree. Iron, lead, nickel, cadmium, and mercury, when frozen, are more or less malleable; bismuth is very slightly malleable in small globules; while antimony, arsenic, cobalt, and manganese are brittle. Zinc is rather brittle at ordinary temperatures, but between 120° and 150° C. it can be rolled into sheets, which remain malleable when cold. At a higher temperature, 210°, it becomes very brittle again. Hammering and rolling render malleable metals more or less brittle, but their malleability can be restored by heating them strongly and slowly cooling them. This process is called *annealing*. Related to malleability is *ductility*, the property of being drawn into wire; but as this depends partly on the power of resisting a strain, or tenacity, the most malleable metals are not necessarily most ductile; the order being as follows, beginning with the most ductile: iron, copper, platinum, silver, gold, zinc, tin, lead. Metals are drawn into wire by pulling them through holes in steel plates. If they become brittle during this operation, they must be annealed. In *conductivity* the metals vary greatly. Silver is the best conductor of heat, and bismuth one of the poorest. Silver is likewise the best conductor of electricity.

Conductivity of Heat.—Silver, 1,000; copper, 736; gold, 532; tin, 145; iron, 119; lead, 85; platinum, 84; bismuth, 18. The *linear expansion* of metal rods by heating from 0° to 100° C. is expressed by the following fractions: iron, $\frac{1}{819}$; gold, $\frac{1}{682}$; copper, $\frac{1}{584}$; silver, $\frac{1}{524}$; lead, $\frac{1}{351}$; zinc, $\frac{1}{333}$. Platinum expands only $\frac{1}{1167}$, and this being very nearly the rate of expansion of glass, it is found that platinum wires can be inserted into fused glass without any danger of cracking the glass on cooling. The fusibility of the metals covers a very wide range, mercury being liquid at ordinary temperatures, and platinum requiring the heat of the oxyhydrogen blowpipe for its liquefaction. Osmium is the most refractory of the metals, volatilizing without fusing at a temperature capable of volatilizing platinum.

Fusing-points of Metals.

Mercury	39·44° C.	Antimony	425° C.
Tin	227·8	Silver	1,023
Cadmium	228	Copper	1,091
Bismuth	258	Gold	1,102
Lead	325	Cast iron	1,530
Zinc	412		

Nickel, cobalt, manganese, and palladium require the highest forge heat; molybdenum, tungsten, and chromium only agglomerate in the forge; titanium, iridium, rhodium, and platinum are infusible except at the temperature of the oxyhydrogen blowpipe. Wrought iron and platinum become soft before melting, and pieces of iron or steel can therefore be united by pressure while in this pasty state, and porous platinum sponge can be made solid. This is called *welding*. *Volatility*, or the property of assuming the gaseous state, is known to be possessed by most of the metals, and is probably a property of them all. It is especially characteristic of certain of them, which volatilize at comparatively low temperatures. Thus mercury yields a sensible amount of vapor at 20° C., and at 350° boils; zinc, cadmium, and magnesium volatilize rapidly at a red heat; and even gold and platinum may be vaporized before a properly arranged oxyhydrogen blast. Arsenic passes off in vapor without fusing. In *hardness* the metals vary at ordinary temperatures from the fluid mercury and soft, waxy potassium to the exceedingly hard chromium and manganese capable of scratching glass and hardened steel. The *crystalline form* of some of the metals has been determined; some being found naturally crystallized, as gold, copper, and silver; others being deposited in crystals by the galvanic battery, as tin; by sublimation, as arsenic; or by fusion and gradual cooling, as bismuth. Zinc, arsenic, antimony, and bismuth crystallize in forms belonging to the hexagonal system; tin is tetragonal; gold, silver, platinum, mercury, copper, lead, and iron are isometric.

The metals are found both free and combined in nature. Gold and platinum almost invariably occur free, for it is a disputed question whether the gold so generally found in iron pyrites is combined with sulphur or not. Mercury occurs mainly as sulphide, and sometimes metallic. Silver is often found native, but more generally as sulphide, and with sulphides of antimony, arsenic, copper, and lead; also largely as chloride. Copper mainly as sulphide, generally with sulphide of iron, also very commonly as carbonate and oxide, and in a few localities large deposits of native cop-

per are found. The iron ores are the oxides and carbonate; sulphide of iron furnishing sulphur, sulphuric acid, and green vitriol, but not being generally accounted an iron ore. Lead occurs mainly as sulphide, but the carbonate is also an important ore. Tin is found as oxide; the sulphide is a less esteemed ore, although abundant in the English mines. The most valuable zinc ores are the carbonate and sulphide; the oxide is less abundant. Nickel and cobalt occur chiefly as arsenides and sulphides; bismuth, antimony, and arsenic are found combined with sulphur, and also native, in sufficient quantities to be worked.

There are forty-nine of the elements universally considered as metals, tellurium, which is sometimes reckoned as the fiftieth, being generally classed among the *metalloids* with selenium, to which it bears close relations. Gold, silver, mercury, lead, copper, iron, and tin were known to the ancients. Potassium was discovered by Davy in 1807 while acting upon potash with a powerful galvanic battery, and this led to the discovery of sodium, lithium, and the metals of the alkaline earths. Rubidium, cæsium, thallium, and indium were discovered by the use of the spectroscope, indium being the last metal discovered. Gallium was discovered by Lecoq de Boisbaudran Aug. 27, 1875, during the spectroscopic examination of zinc-blende from the Pierrefitte mine, valley of Argeles, Pyrenees. It gives a violet line at 417, and a faint band about 404, and is a white, moderately hard metal, closely allied to zinc.

The metals have been variously classified, according to the purposes to be served by the grouping. To express their electrical relations they were arranged in succession, beginning with the most electro-positive metals, the alkali-metals, and ending with the most electro-negative, the noble metals; the noble metals being those whose oxides are reduced by heat alone—viz., gold, silver, mercury, and the metals of the platinum group. They are also classified according to the properties of their oxides, some forming powerful bases, as the oxides of metals of the alkalies and alkaline earths, with the lower oxides of most of the other metals; others form only acid oxides, as arsenic and antimony, and the higher oxides of chromium, manganese, and iron; while others, like sesquioxide of aluminium, may sometimes play the part of acids and sometimes of bases.

The classification of the metals according to their equivalence or combining power is the most accurate for the general purposes of modern chemistry. This method of classification assumes the atomic weight of hydrogen as the unit for the relative combining weights of the elements, which are then placed in groups whose members have equivalent combining proportions, and also possess certain properties in common.

1. *Monad Metals.*—The *alkali metals*, potassium, sodium, lithium, cæsium, and rubidium, which form only one chloride each. Silver, although differing widely from the alkali metals in general, is a monad, and yields an alum closely related to potash alum.

2. *Dyad Metals.*—Barium, strontium, and calcium, whose oxides are called the *alkaline earths*, form a group together. Glucinum, yttrium, erbium, lanthanum, and didymium, all rare metals, whose oxides are called earths, form a second group. Zinc and cadmium, with magnesium, which is analogous in many of its compounds to zinc, although it was formerly reckoned among the alkaline earths, form a third group. The elements of each of these groups form only one chloride. Mercury and copper constitute a fourth group, and form each two chlorides.

3. *Triad Metals.*—Indium, forming only a trichloride, and thallium and gold, forming each a mono and a trichloride, belong here. Thallium, however, has strong analogies to the alkali metals, and indium is capable of forming an alum with ammonium.

4. *Tetrad Metals.*—Platinum, palladium, iridium, rhodium, ruthenium, and osmium are classed together, and all form tetrachlorides, as well as dichlorides, excepting rhodium, which forms a dichloride and a trichloride, but is retained here from analogy. Tin and titanium form a second group of tetrads. Lead is considered quadrivalent, because it yields a plumbo-tetrethide with the hydrocarbon radical ethyl. Zirconium and thorinum form tetrachlorides. Iron, aluminium, manganese, cobalt, nickel, and cerium are also considered as tetrads, although their proper position is on some accounts doubtful.

5. *Pentad Metals.*—Arsenic and antimony form trioxides and pentoxides, and bismuth is grouped with them from its analogy to antimony. Vanadium is regarded as a pentad on account of its analogy to phosphorus in some of its combinations. Tantalum and niobium have been shown to form pentachlorides.

6. *Hexad Metals.*—Chromium forms a hexfluoride, and uranium is reckoned as a hexad from compounds similar to those of chromium. Tungsten forms a hexchloride, and molybdenum, being analogous to it, is considered hexadic.

Specific Gravities of Metals at 15·5° C.

Platinum (in thin wire)	21·50	Cobalt	8·54
Gold	19·50	Manganese	8·00
Uranium	18·40	Iron	7·79
Tungsten	17·60	Tin	7·29
Mercury	13·59	Zinc	6·86–7·1
Palladium	11·30–11·80	Antimony	6·80
Lead	11·45	Arsenic	5·88
Silver	10·50	Aluminium	2·56–2·67
Bismuth	9·90	Magnesium	1·75
Copper	8·96	Sodium	0·972
Nickel	8·80	Potassium	0·865
Cadmium	8·70	Lithium	0·593
Molybdenum	8·63		

Revised by CHARLES KIRCHHOFF.

Metal-work: the manipulation and treatment of metals and the making of metal objects of any kind, for use or ornament; also the objects so made. Ordinarily the term is not used for matters of pure utility; thus we do not hear of machinery or of barbed-wire fences or of brass faucets and stop-cocks as *metal-work*; the term is applied rather to the *making* of things that are more or less ornamental, and to the *things* themselves. It is in that sense that it is used in this article.

Metals are given the forms desired by several different processes, as by *casting*, by *hammering*, by *stamping*, by *filing* or otherwise cutting away some part of the substance, by *rolling*, as when sheet-metal is wanted, by *drawing*, as wire. Moreover, the forms so produced are further modified by CHASING (*q. v.*), and the surfaces are treated either by chasing or by ENGRAVING (*q. v.*). Parts are put together by means of welding and soldering, and by means of rivets and screws. The colors of metals are changed or modified by *alloyage*, that is, by melting two or more metals together (see ALLOY); by applying a thin film of one metal to the surface of another, as in *silver plating* and in *gilding*; by exposure to washes and "pickles," which give different tints to bronze castings; and by chemical changes of a simpler kind, such as the formation of oxides and sulphides on the surface. Moreover, color effects can be got by DAMASKEENING (*q. v.*), or inlaying one metal in another; by NIELLO-WORK (*q. v.*), by the Japanese process imitated in the West of hammering different colored metals together to produce a veined or mottled surface; and by the corrosion or mechanical roughening of parts in contrast with the brightness or smoothness of others. Painting, too, of different sorts can be applied to metals, and enameling can be applied with perfect ease. Each metal allows of certain kinds of ornamental treatment, and is less adapted to others.

Hammer-work: (1) *Wrought Iron.*—The singular property that iron has of keeping in a soft condition when above red heat, though still far below the fusing-point, is its special fitness for being shaped by hammering. It has also the property of uniting readily and strongly one mass of hot iron with another when the two are brought together and hammered one into the other. Pieces so united are said to be *welded* together, and iron treated by hammering when hot is said to be *forged*. Iron-work produced by these means, especially when elaborate and of many parts, or very delicately worked, is called *wrought iron*. Nearly all the artistic work in iron, in all ages and all parts of the world, has been wrought iron. We know little of the iron-work of the ancients; it has perished, and it does not seem to have been important as decorative art; but that of the Middle Ages is of the greatest interest. As the smiths of the time had no machinery to facilitate and hasten their work, everything had to be done by sheer hammer-work; the pieces of iron were shaped, drawn out, flattened, curved, united in one, split apart and spread into branches, formed into efflorescent sprays, and these grouped in anthemions—all by the hand of man, aided only by simple tackle for lifting and lowering, and by pincers and hammer, and now and then by punches and dies of home manufacture. The gates, the window-grates, hinges and locks, bars and bolts, made in this way by patient handiwork, became almost of necessity

the medium of whatever power of fantastic design the smith possessed. Such power of design was inherited, too, from ancestors, and taken up from teachers and masters, who had worked in an equally spontaneous way all their lives, and whom the son and pupil hoped to excel; and in no department of decorative art is the early time more admirable and enviable than in this of simple smith-work. With each improvement made in the industrial arts of iron the fine arts of iron have grown more feeble.

Hammer-work: (2) *Repoussé-work.*—The practice of beating up patterns in relief in thin plates of metal requires that the artist's eye should be upon the work as it grows, while the hammer-strokes must be plied from the other side, the reverse. For this purpose a singular tool is used, called sometimes a snarling-iron. It is a bar of iron fixed strongly at its larger end, tapering toward the other or free end, which is turned up at the point. An assistant pounds steadily upon the bar at a convenient distance from the fixed end; its elasticity then causes the turned-up thin point to strike a series of slight blows upon the under side of the plate of metal which the artist holds firmly above it. In this way, as the plate is moved about, the relief pattern slowly takes shape. Such *repoussée* or *repoussé*-work, as called by the French term generally used in English, is done in gold and silver very commonly, nearly all the relief ornaments in old silver plate being of this character, and purely ornamental disks and plaques being common in the seventeenth and eighteenth centuries of art. At the same epoch it was done in copper on a very large scale, cooking-vessels, water-pots, and all sorts of bowls and dishes were made of sheet-copper worked exclusively with the hammer. It is done in bronze by the Orientals; the Japanese have exquisite work of this sort, both simple and elaborate. Lead has been treated in this way, and, at the other end of the scale of hardness, so has steel. In modern times old work of this sort has been imitated and even surpassed in delicate finish as well as in boldness. Works of art of immense size have been carried out chiefly by hammer-work: the most ancient bronze statues of the Greeks were shaped in this way, and the practice has been revived in modern times.

Hammer-work Helped by other Processes.—It is customary to carry out the design and to diversify the surface of hammer-wrought metal by means of sharp-pointed and edged tools applied directly, and also by stamps and dies. Wrought iron is worked upon while hot by tools with chisel-edges, and also with the sharp point; of course, only very simple patterns are possible, such as zigzags and crosses, and the impression of gouge-shaped tools producing little arcs of circles, and punches of circular form. For more elaborate patterns and all reliefs, such as the simple leafage which one sees in rich Gothic hinges and the like, a die is used into which the hot iron is forced by blows of the hammer. *Repoussé*-work is retouched by the chasing-tool, and that in a most elaborate fashion. (See CHASING.) In the eighteenth century, which was, in Europe, the great time for goldsmiths' and silversmiths' delicate and minute work, watch-cases, smelling-bottles, *étuis*, or small boxes of a decorative sort were made of thin plates of precious metal worked in high relief by the hammer and then chased with surprising elegance. The back of a watch would be a bas-relief containing a dozen or more human figures well and delicately modeled, with a suggested landscape for the background, and a decorative border of scroll-work; and such a watch commanded no very exorbitant price. *Engraving* may be used also to decorate hammer-work (see ENGRAVING); indeed, it is probable that the burin as well as the chasing-tool has been used on the gold and silver *repoussé*-work described above. In antiquity the bronze *cistæ* or caskets for toilet articles and the like were made of thin sheets of bronze hammered into the simple forms of circular and elliptical cylinders, and received their chief ornamentation from the graver. The touch of the sharp tool on the hot iron though often spoken of as engraving can hardly be considered so: the graver removes some part of the metal, which is hardly feasible in hot iron, and the impressed lines and patterns on wrought-iron hinges, lock-plates, etc., are rather chased than engraved, but actual chiseling in the cold iron has been done, and even on a large scale. Japanese decorative objects are often finished in this way, and the famous wrought-iron pillar of the Koutab mosque in old Delhi seems to have been sculptured as if it were bronze or a still softer metal. Oriental bronzes offer many such examples of graver-work in the cold metal.

Cast-work: (1) *Cast Iron.*—This material is not pure iron, but has much carbon combined with it and also mixed with it, and is more brittle and harder than wrought iron. It does not give very clean and sharp castings, and it is too hard to be tooled after casting, as is done with bronze, for instance. Therefore, cast iron has never been a recognized medium for works of fine art, although several attempts have been made to produce artistic castings. This is notably in the case of what is called *Berlin iron* or *Berlin jewelry*, which originated in Germany at the time of Napoleon's supremacy, when gold jewelry was given to the nation and it became a fashion to wear the inexpensive substitute. These castings were of surprising delicacy, but more recent work of the same sort is inferior. Another noteworthy attempt has been the casting of large statues and groups by French founders since 1875, some of which have approached real excellence. *Brass* also, and *latten*, which is not really different from brass, are used for castings, and generally the cast parts are subsidiary to larger works in sheet-metal. The most important use of casting in the arts is in the case of *bronze*. This is an alloy of copper with tin, or with tin and lead, or tin and zinc, or all three, sometimes having small proportions of still other metals. Tin alone with copper makes the hardest and finest bronze; the proportions are generally about nine parts copper to one of tin, there being no fixed rule. Bronze has always been the especial material for artists; from early civilization to the nineteenth century it has been in use for medals and medallions, bas-reliefs, statues, and decorative objects. It gives a beautifully sharp and delicate casting, and allows of great refinement of finishing work upon the surface, so that it can be brought to a full realization of the artist's conception; then it bears perfectly exposure to the weather, soon losing its golden primitive color and taking a greenish tinge which comes from a chemical change in the external particles, and is called the *patina*. Moreover, as many bronzes are not meant for exposure out of doors, the patina is often given by artificial means, and many tints of green and brown and yellow, olive and buff, and silver gray are produced by means of "pickles" or strong acid mixtures. Some Eastern bronzes are colored to resemble a crystalline surface, shot with little *spiculæ*; others are mottled and spotted, but these surfaces are applied to vases and dishes in the main, and to those of plain outline and simple form. Bronze bowls and other vessels, arms, weights, lamps, mirrors, and the like are found among very early Egyptian and Assyrian deposits. Bronze statuary and relief sculpture come down to us in perfect condition from Grecian times, from the Roman imperial epoch, from the Byzantine empire, and from the Middle Ages and later times; some of it is hammered and riveted, but by far the greater part is cast-work. Most of the works of art in this material have been lost to the world because of the intrinsic value of the bronze. Thus of the enormous number of large bronze statues and groups which are known to have existed in Rome and the other cities of the empire, not half a dozen have been preserved, apart from the great collection found in a single villa at Herculaneum, and now exhibited in the Naples Museum. In like manner very many pieces of even the fifteenth and sixteenth centuries have been melted down, and to this day newly found antiques are in imminent danger of being cut up and sold by ignorant finders. There is no doubt that valuable pieces are being destroyed in this way every year in all the lands surrounding the Mediterranean.

Stamped Work.—Much the most important kind is that of medals and coins struck with a die. (See MEDAL and NUMISMATICS.) Other instances of stamped work have been named under *wrought iron*. Apart from this, stamps are used chiefly in silverware and the finer vessels of pewter and other cheap metals. Small ornaments in relief are produced in this way with good results.

Filing and chiseling are used in all kinds of metal-work, and are not the chief formative processes in any.

Rolling is only an alternative of hammering in cases where a flat sheet or a continuous bar or strip is required. The flat sheet-metal used in ancient cists was made, as armor was made, by the hammer; bars and the like were made, as was also wire, by hammering the metal into a groove in the anvil. Modern processes of passing between rollers are merely cheaper and quicker ways of doing the same thing on a large scale.

Drawing, as wire, is of the same nature, but a modification of wire-work is that called damaskeening, which is strictly inlaying metal upon metal.

As regards the purposes to which metal-work is put in the way of decorative art, it is customary to make many divisions and subdivisions; thus gold and silver plate is divisible into ecclesiastical and domestic, and there is also the intermediate variety of college and corporation plate, much studied in England, where more remains than on the continent of Europe; and the purely artistic, not at all useful work put upon medallions, *repoussé* plaques, and the like; and also the pieces worn or carried upon the person, such as buttons and buckles, *étuis* and *vinaigrettes*, to all which varieties the large department of jewelry must be added. (See JEWELRY.) In like manner in wrought-iron work are included not merely the gratings and crestings of architectural purpose, but also arms and armor in all their variety, steel being substituted for iron.

There are certain ornamental processes which though not metal-work themselves are closely allied to it, such as NIELLO and ENAMEL (*qq. v.*). Their use is practically limited to gold and silver ware, except that in cases where enamel is the chief decorative appliance, the design of the whole piece being based upon the effect of the enameling, the metal basis may be of brass or other inexpensive metal. The filling of engraved lines with black or red wax, as in monumental brasses (see BRASSES, MONUMENTAL), is inlaying and not essentially metal-work. RUSSELL STURGIS.

Metamerism [prefix *μετα-*, corresponding to, duplicating, from Gr. *μετά*, with + Gr. *μέρος*, part]: in zoölogy, that condition exhibited by various types, like Annelids, Arthropods, and Vertebrates, in which the body can be reduced to a series of similar parts. Thus in an earthworm the body is composed of a series of essentially similar segments arranged one after the other, each segment containing portions of the nervous, excretory, digestive, muscular, and circulatory systems. In the Vertebrates this metamerism is at first sight not so evident, but it is readily shown to exist, and upon its presence some of the modern advances of our knowledge of the relationships of the Vertebrates to the lower forms depend. J. S. KINGSLEY.

Metamerism, in chemistry: See ISOMERISM.

Metamor'phism [Gr. *μετά*, after, beyond, over + *μορφή*, form]: a term extensively employed in the science of geology to indicate all those changes in the mineralogical composition and structure of rocks, whereby they are rendered harder and more crystalline (or at least not less so) than in their original condition. In its broadest sense the term metamorphism might apply to all chemical and structural changes which go on in rocks, but by common consent it is restricted to the above given meaning, and thus contrasted with the terms *weathering* and *decomposition*, which are used to cover those changes tending to make rocks less crystalline and more soluble.

The two contending cycles of rock-history, *decomposition* under atmospheric conditions, and *recomposition* under conditions of high temperature and pressure, have long been recognized. At the earth's surface crystalline masses become hydrated or combine with carbon dioxide, thereby disintegrating into soil; the *débris* thus formed is spread out in sedimentary deposits, which, when deeply buried, become recrystallized into hard and resistant rocks.

Metamorphic Rocks.—The fact of metamorphism on a large scale was clearly appreciated by Hutton, who, over a hundred years ago, in his *Theory of the Earth*, described it, while considering heat as its all-sufficient cause; the term itself science owes to Lyell. For a century the processes it embraces have received an ever-increasing amount of study and attention from geologists.

Metamorphic rocks are regarded as occupying an intermediate position between those of igneous and those of sedimentary origin; they are such as owe their component minerals and structures, in great part at least, to the recrystallization of pre-existing rocks without fusion. They include most of the so-called CRYSTALLINE SCHISTS (*q. v.*), which are in part demonstrably of igneous, and in part of sedimentary origin, although a still larger number are so profusely altered as to leave their original character in doubt.

Kinds of Metamorphism.—One of the most apparent as well as earliest recognized distinctions among metamorphic rocks is to be found in the presence or absence of an apparently effective cause of metamorphism. It was early recognized that various intrusive igneous masses had produced a direct change by hardening and recrystallizing the rocks around them. As these changes surrounded the entire intrusive mass, and as their intensity was seen to be proportional to the proximity of the eruptive rock, the efficiency of the latter as the metamorphosing agent was hardly to be questioned. Such cases were therefore called *contact* or *local* metamorphism, in contradistinction to those which disclose no such active agent. These latter, which generally involve much greater areas than the comparatively narrow zones of alteration surrounding igneous intrusions, have been called cases of *general* or *regional* metamorphism. In many instances the effects of this latter kind of metamorphism are so like those produced by contact action that igneous masses have been assumed as existing below the surface. In the majority of cases, however, no such assumption will account for the facts.

Within recent years the energy developed by the great mechanical movements within the more disturbed zones of the earth's crust has been recognized as an efficient cause of the metamorphism of rocks on a vast scale. The faulting, folding, and shearing of great rock-masses has generated heat, stimulated circulation, and developed new minerals and structures. Thus new rocks are developed from old ones, and the completeness of the change is, in the main, proportionate to the intensity of the earth's movement. Such metamorphism has been called *dynamical* or *dislocation* metamorphism. The vast and complex problems which it involves have as yet only just begun to be investigated in detail.

Agents of Metamorphism.—Whether the primary exciting cause of metamorphism be the intrusion of igneous masses or the dislocation of the rock strata, the three most active and necessary agencies in producing the changes called metamorphic are (1) heat; (2) moisture, or some other mineralizing agent; (3) pressure. Heat and pressure both greatly increase the chemical action of igneous solutions, while even a small amount of some substance, like fluorine, chlorine or boron, capable of forming volatile compounds, facilitates the formation of new minerals.

Another important factor in metamorphism is the presence of a thick mass of overlying material which prevents the free escape of heat and volatile substances, and thus gives them their maximum efficiency.

The *result* of metamorphism in a given case depends of course not merely on the nature and intensity of the metamorphosing agents, but also on the kind of rock acted upon. Limestone, sandstone, slate, and eruptive rock will yield very different products when subjected to the same metamorphosing influences.

The metamorphic action on a given rock-mass may be designated as macro-structural (cleavage or jointing), micro-structural (crushing and recementation of the constituents), or chemical (formation of new minerals). In most cases all three of these occur simultaneously. The separate consideration of the action of each of the three metamorphosing agencies, as well as of the three kinds of changes which they produce, would carry us far beyond the space available for this article. They are well described by Sir Archibald Geikie in his article on *Geology* in the ninth edition of the *Encyclopædia Britannica*, and in his *Geological Text-book*.

Origin of the Metamorphosing Agencies.—Heat: In the case of contact metamorphism the necessary heat is furnished by the intruding igneous mass; in the case of dynamic metamorphism it is produced by friction in the rocks undergoing the disturbance, and in part also by the escape of heat from below through the fissures formed. *Moisture*: Water is present in all rocks, even the most compact and impermeable. The so-called quarry-water (*eau de carrière*) is well known to all practical stone-workers. Its amount varies greatly with the porosity of the rocks, but it is always present. This furnishes the necessary moisture in the case of contact metamorphism, although it is well known that igneous rocks also contain large quantities of water and other volatile substances. In the case of dynamic action the crushing and faulting of rock-masses of course greatly facilitates the presence and circulation of water. *Pressure*: Great thicknesses of overlying strata may furnish a pressure which greatly increases the chemical activity of solutions. In disturbed regions the strains to which the rocks are subjected are very efficient agents of metamorphism, as is shown by the intensity of the changes, being proportional to the amount of disturbance.

Experiments Relative to Metamorphism.—Much has been learned as to the nature and processes of metamorphism by experimentation. Foremost among the investigators in this field are Hall, Scheerer, Rogers, and Daubrée.

G. H. WILLIAMS.

Metamor'phosis: in zoölogy, the term applied to those changes exhibited by various animals in their growth from the egg to the adult condition in which they pass through forms apparently very dissimilar. Possibly the most familiar example is that afforded by the butterfly, where the caterpillar, the first stage, becomes transformed into the chrysalis, and this, in turn, into the winged form. (See ENTOMOLOGY.) These three stages at first sight are very unlike. Metamorphoses are very common in all groups of animals except the vertebrates, and in many cases they are seized upon by the evolutionist as indicating the affinities and lines of descent of different groups. In this, however, great care has to be exercised, for there is much evidence to show that not all the stages passed through are reminiscences, so to speak, of ancestral conditions, but are complications introduced at a later period into the life-history.

J. S. KINGSLEY.

Metaphor [from Lat. *meta'phora* = Gr. μεταφορά, deriv. of μεταφέρειν, carry over, transfer; μετά, over + φέρειν, carry]: a figure of speech in which an ordinary term is displaced by one which suggests merely a portion of its characteristics, thereby instituting a comparison between the two circles of ideas suggested by the two terms, on the basis of something they possess in common, disregarding what is peculiar to each. It may therefore be regarded as an abbreviated or implied simile. Thus the metaphor *an iron will* implies the simile *a will strong as iron*; *the ship plows the sea* implies the simile *the ship cuts the water as a plow cuts the soil.* The substituted term usually replaces the general and remote with the concrete and familiar. The purpose of the substitution is in general to stimulate the imagination.

The substitution or transference is not merely or principally a feature of rhetoric or style. It represents a deeply rooted tendency of natural speech, which plays an important *rôle* in shaping the historical development of the meaning and use of words. When the substituted or metaphorical term becomes through persistent use the ordinary or regular, a permanent step has been taken in the development of language; thus the metaphorical use of the Latin *spiritus*, breath, in the sense of spirit, becomes in the French *esprit* a permanent fact of language. See METONYMY and SYNECDOCHE.

BENJ. IDE WHEELER.

Metaphysics [from Gr. τὰ μετὰ τὰ φυσικά, liter., the (essays) after the ones about (external) nature, the subjects treated after physics (in Aristotle's essays), but later taken to mean the subjects higher than or above physics (μετά, after, beyond, above; φυσικός, pertaining to φύσις or nature)]: a system of thought aiming to explain the universe by one or more general principles. The problem of metaphysics is the discovery of the deeper nature of things, the last truth which comprehends all the partial truths of the different sciences, physical and mental.

Conceptions of Metaphysics.—The various systems of philosophy which have been propounded in history all deal ultimately with the metaphysical question of "first cause" or "ground" of things, and they may be classed under four heads, according as they have conceived the problem and the method of solving it. These four conceptions or types of thought may be called (1) the Aristotelian, (2) the German, (3) the Scottish, (4) the Herbartian conceptions, respectively:

1. *The Aristotelian Conception.*—Aristotle conceived the problem of metaphysics to be the explanation of the reality which lies deeper than the "physics"—i. e. deeper than all empirically ascertained knowledge, whether it be the truths of psychology or those of physical and natural sciences. To him metaphysics is the doctrine of the underlying, the permanent, the cause which itself has no cause. This view had to Aristotle, situated as he was historically, two main points of application. In Socrates the separation of truth, knowledge, opinion (δόξα) from reality, essence (οὐσία) had appeared. Socrates distinguished concepts from reality, and aimed so to verify and define concepts as to make them universally true to reality. Plato widened the breach between knowledge and reality by distinguishing *ideas* (ἰδέα) as metaphysical essences of which knowledge in consciousness and things in the world were types and imperfect reflections. The problem presented to Aristotle therefore was twofold—i. e. to explain knowledge and to explain reality. Aristotle aimed to combine these opposites in a view which found in knowledge the true reflection of reality, and this involved the identification of reality with the particular things of nature, which were the objects of knowledge. This general position of Aristotle appears in the three leading doctrines of his metaphysics: (1) His doctrine of the relation between the individual and the universal. Aristotle held, against Plato, that reality resided not in the general notion or idea, but only in the particular thing in which the idea is realized. Hence metaphysics, as a science of what is universal, must find its material in the natural sciences—in the world as it is given in experience. (2) The doctrine of "matter and form" by which he distinguishes between reality as matter and idea as form. The "thing" in nature is matter from the point of view of fact, but form from the point of view of thought—i. e., of the meaning, use, development—which thought attributes to it. Things are particular in themselves (matter), but universal according as they enter into a system (form). In order, therefore, to a true system, a universal form, there must be particulars—material things—which embody it. (3) The doctrine of "mover and moved," which though less essential in its development, illustrates the same dual problem and its solution. Matter he made the static element, without dynamic property or movement; movement came from the "mover," which, however, was not divorced from the thing moved, but pertained to it as a higher category of its existence in the world of forms or concepts. All of these positions show the unity of Aristotle's thought, and at the same time the elements of the problem of metaphysics as conceived in the Socratic school.

2. *The German or Ontological Conception.*—It is evident that a system of metaphysics might be constructed from either of the two points of view which Aristotle endeavored to combine; being may be asserted at the expense of knowledge, on one hand, giving an *ontological* system, or knowledge may be emphasized at the expense of being, on the other, giving a *gnosiological* system. The great systems of German metaphysics down to Hegel (Kant, Schelling, Fichte in part) are of the former character, which as a type of thought may therefore be said to have flourished, apart from the rise of the Oriental mystical systems, mainly in Germany. It takes up the tradition of Plato and the philosophers of the Eleatic school, who postulated a principle of being (τὸ ὄν) from which the world of things—knowledge included—might be deduced. Such a principle is capable of a twofold construction, however. It may be conceived in terms of the mind's object, i. e. the external world or matter, and so become *Materialism*; or it may be conceived in terms of the mind which perceives its object—the object being in some way a manifestation of mind. In this case we have some form of *Idealism.* It is this last type of doctrine which the German systems have developed. Materialism has had little avowed support as a conscious metaphysical system. Idealism, in Germany, has been mainly of the ontological character. In Fichte it became more subjective and ethical in its interpretation of being, and in Hegel reached a reconciliation of the two points of view which reversed the terms of Aristotle's attempt to accomplish a similar reconciliation. In Hegel the true is the universal; but it is an outcome, an ideal, a goal of nature; its reality is its progress in the phenomenal world. In Aristotle the true is the particular, the thing in the world; but it is form as well as matter, and only in its systematic interpretation does its final truth, its *ideality*, its meaning, become evident.

3. *The Scottish or Gnosiological Conception.*—The other alternative mentioned goes back to Socrates; the alternative which emphasizes the subjective side of the process of knowledge and attempts to find justification for the world in the nature of thought and the soul. This view may take the form of an analysis of the mind's object so thoroughgoing that only the mind which knows is left; in which case we reach a form of *subjective idealism* in contrast with the objective or ontological idealism already described; this type of thought is associated with the name of Berkeley; or—and this is the tradition of the Scottish school founded by Reid—the mind may be held to have in it the direct witness not only of its own existence and reality, but also of that of things or truths outside of it. On this view metaphysics either becomes Natural Realism, a form of rational psychology based on so-called "intuitions" of the mind—which is not metaphysics at all—or it takes the character of an avowed dualism in the structure of the universe. Natural realism of a theological character has been the prevailing philosophy in the U. S. It also held sway in Britain as a sort of unavowed support to the association psychology, until the German metaphysics found footing both in England and in Scotland.

4. *The Herbartian Conception.*—The most important and widely current conception—except possibly the second mentioned above—goes by the name of Herbart, also a German philosopher. It is a conscious return to the type of solution found in Aristotle; except that it goes further back and lays under contribution something of the method of Socrates. The first task of metaphysics, on this view, is to rectify and justify concepts. This can be done only by an adequate criticism, both of thought and of experience. Only on the basis of such a patient criticism and mutual adjustment of claims can philosophy proceed at all. The true question is: What *must we think* about cause, self, change, reality, God, that our thought may be consistent and our lives true? Knowledge can not, in the last analysis, contradict experience, for experience, in the last analysis, is knowledge. So the real must ultimately be reached through such knowledge as is undoubtedly the full teaching of experience interpreted consistently with itself. In this basis Herbart reached a doctrine of atoms or "reals" which had the properties both of objective existence and of presentation—a view which is the historical outcome of such a conception of the problem—i. e. the atomism of Leibnitz and the "real beings" of Lotze. Metaphysics, then, builds itself upon all science and takes light from every source. This conception commends itself to scientists and to philosophers to whom the disposition to speculate is not considered the metaphysician's highest endowment. It is becoming the dominant conception in America. See Ladd, *Introduction to Philosophy*; Ormond, *Basal Concepts in Philosophy*; Bowne, *Metaphysics*.

Divisions of Metaphysics.—The indications now given from the historical point of view may serve to show the divisions of subject-matter in this topic. Metaphysics is related to general philosophy as part to whole. Philosophy includes not only the ultimate questions propounded by metaphysics, but, further, the justification of the partial truths in science and life upon which metaphysics must rest. Philosophy has three departments of inquiry: *Gnosiology*, or epistemology, devoted to an analysis of the nature and validity of knowledge; *Cosmology*, the detailed theory of the world as an orderly whole, involving the united results of the sciences of nature and life; and *Ontology*, the final synthesis or construction of the concepts of gnosiology (the soul, subject and object, etc.), and cosmology (problems of space, time, design, etc.) in a final doctrine of being. This last is accordingly metaphysics, properly so called. See Idealism, Materialism, and Philosophy. J. Mark Baldwin.

Metargon: See the Appendix.

Metastasio, mā-tăăs-taa′sĕĕ-ō, Pietro: poet; b. in Rome, Jan. 3, 1698. His father, Felice Trapassi, of Assisi, was a pork-butcher, and he was himself as a boy apprenticed to a jeweler. His beauty, however, and his readiness at song and improvisation attracted the attention of the jurisconsult and critic Gravina, who adopted him, Grecized his name into Metastasio, had him carefully educated, and when he died (1718) left him a considerable sum of money. He had already, at the age of fourteen, written a tragedy, *Giustino*, and been received among the Arcadians with the name *Artino Corasio* (Apr. 15, 1718). He soon spent his inheritance, however, and had to seek his living in Naples (1720), in the office of the advocate Castagnola, who made him promise to refrain from poetry. He could not keep this promise, but wrote anonymously the tragedy *Endimione*, then the *Orti Esperidi* (1722). In the latter of these pieces the famous Marianna Benti-Bulgarelli, known as *la Romanina*, took the part of Venus; and soon after she fell deeply in love with the author and took him to live with her. They went to Venice, then to Rome, where Metastasio attracted the attention of the Countess Althann, who obtained for him the position of *Cæsarian poet* at the court of Vienna. In 1730 he settled in Vienna, leaving *la Romanina* in Rome. She died in 1734, and showed that she had not forgotten him by bequeathing him her fortune, which he resigned in favor of her husband. He lived in great honor at the Austrian court, under Charles VI. and Maria Theresa, perhaps the most famous poet in Europe at that time. He was very intimate with the Countess Althann, and is said to have married her secretly. Many famous men were among his friends, he belonged to numerous academies and learned societies, and his literary pre-eminence was universally acknowledged. In his last years, however, he wrote little, and that uninterestingly. He died in Vienna, Apr. 12, 1782.

Metastasio's fame rests chiefly upon his lyrical dramas, or melodramas in the accurate sense of that term, of which he wrote a large number. Though the fundamental principle is the same in all of these, yet they fall into several groups, according to the period of his life in which they were written. The earliest, like those already mentioned and like the *Galatea*, the *Didoni Abandonata* (1724), the *Catone* (1727), the *Artaserse* (1730), hardly deserve the name of plays, being really only *azioni drammatiche*, in which a theme is employed in order to string together lyrical and musical numbers. With the *Adriano* (1731) begins a new manner, that of the melodrama proper, in which there is something of true dramatic structure, though here, too, music, rather than action, really determines that structure. Here belong the *Demetrio*, *Issipile* (1732), *Demofoonte*, *La Clemenza di Tito* (1734), and *Attilio Regolo* (1740–50)—the last of which is generally regarded as Metastasio's masterpiece. The pieces of the last period of his life are few and mediocre. Besides the dramas, he wrote also many lyrics—*canzonette* (of which he was a master), sonnets, idyls, elegies, etc. He wrote also various interesting bits of poetical criticism, and many letters of a literary character. The best edition of Metastasio's works is that of Paris, 1780–82, but there are many fairly good besides—e. g. in 20 vols. (Mantua, 1816–20), and in 16 vols. (Florence, 1819). The *Lettere* are to be found in two collections: G. Carducci, *Lettere disperse e inedite di P. M.* (Bologna, 1883), and C. Antona-Traversi, *Lettere disp. e ined. di P. M.* (Rome, 1886). For his *Life*, see A. Mussafia, *Pietro Metastasio* (Vienna, 1882); Vernon Lee, *Studies of the Eighteenth Century in Italy* (London, 1880); O. Tommasini, *P. Metastasio e lo svolgimento del melodramma italiano* (in *Scritti di storia è critica*, Rome, 1891).

A. R. Marsh.

Metas'tasis [= Lat. = Gr. μετάστασις, removal, change, departure, deriv. of μεθίστασθαι, be removed, depart; μετά, over + ἵστασθαι, be put]: in pathology, the sudden removal of a disease to a distant part, as when the disease called mumps is transferred from the parotid to the ovaries or to the testes. There are also metastatic abscesses, dependent upon the transference of bacteria from a primary focus of suppuration to distant parts by the blood. Tumors give rise to secondary nodes at a distance in similar manner, a small part of the original tumor being carried to the distant part where it grows. William Pepper.

Metatheria: See Eutheria.

Metayer [Fr. *métayer*: Provenç. *meytadier* < Lat. **medieta′rius*, deriv. of *medi′etas*, mean, middle]: a name applied to the peasants of continental Europe, and especially those of France and Italy, that farm their land on shares. This form of tenure was common all through the Middle Ages and to the end of the eighteenth century, but is falling into disuse. It is thought that the metayers were originally emancipated serfs, who, having neither land nor capital of their own, were fain to till the lands of another on such terms as they could get. The landlord furnished the land, the metayer furnished the labor; the landlord usually received half the produce in France, two-thirds in Italy. Tenures of this kind had a permanent character, and in this respect offered some of the advantages of private land ownership; but the system did not give the fullest stimulus to personal effort or to the improvement of the soil by the use of capital. The laborer was unwilling to do extra work when half of the surplus produce would go to the landlord. The landlord was unwilling to invest capital (beyond the necessary minimum which custom demanded), when half the benefit of such capital would go to the laborer. In these respects the English land system was better than the continental system, since in England, under a system of money-rents, the tenant obtained the whole immediate profit from his exertions, and the landlord the whole permanent benefit from the investments of fixed capital, so that each was stimulated to do his best. A. T. Hadley.

Metazo'a [Mod. Lat.; from Gr. μετά, after + ζῷον, animal]: a term given, in contrast to Protozoa, to the great majority of the animals, which differ from the Protozoa in the fact that they are composed of many cells, and these cells are further differentiated into tissues and organs, while in the Protozoa each cell performs all the functions of life.

Metel'lus: the name of a Roman family belonging to the plebeian gens Cæcilia. It first became known in history during the first Punic war, when Lucius Cæcilius Metellus was elected consul in 251 B. C. Its most conspicuous members were (1) Quintus Cæcilius Metellus Macedonicus, who defeated the Macedonians in 148 B. C. and the Achæans

in 146 B. C. With Q. Pompeius he was censor in 131 B. C. (they were the first plebeians to hold this office), and proposed that all citizens should be required to marry. His name became proverbial as an example of human happiness.—(2) QUINTUS CÆCILIUS METELLUS NUMIDICUS, who fought successfully in 108 B. C. against Jugurtha, King of Numidia, but was superseded by Marius, at that time his legate.—(3) QUINTUS CÆCILIUS METELLUS CELER, who was prætor in 63 B. C., when Cicero was consul, and contributed much to the suppression of the conspiracy of Catiline.

Revised by G. L. HENDRICKSON.

Metemone: See GALABAT.

Metempsycho'sis [Mod. Lat. = Gr. *μετεμψύχωσις*, transmigration of souls; *μετά*, after, beyond, over, across + *ἐμψυχοῦν*, animate, vivify; *ἐν*, in + *ψυχή*, soul]: the transit of the soul from one stage of being or life to another, commonly called transmigration. As the belief that the soul after death appears again in animals or in men and women is spread all over the world, it would appear to be anthropologically innate, and to be the first form in which the idea of immortality occurs to man. The early Egyptians saw in it an explanation of the sufferings endured by many men on earth, which sufferings were otherwise inexplicable. Their entire religion was based on this doctrine, that man is a fallen angel, once an equal of the gods. He is to be judged after death, and if his life on earth has been evil he must renew his earthly existence, if not as a human being, as an animal, according to his crimes. It was in India, where the problems of metaphysics and ethics as connected with ontology and the destiny of the soul were elaborated to the last degree on a pantheistic basis, that metempsychosis was most ingeniously and extensively developed. All the problems of fate, free will, and human suffering were easily explained by the doctrine that the soul, an emanation from God, passed from life to life, and that the sins committed in one existence were expiated in another. It was even held that the account was kept so closely that a soul might pass thousands of years or *kalpas* in one or other of the heavens as a reward for good deeds or self-inflicted suffering, and yet be obliged to return to earth or hell to expiate as an animal, man, or demon, certain sins. (See BUDDHISM and KARMA.) To the pure theism of the early Jews and Arabs, or of the Shemitic race, who simply held that God directly made and willed all things, the idea of metempsychosis was utterly opposed. According to the latter, the soul is guided by laws which lie far behind the highest conceivable idea of a God; according to the former, God distinctly makes all laws with full self-consciousness. Consequently, the Old Testament contains no trace of the transmigration of souls. After the building of the second temple, however, foreign speculation and superstition flowed in on them freely. The *Gilgul Neshamoth*, or theory of metempsychosis, forms an important doctrine in the Cabbalah, and ere long a mass of wild and beautiful legends arose to illustrate it. The rabbis held that David had been Adam, and is to come again as the Messiah, and that Simeon had been Japheth. Many fanciful ideas sprung up in the Hebrew theory of transmigration—e. g. that when a woman had a soul which had been that of a man she could not bear children until God had breathed into her some part of a woman's soul. The Greeks derived the doctrine of metempsychosis from teachers who had taken it from Egypt or India. Thales had taught it at an early period, and it was subsequently greatly developed by Pherecides, Pythagoras, and Plato. The Greek mysteries were, in fact, not only a school in which metempsychosis was taught, but an indispensable grade or lodge through which all of the aspirants must pass before they could be purified and pass on to higher stages of existence. Pindar, setting forth the Orphic doctrines, teaches that the soul must thrice lead a pure life before it could be fully set free; and Plato, refining on all the theories of his predecessors, believed (or rather argued for) the principle that souls had pre-existed, and that on earth they assumed shapes corresponding to their character. What with purification, penance, and intervals of a mere ghost-existence apart from the body, Plato assumed that 10,000 years must pass before the soul would attain divinity. But Aristotle, however, in many passages of his writings, combats the doctrine of metempsychosis on the ground that the soul is the efficient and final cause of the body, and hence that it is suited only to the body that it makes and not to some other body that it happens to enter. There is every reason for believing that there were few religious or spiritual systems of antiquity which did not eventually include metempsychosis, strange as it appears at the present day. The Epicureans denied it, but it appears to have been generally inculcated as one of the deepest doctrines of the mysteries. The Neo-Platonists, who believed in magic, as in all the wild deductions from a theory of a universal soul and life, of which man was a part, assumed the doctrine of metempsychosis as a natural inheritance. Gnostics and Manichæans welcomed it, and the more speculative or mystical of the Church Fathers found in it, as the Egyptians had before them, a ready explanation of the fall of man and the doctrine of evil spirits. All are "dreeing their weird," or undergoing penance for sins. This considerable step toward reconciling the existence of suffering with that of a merciful God was distinctly set forth by Porphyry and Origen, and passed from the East, with all the strange heresies of "illumination," in all probability, through such institutions as the Cairene House of Light and the Knights Templar, into the doctrines of the obscure sects of the Middle Ages in Europe. The Taborites, an extreme branch of the Hussites, are said to have believed in transmigration, and this view has been thoroughly set forth by George Sand in *Consuelo*. The Druids taught it, and of late years poetical philosophers or true poets have found in its inexhaustible fitness for romantic pictures and incidents subjects for their pens. It has also become familiar to a wide public since 1885 through the writings of Madame Blavatsky and the members of the Theosophic Society.

Revised by W. T. HARRIS.

Metencephalon: See BRAIN.

Me'teorite, Meteor'olite, or **A'ërolite** [*meteorite* is from Gr. *μετέωρος*, in the air, suspended on high; *μετά*, beyond + *ἀείρειν*, raise; *meteorolite* is from Gr. *μετέωρος* + *λίθος*, stone; *aërolite* is from Gr. *ἀήρ*, air + *λίθος*, stone]: terms used synonymously to denote a solid body that has fallen from the heavens. They are not to be confounded with those small luminous bodies that flash across the sky every bright night, visiting us in large numbers at stated periods, and called *shooting stars*; for these last are doubtless composed of very attenuated matter, and are never known to leave any solid residue behind them. (See METEORS.) A genuine meteorite may flash across the sky, become visible, and yet pass on without sending to the earth any evidence of its true character; but very frequently it falls to the earth, and forms a permanent addition to our globe. These bodies have been observed to fall in all ages of the world; and doubtless the earliest account we have of any one of them is to be found in Joshua x. 11; at any rate, the phenomenon referred to in that verse can be interpreted by reference to some of the more modern falls of meteoric stones; but one of the most remarkable falls recorded in ancient history is that of the Thracian stone mentioned by Pliny in the fifty-eighth chapter of his second book of natural history. It fell near Ægospotamos in Thrace 467 years before Christ. Pliny describes it as being as large as a cart; he describes it also as being of a burnt color. It was held in veneration by the inhabitants of the country, and the time of its fall served to fix the period of certain important events, as evidenced by the following statement to be found in the *Parian Chronicle*: "From the time when the stone fell at Ægospotamos, and the poet Simonides, who died at the age of ninety during the archonship of Theagenides at Athens, is 205 years." Another ancient and memorable meteorite is now at Mecca; for the celebrated black stone, *Hajar el Aswad*, that forms an object of adoration of the pilgrims to the Kaaba at Mecca, is doubtless one of these bodies; and some think, with very good reason, that the image which fell down from Jupiter (referred to in Acts xix. 35), and was worshiped by the Ephesians, was also an aërolite.

To give an idea of the phenomena accompanying the fall of these bodies, we shall furnish a short statement of those connected with the fall at L'Aigle, France, in 1803, and that in Guernsey co., O., in 1860. At the time of the fall of the L'Aigle meteorite the atmosphere was clear and calm, and many persons observed a brilliant fiery ball passing rapidly through the atmosphere; and a few moments after there was heard a violent explosion, or rather succession of explosions, lasting five or six minutes, the first two or three sounds resembling those of cannon, and subsequent ones that of musketry, then a rumbling noise like the beating of a drum; all these noises being produced by the original explosions and subsequent reverberations. The noise appeared to proceed from a small rectangular cloud, parts of which

from time to time were thrown off by the successive explosions; the noises were heard in an area of over 100 miles, and the area over which the stones fell was about 6 miles long by 3 miles broad. Of the Guernsey fall we have no very definite account of the meteorite during its flight through the atmosphere. This occurred also in the daytime, a little after one o'clock, when three or four distinct explosions were heard, like the firing of heavy cannon, with the interval of a second or two after each report. This was followed by sounds like the firing of musketry in quick succession, which ended with a rumbling noise like distant thunder; and this continued two or three minutes. The first reports were so heavy as to produce a tremulous motion like heavy thunder, causing the glass in the windows to rattle; the sound was so singular that it caused excitement and alarm, many supposing it an earthquake.

There was a fall of meteorites in Iowa on Feb. 12, 1875, from which many fragments, in all not less than 500 lb. in weight, were secured. Iron masses assumed to be of meteoric origin are known to exist which weigh many tons, and it may be readily believed that the larger detonating and stone-producing meteors are, when they enter the air, as large as these irons. On the other hand, the smallest shooting stars, especially the telescopic ones, are probably not greater than small pebbles or grains of coarse sand. The apparent size of all meteors is magnified by the surrounding flame and by irradiation, and does not therefore indicate the real size of the meteoric body.

Fracture in the Air.—The meteorites coming from a single meteor must before entering the air have been in close company, and probably were coherent. The resistance of the air is a sufficient cause for breaking the body into fragments. At the close of the flight these fragments usually are distributed over areas miles in extent. Upon them we often find evidences of successive fractures. One surface may show by its smooth form continued melting. On an adjacent surface may be an accumulation of melted matter, with clear evidence on its margin of its having come from the other side. Another surface may show a mere accumulation of melted matter, while its own material is not changed. Another surface may be more or less browned as with smoke, with some or all of its margins exhibiting a delicate rounding of the black crust of the adjacent surfaces, showing the fracture to have taken place while the crust was soft. Still other surfaces are so slightly discolored that it is impossible to decide whether the fracture may not even have been subsequent to the fall, while numerous cracks extending into the stony mass show that the disintegration was still in progress. All these peculiarities are shown in some Iowa meteorites mentioned above. This breaking is shown peculiarly by the fragments of a meteor that fell in India in 1861, which were picked up at places 3 or 4 miles apart, and which fit to one another. Moreover, some of the fitting surfaces had the usual black crust, while others were unaltered.

Structure of Meteorites.—The meteorites contain no elements, so far as we know, which have not been found on the earth, but these elements are compounded differently from those of any terrestrial minerals. Iron is always present, usually in metallic form and combined with nickel. The stones from different meteors differ much in their structure, though they may be grouped in a few well-marked classes. In general, the meteorites resemble the igneous more than the other rocks of the earth's crust. The iron masses have a crystalline structure, which is revealed by polishing a surface and etching it with acid. The lines developed by the acid are called the *Widmannstätten figures.*

Gases in the Meteorites.—If fine chips of meteoric iron, or powdered fragments of the stony meteorites, be placed in a vacuum and then heated moderately, they yield up gases consisting of oxygen, carbon, hydrogen, and nitrogen. These gases seem to have been absorbed at some former time by the meteor, probably by the iron of the meteor. The spectrum of these gases corresponds to the spectrum of the light of a comet's coma and tail.

Meteorites are of two kinds, stony and metallic, the latter being composed mostly of iron. The general character of *the stony variety* is (1) great variety in size, from that of a pea to many cubic feet; (2) irregularity of form, with rough and indented surfaces; (3) they are coated with a black crust or varnish, which doubtless arises from the fusion of the surface by the intense heat developed during the rapid passage through the atmosphere; (4) their specific gravity is between 3 and 4; (5) the minerals constituting the mass are principally of the class belonging to the pyroxenes and olivenes, always containing more or less metallic iron alloyed with nickel and cobalt. There are one or two meteorites supposed not to contain this metallic iron, but it is very doubtful if such be really the case. There are other minerals associated with them; the most interesting and constant are schreibersite (a phosphuret of iron and nickel) and triolite (a sulphuret of iron). A fragment of one of the Guernsey County meteorites gave for its composition—

	Per cent.
Olivene	56·884
Pyroxene	32·416
Nickeliferous iron	10·690
Schreibersite	0·002
Triolite	0·015

Iron Meteorites.—This class simply represents the metallic particles found in the stony meteorites, increased to several pounds and even tons in weight, as exemplified by the Cranborne iron in the British Museum or the Texas iron (of less weight) in the Yale University Museum. All of the irons that are known, except three or four, have been discovered some time after their fall, this not having been observed, their composition being the only guide as to their origin. There have, however, been three of them seen to fall, and these constitute the three most valuable specimens of this class. They are the following:

Agram	1751
Dickson co., Tenn.	1835
Braunau	1847

The iron meteorites have the same irregular shape as the stony ones, with a specific gravity of 7 and 7·8, with a composition of which the three following irons are types:

PARTS.	Tazewell, Tenn.	Oldham co., Ky.	San Gregorio, Mex.
Iron	84·10	91·61	95·01
Nickel	15·22	8·09	4·40
Cobalt	0·43	0·25	0·51
Copper	0·06	trace	trace
Phosphorus	0·19	0·05	0·08

In the interior of these irons it is not uncommon to find nodules of sulphuret of iron, phosphuret of iron and nickel, and graphite. When polished the surface of the metal is very brilliant, and in some cases remains so; in others the surfaces are rapidly rusted.

Origin of Meteorites.—It was at one time supposed that these masses of stones and iron originated in the atmosphere or were ejected from terrestrial volcanoes. Another theory, advanced by Terzago, and subsequently by Laplace (adopted by Berzelius and others), and sustained in part by his mathematical calculations, is that they were projected from the moon, but these crude notions have been long since exploded. It is now fully understood that they form a few specimens of countless small bodies or fragments, invisible in the most powerful telescopes, which are moving like planets or comets in eccentric orbits around the sun. We know nothing of them except when one happens to encounter the earth. Revised by S. Newcomb.

Meteorol'ogy [Gr. *τὰ μετέωρα*, things in the air (see Meteorite) + *λόγος*, reason, discourse]: the science which treats of the atmosphere. It falls naturally into two branches, meteorology proper and Climatology (*q. v.*). Meteorology proper treats of the weather and its causes, and of the physical laws involved, including the instruments by which the phenomena are observed. The instruments are discussed under their proper headings. Meteorology has a practical and a theoretical aspect. The practical aspect is the one which will be treated here, as of most interest to those who are not professional students of meteorology. For those who wish to pursue their studies further, the bibliographical references at the end of this article will serve as a guide.

Ancient meteorology included everything supposed to be aërial, embracing some things now known to be astronomical, as comets and meteors. As it lacked the means of accurate observation it came to rely on pseudo-observations, and by the Middle Ages had become thoroughly astrological. A new and better era was begun by the invention of the thermometer (before 1597) and barometer (1643), due to the happy intuitions of Galileo, who started the work of striking off the intellectual fetters imposed by Aristotle 2,000 years before. Two hundred years were spent in developing these instruments and inventing new ones, in gathering the enormous harvest of facts rendered possible

by them, and in drawing the plain deductions from these facts, when a new era was initiated by the use of the synchronous weather-map. We are now in the weather-map period of the history of meteorology, and although we have been but a short time in this period the advance made by the science has been enormous.

The weather-map is a chart on which are graphically represented meteorological data taken simultaneously over the entire area it represents. To make the map useful for forecasting the data must be collected and transferred to the chart with the least possible delay—within two or three hours of taking the observations, if possible, and within four at the outside. The happy idea of simultaneous observations was not a new one, but the immediate collection of the data could not be put into operation until the successful trial (1835) of the electric telegraph and its extension to a considerable number of widely separated plans (1847). In 1856 Prof. Joseph Henry began the use of the first *immediate* weather-map. It was a wall map with movable symbols, posted in the Smithsonian Institution. From the map Prof. Henry deduced certain conclusions concerning the weather which he sent to Congress. In 1857 Le Verner, in France, began the publication of an international bulletin (a statement of current meteorological data, but not reduced to chart form), and from these he began predictions for the ports in 1860. On Sept. 16, 1863, he printed the weather-map for that day, and distributed it to his correspondents. This was the first current weather-map published, and the series has been continued since without interruption. It gives daily the air-pressure and winds for Central and Western Europe.

In the meantime the disturbances incident to the civil war had interrupted the orderly advance of meteorology in the U. S. It was resumed by Prof. Cleveland Abbe, then director of the Cincinnati astronomical observatory, who in 1869, with the gratuitous assistance of the Western Union Telegraph Company, began the collection and use of telegraphic reports from the adjoining States; and on Feb. 2, 1870, Mr. Armstrong, the local manager for the telegraph company, undertook under Prof. Abbe's direction, the making of current weather-maps and their multiplication by a manifold process. These maps were continued until Oct. 10, 1870, and were the first current weather-maps in the U. S. The official series of weather-maps in the U. S. began with tri-daily maps on Nov. 1, 1870. They were in manuscript, and were made both in Washington and Chicago. They were multiplied by a manifold process, and were first printed May 2, 1871, at Washington. The next series of official weather-maps was that of the British Meteorological Office, which first appeared in printed form in the bulletin for Mar. 23, 1872. The number of series has gradually increased since, until in 1894 there were eighteen of them issued by as many official weather services, besides about seventy daily issued at local stations in the U. S. In size they vary from 16 by 22 inches (U. S.) to 4 by 5 inches (British). In Japan they are issued three times daily (as formerly in the U. S). In the U. S., and in Russia, they are bi-daily. The remaining fifteen are daily, and all, except the Australian, are issued on Sunday. The hours of observation are early in the morning, and—for the bi-daily—early in the evening. At all stations of the U. S. there were 8,830 maps issued on June 1, 1893, of which 6,257 were morning maps and 2.573 evening maps. This makes a total issue of about 3,000,000 maps per year.

In what follows, reference is always made to the Washington map unless otherwise specified. The maps issued at other U. S. stations differ in some details from the Washington map, and the maps of the other national services, although occupied with the same meteorological elements and serving the same purposes, differ in many details.

The observations are taken at 8 A. M. and 8 P. M., in 75th meridian time. This is what is called Eastern time, and is closely the local time of Philadelphia and nearly that of Washington. It is about seven o'clock local at Chicago, St. Louis, and New Orleans; about six o'clock for Helena, Denver, Santa Fé, and El Paso; and about five o'clock for San Diego, Los Angeles, San Francisco, and Portland. The observations are taken as nearly simultaneously, and as nearly in the same way, with as similar instruments as possible. They are collected at Washington, reduced to maps, the forecasts made, and the maps published within about three hours from the time of observation.

The pressures of the atmosphere as shown by the barometer are reduced to sea-level before they are entered on the map. The reduction employed is in part founded on general physical principles (Ferrel, *Recent Advances in Meteorology*, pp. 392–402), and in part on an empirical adjustment, such that it makes a consistent map. In the elevated plateaus of the interior and mountain stations these reductions are somewhat uncertain and occasionally introduce illusory appearances on the weather-map, but with the reductions now used (due to Prof. H. A. Hazen) those misleading phenomena are reduced to a minimum. These reductions are made in order to render strictly comparable observations taken at widely separated points. If they were not made the topographic effects on air-pressure would be the chief ones visible, and those due to weather changes would be masked. Any other level could be taken as the basis of the map (as a plane 1,000 feet above sea-level, or 2,000 feet), or instead of the actual pressures reduced the variations from the average pressure for the day might be employed; but the method actually used, though not free from objections, is now universally employed on weather-maps, and its faults have become familiar to forecasters. Slight culminations or hollows of air-pressure on the elevated plateaus and mountains of the West are to be treated with suspicion, but high or deep ones are reliable.

When the barometric pressures have been entered on the map, lines are drawn passing through all points having the same pressure. These are called *isobars*, or lines of equal pressure. They are usually made for each tenth of an inch of pressure, as 29·5, 29·6, 29·7, etc., and are drawn as shown in the diagram. If one station has the reduced pressure of 29·79 and the next to the E. has 29·83, it is evident that the isobar of 29·8 must pass between them, and will be at about a quarter of the distance from the first to the second, at the point A. It will not pass between the first and the one to the S. of it, because they are both below 29·8, but will between the latter and the one to the E. of that, as the last is 29·86—and at the point B, about half way between the two, connecting now A and B, with a sweep suggested by its previous and following course—and we have the isobar of 29·8 for that part of the map. With practice the isobars and other lines can be drawn with rapidity and precision, but one rule should be always remembered: these lines, from the fluidity of the air, will always be in free and easy sweeps, and will never make a sharp angle.

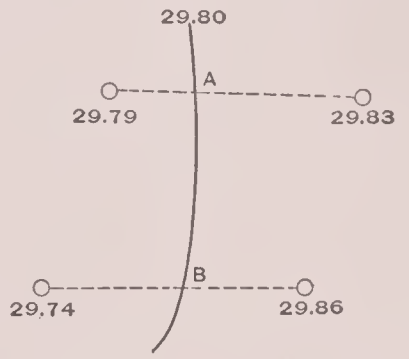


DIAGRAM 1.—Drawing of isobars.

The resulting isobaric map will look like a contour map in geography, presenting certain slopes from lower pressure to higher and descents from higher to lower, the one often ascending to a rounded area of highest pressure, the other terminating in a rounded area of lowest pressure—each covering a considerable area.

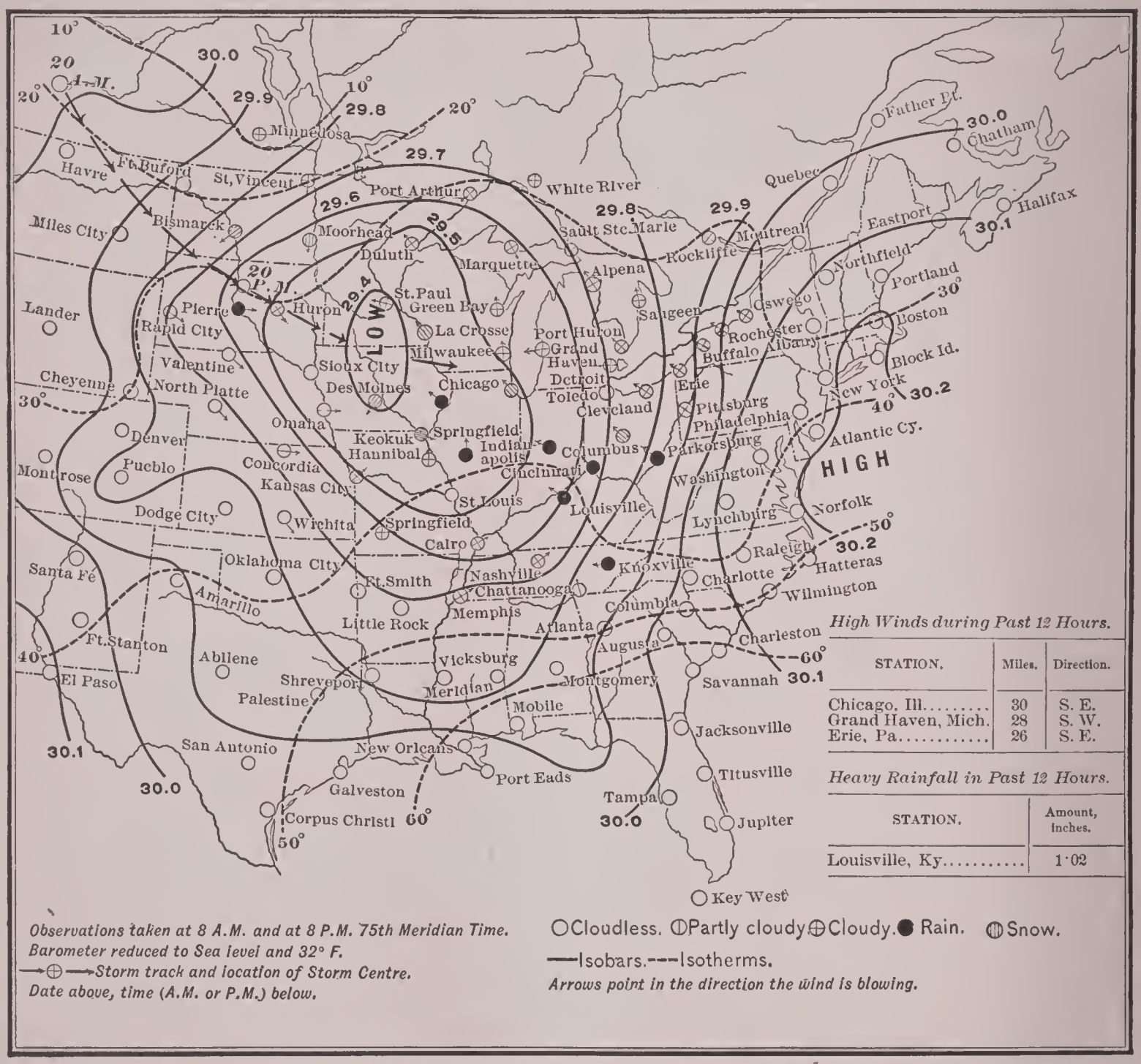
The culmination of highest pressures is one of the most important features of the map, and a key to the meteorological situation. It is called an *anti-cyclone*, but, from its resemblance to a hilltop on a topographic map, it is also called, familiarly, a *high*. Such a high is appearing in the northwest corner of map No. 4, inclosing the unusually high pressures of 30·6 or more. A high defines an area of fair weather with dry air and gentle winds. The air of a high is relatively cool, but the absence of clouds and humidity gives the sun's rays unusual power in the afternoon, and the free radiation to the sky makes it unusually cold toward morning. The high is therefore the region of extreme daily changes in temperature. The air of the high is dry, tonic, and agreeable, but it is also the region of extreme heat and cold and of untimely frosts, and if it remains long it means drouth and failure of crops.

The area of lowest pressures is called a *cyclone*, or, for topographic reasons and to avoid the common associations of violence with this word, a *low*. From the low the pressure ascends in all directions. The low is the area of warmth, cloud, moisture, rain, and high winds. Though it brings close, warm, muggy, humid weather, and is consequently depressing and disagreeable, its influence is benign, for it brings the rain and keeps the air stirred, preventing the stagnation so characteristic of a long drouth. The low is even more a key to the meteorological situation than is the high. The maps Nos. 1 to 4 show the successive positions

of a low, the path of which is marked out (especially on No. 4) by the stream of arrows. This low brought high winds to the Great Lakes, but little rain. Lows are often called *storm-areas.*

After the isobars come the *isotherms*, or lines of equal temperature. They are usually drawn for each 10° F., making an isotherm for −10°, 0°, 10°, 20°, etc. (See the broken lines on maps No. 1 to 4.) They are not reduced for elevation. They usually run poleward toward a low, and equatorward from a high. Near a low is sometimes an area of rapidly warming weather—especially in front and sun, because its direction is contrary to that taken by the sun in its diurnal course. For all cyclones or lows in the northern hemisphere the spiral inflowing of the winds is in a contra-clockwise direction; for the same storms in the southern hemisphere the direction of spiral inflow is clockwise. In the case of the anti-cyclones or highs, the air pours out from the center with a slight clockwise turn in the northern hemisphere, and contra-clockwise in the southern.

The velocity of the winds is not represented on these maps, though it is on foreign maps, usually by the number of feathers on the wind-arrows. The wind is usually gentle



High Winds during Past 12 Hours.

STATION.	Miles.	Direction.
Chicago, Ill.....	30	S. E.
Grand Haven, Mich.	28	S. W.
Erie, Pa.....	26	S. E.

Heavy Rainfall in Past 12 Hours.

STATION.	Amount, inches.
Louisville, Ky.....	1·02

Observations taken at 8 A.M. and at 8 P.M. 75th Meridian Time.
Barometer reduced to Sea level and 32° F.
→⊕→Storm track and location of Storm Centre.
Date above, time (A.M. or P.M.) below.

○Cloudless. ◑Partly cloudy ⊕Cloudy. ● Rain. ◍Snow.
—Isobars.---Isotherms.
Arrows point in the direction the wind is blowing.

No. 1.—Weather-map for Eastern U. S., Nov. 21, 1893, 8 A. M.

a little to the S. Correspondingly there is a colder area in front of and below a high. These, when they represent a change of 20° or more, are marked out by a row of red dots (shown in the accompanying illustrations as large black dots). Such an area of "colder" is seen on each of the maps Nos. 2 to 4, and on No. 3 it is divided into two. *Isocheimal Lines* connect places having the same mean winter temperature, and *Isocrymal lines* connect places having the same mean temperature for the coldest months in the year.

The winds are presented on the maps by arrow-heads at the stations, the arrows flying with the wind. If, as at Duluth, the arrow points S. E., the wind is a northwest one. A careful examination of the maps will show, what is true on the average, that the wind flows spirally into the low, and that the direction of the inflow is contra-clockwise (the clock lying on its back, with face up). It is also called sinistral, because to a man standing at the center it would wind from the right hand to the left; also against the with highs and fresh with lows, but there are many exceptions to this. Some lows have such gentle winds that they would not attract attention, while some highs have high winds on some part of their margins, generally on the side next the nearest low when the latter is intense and not far off. These are questions of intensity, and lows vary from extreme gentleness to the intensity of the hurricane.

The criterion for intensity on the weather-map is the crowding of the isobars. When they are near together the winds are high, and when far apart the winds are gentle. The perpendicular distance between two successive isobars (or, more properly, the length of the line of force as defined in physics) is called the pressure *gradient*, and the above relation may be stated as a rule: the shorter the pressure gradient the stronger the wind.

The relations of direction of wind to the center of the low can be stated as a rule or law. When it is cloudy and humid and the wind is fresh, so that it is certain that the

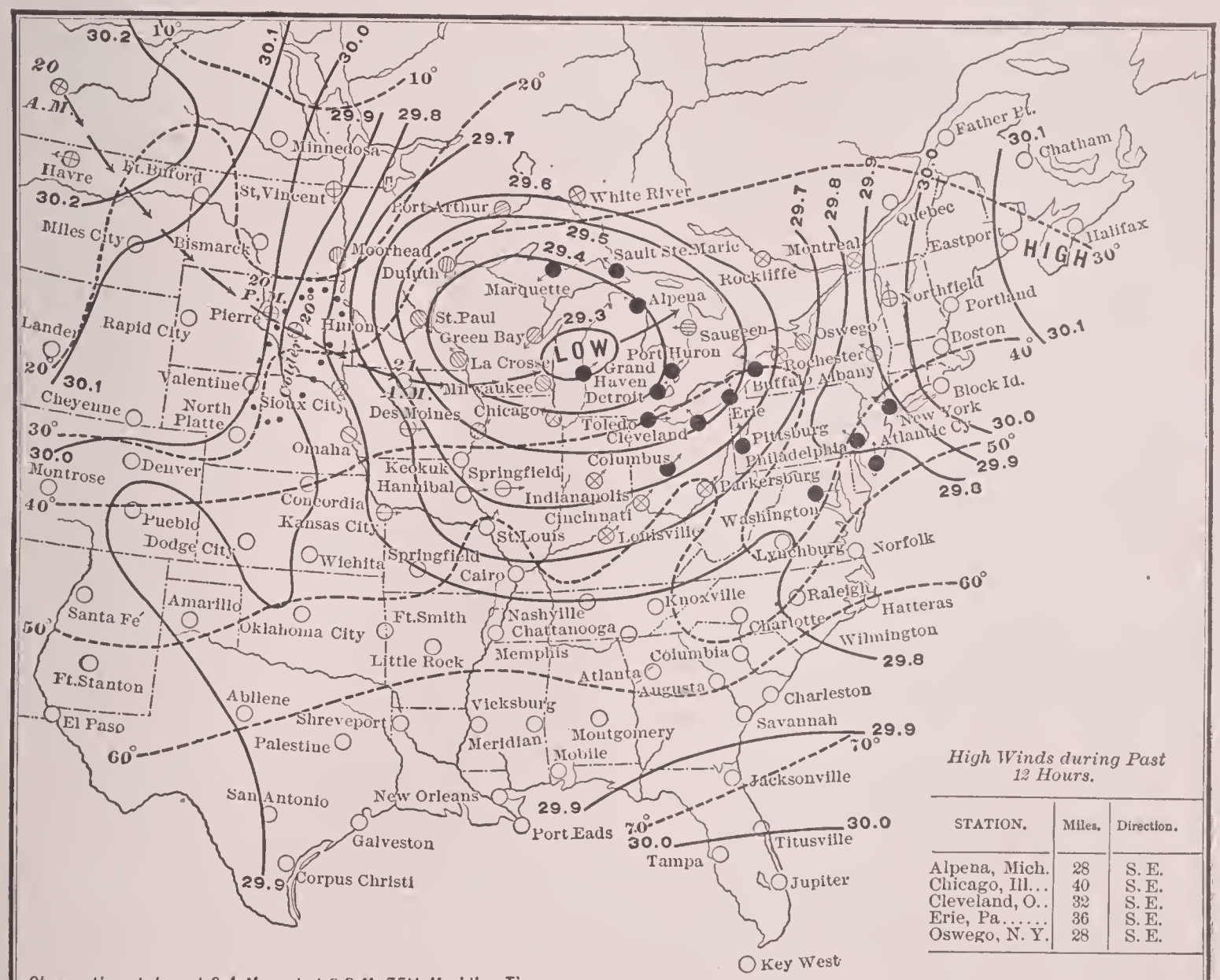
low is sufficiently intense to be considered a storm, then the rule is—stand with your face to the wind and the low center is to your right hand, a little behind you. This is called Buys-Ballot's law, after an eminent Dutch physicist.

The cloudiness is indicated by the changes in the station-circle on the map. In maps Nos. 1 to 4 ○ means clear, ◑ fair or partly cloudy, ⊕ cloudy. The low usually has a cloud-cap, which is likely to extend farther forward or eastward of the center of the low than behind or westward, and more to the S. than to the N.

The symbol for rain is ●, a dark circle, that for snow ◍. The rain often precedes the low, especially in the S. E. quadrant; the snow may either replace the rain, or it may occur to the rear of the low, and toward the high.

ciple in the theory of gases that any gas or vapor, in the presence of another, acts as if the other was not present, provided it does not enter into chemical combination with the other. Hence the vapor of water in the atmosphere forms what is in many respects an independent atmosphere. This vapor atmosphere is called the *hydrosphere*, and meteorological conceptions are somewhat clearer if the hydrosphere is considered as a whole and by itself before consideration is given to its interaction with the dry atmosphere.

The fact of prime importance concerning the atmospheric water is that it undergoes all of its changes of state (vapor, liquid, and solid) within the range of actual meteorological temperatures, and that it is the only element of the atmosphere that does so. Water and ice evaporate into vapor, and this



High Winds during Past 12 Hours.

STATION.	Miles.	Direction.
Alpena, Mich.	28	S. E.
Chicago, Ill...	40	S. E.
Cleveland, O..	32	S. E.
Erie, Pa.....	36	S. E.
Oswego, N. Y.	28	S. E.

Observations taken at 8 A.M. and at 8 P.M. 75th Meridian Time.
Barometer reduced to Sea level and 32° F.
→⊕→ Storm track and location of Storm Centre.
Date above, time (A.M. or P.M.) below.

○ Cloudless. ◑ Partly cloudy. ⊕ Cloudy. ● Rain. ◍ Snow.
— Isobars. - - - Isotherms.
Arrows point in the direction the wind is blowing.

No. 2.—Weather-map for Eastern U. S., Nov. 21, 1893, 8 P. M.

These are the elements of the weather-map, briefly stated. They will be discussed more in detail in what follows. It only remains here to state one general principle of the highest importance in the use of the weather-map. It is this: The weather in temperate regions drifts eastward with about the speed of a passenger train. There are, however, many variations in the paths and speed of highs and lows; changes in intensity of all the elements also often occur. The skill of the forecaster consists largely in detecting the signs of these changes, and this skill is the result of long practice.

The Hydrosphere.—Before passing on to a discussion of the mechanism of storms, it is necessary to consider what is, according to present meteorological theory, the chief source of energy in storms—in fact, the element without which we would have no storms. It is a fundamental principle condenses again into liquid water and into ice. Each change involves a change of energy. When water is evaporated, heat is taken up and removed from the immediate surroundings, thus lowering their temperature; when water is condensed, this heat is restored, raising the temperature. A heat-unit is the amount of heat required to raise a kilogramme of water a degree centigrade. To evaporate a kilogramme of water at freezing requires 607 such heat-units, and at boiling 537. The result is that, by evaporation and condensation of water, the atmosphere becomes a heat-engine, with the sun's rays as the chief source of heat, and the patches in the cloud-layers, where active condensation is taking place, as the cylinders. The vapor is pouring into the hydrosphere at every point where it comes into contact with a liquid or solid surface, at all times and at all temperatures. Evaporation takes place even from a surface of ice

without visible transition through the liquid state. It is more free from a surfaee of turf than from a water surface, and more free from the latter than from a surface of moist bare soil. It is more free at higher temperatures, in the sun than in the shade, in summer than in winter, in the tropics than in higher latitudes. Evaporation also depends on the amount of moisture in the air, being the more free the drier the air. Wind favors evaporation, as also does the purity of the water evaporated. Evaporation also depends slightly on the air-pressure; it increases with decrease of pressure.

When the moleeules of water free themselves from the trammels under whieh they were held when in the liquid or the solid state, they tend, aside from the influence of gravity, to spread equally in all directions. Their motion as gaseous partieles is rapid, so that this spread is a very quick one.

The vapor of water in the air is called *humidity* of the air. There is a limit to the amount of this vapor which the air can eontain. When the vapor has reached this point the air is said to be saturated. If more vapor is forced into the air, the surplus condenses, and the temperature at whieh condensation begins is ealled the *dew-point*. The amount of moisture in the air at any time, measured either by its pressure or tension as a part of the hydrosphere or by the number of grains in each cubic foot of air, is called the *absolute humidity*. The ratio between the amount of moisture aetually in the air and the amount which would saturate the air at its present temperature is called the *relative humidity*. The relative humidity shows whether the air is moist or dry, and is naturally never greater than unity whieh marks saturation—at least never under natural conditions; certain artificial eonditions seem to cause supersaturation. The lower the temperature, the lower the dew-point and the smaller the absolute humidity at saturation. In cold weather the relative humidity is often 1; in hot weather, rarely. When the relative humidity is low, water evaporates rapidly from the soil or from reeeptaeles, furniture shrinks, the skin is likely to chap, and fine wrinkles gather on the faee. When the relative humidity is high, plants look bright and freshen up, animals appear more comfortable, and furniture swells and ereaks.

The hydrosphere is a shallower envelope for the earth than is the dry atmosphere. It thins out rapidly toward mountain-tops and toward the poles. It is also irregular, variable, and stratified. The irregularities are produeed by night and day, sunshine and shadow, clear weather and elouds. The variations are due to mueh the same eauses. The stratifieation depends on the principles of condensation, as follows:

The humidity spreads in all direetions until it reaehes some plaee already saturated, when eondensation takes plaee. This may be due to the chilling of the air in contact with any free surfaee cooled below the dew-point, when there is a deposit of dew, hoar frost, or frost-work (see DEW), or it may be due to the chilling of the air by elevation and consequent expansion, in which case cloud is formed, or the water-moleeules themselves may, in their journeys, pass the elevation at whieh the temperature is that of the dew-point, in which case a thinner cloud may be formed. (See CLOUDS.) At the preeise level or isothermal plane where the temperature is that of the dew-point, a stratum of cloud will be formed, but the release of heat by condensation of vapor and the action of the sun's rays on the upper surface of the cloud now make this air warmer than below, and the condensation has removed some of the moisture, so that the next cloud-layer can be formed only at a considerably greater elevation. Above this may come a third layer and possibly more, so that a distinct, though transient, layering is set up.

A fog is a eloud at the earth's surface, and is the result of a supersaturation due to chilling.

We have now followed the molecule of water from the time it left the mass of ice or liquid water until it is recondensed as dew or the element of a cloud. These partieles may now agglomerate until raindrops, hailstones, or snowflakes are formed, when they fall to the earth as precipitation. (See RAIN, HAIL, and SNOW.) A part of the precipitation flows off the surfaee to streams, then to rivers and the sea; a part percolates into the soil to appear at a distance in springs, or to be evaporated gradually from the surfaee; a part is utilized in organic or inorganic changes; and a part is evaporated sooner or later from the surface of the earth. The amount utilized in each way depends on the sort of precipitation, the character of the surfaee and soil, and the character of the vegetation at the plaee of fall. In any case, the moleeule which falls is likely, by the aid of streams and winds, to be earried far to leeward before it falls again.

Experiments indicate that dust plays an important part in the condensation of atmospheric moisture, which condenses most readily on free surfaces, and such surfaees are afforded by motes and particles of dust floating in the air. These extremely small, solid masses fall with excessive slowness through the air, and the resistanee of the air causes them soon to assume a uniform veloeity, which may be but a fraction of a foot per day. They also show a tendency to make more or less distinet layers or strata in the air, those of about the same size tending to oecupy the same stratum. This is a tendency common also to sediments in water.

Lows or Cyclones.—The air, like other gases, and even liquids, shows a strong tendency to form vortiees, which are transitory beeause of friction. In a frictionless fluid they would be indestructible. The tumultuous whirls from a faetory chimney or from the crater of a smoking volcano, the perfeet whirls formed by a smoker, or by the puffs of a locomotive at starting, illustrate these whirls beeause the moving air is outlined by the smoke that moves with it. The eddy of a windy street-corner is a stationary one due to the obstruction; those seen in the movement of flakes in a windy snow-storm are not stationary, but are very transient.

A more complete type of aërial whirls is found in the little whirlwinds formed over a dusty road or field of stubble on a hot afternoon. The sun's rays heat up the ground, and thus the air in contaet with it, until the latter becomes hotter, and consequently lighter, than the air immediately above. If the field is uneven the projeeting points conduet the lighter air up their sides, thus giving it enough momentum to send it on its way upward, and the general effect on looking across the field is that of a tremulous motion over the whole of it. If there is no such aid to its start upward, the lighter and warmer air remains below until it gets force enough to aseend without help. Under these conditions a horizontal view through the air gives a more or less perfeet mirage—a phenomenon which ean sometimes be seen over a hot street as perfeetly as over a desert. When this air breaks its bonds it is likely to do so at one point, and there is a sort of drainage upward, resulting in a somewhat orderly inflow below and a eonsequent whirl, whieh on the road is soon exhausted, but on the desert may last for a large part of an hour.

The whirls just mentioned are due to heated air alone, and when the supply of hot air is intereepted or exhausted they come to an end. If the whirl were very large and moist air should flow in, then a continuous souree of energy —the condensation of moisture—would be added, and the whirl would be persistent. Such is the so-called convective theory of eyelones, and though this theory is not satisfaetory at all points, it is the only consistent and generally accepted explanation of these phenomena.

The convective or aspiration theory of storms is as follows: An unequal heating of the air sets up at some plaee a motion upward. The air rushes in below to take the plaee of that which rises; above, the air is chilled by expansion, condenses some of its moisture to form a cloud-cap, then flows out from the center above. The height to which the air rises is very small—probably not a hundredth of the horizontal diameter of inflowing winds. Thus a eyclone is a flat, horizontal vortex, a hundred times as broad as thick, lying flat on the earth and moving as a whole eastward, with inflowing winds on its lower and outflowing on its upper surface.

That the air flows in spirally and not radially, as might be expeeted, is due to irregularities of inflow, and that the spiral is contra-cloekwise in the northern and clockwise in the southern hemisphere is due to the rotation of the earth. Ferrel has shown (*Pop. Treat. on Winds*, pp. 77–88) that any body in motion horizontally over the surfaee of the rotating earth has a tendency to defleet to the right in the northern hemisphere and to the left in the southern. If the center of the low is at C (diagram), the decrease of pressure there will cause a particle of air at A to pass radially along A B toward C; but the earth's rotation causes the deflection B D, and the particle actually reaches

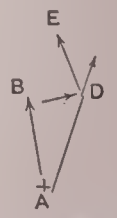


DIAGRAM.—Cause of sinistral spiral motion in lows.

D. From this point the suction, so to speak, of the center would cause the particle to move to E, but the earth's rotation, and now also the momentum from the motion from A to D, will cause its actual path to be to the right hand of D E, and so on.

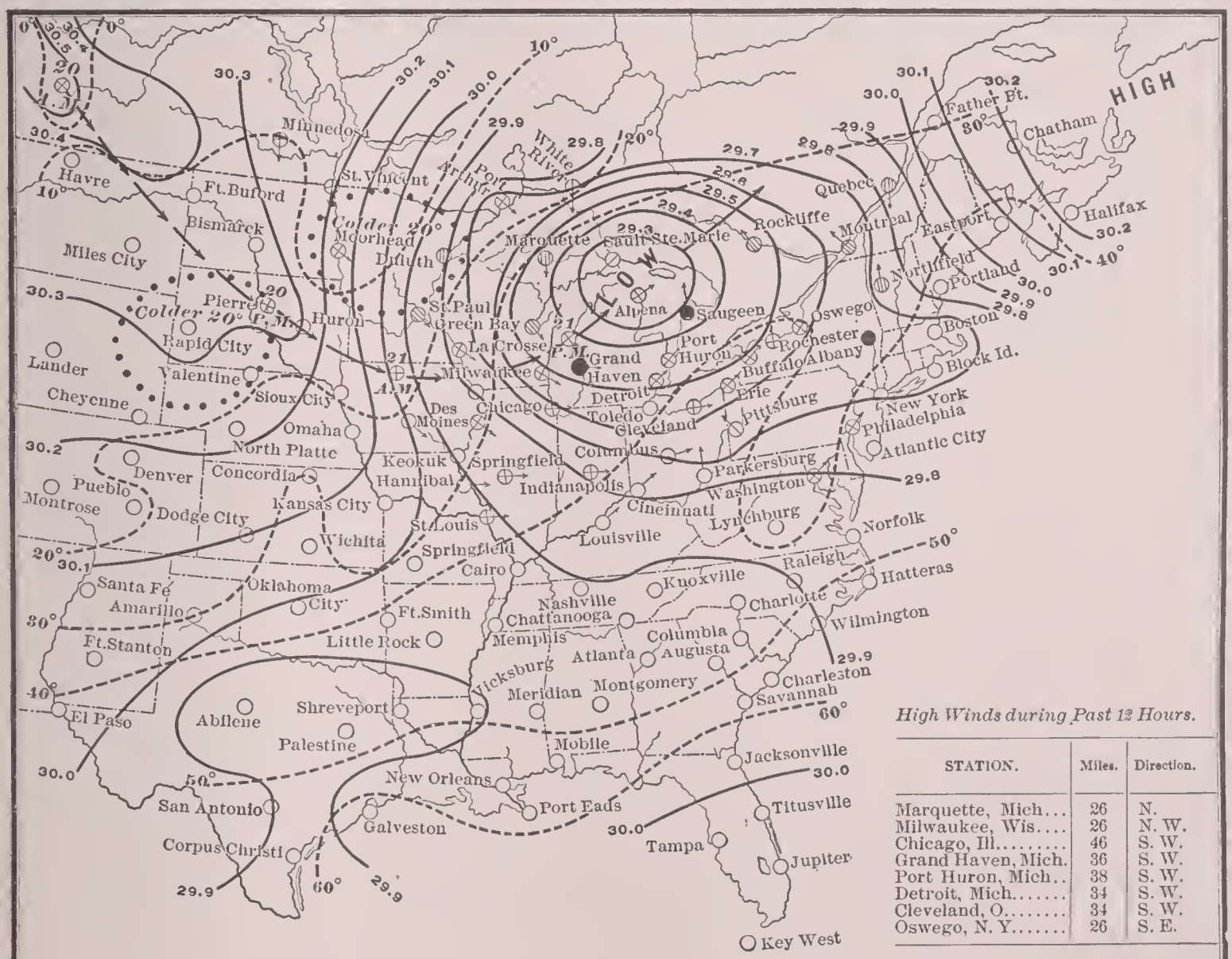
Thus the particle of air passes in a spiral path to the center of the cyclone. Meantime its velocity is increased as it approaches the center. This is due to the law of "preservation of areas," or, as it is called in astronomy, Kepler's second law. In meteorology it is sometimes so efficient that, combined with the action of inertia (the so-called centrifugal force), it causes the particle near the center to circulate around the axis without ever reaching it, thus causing a partial vacuum about the axis—a feature of importance in Ferrel's theory of tornadoes.

To obtain a clear idea of the mechanism of a cyclone, as above explained, let us follow in imagination a particle of air from the time it enters until it leaves such a vortex. Lying on the extreme margin of a cyclone, it is caught in the suction action of the center, and starts slowly toward it. Its course is at first along a radius, but the deflective effect the speed becomes less and less, until finally it is thrown out at the margin of the cyclonic disk, and comes to rest in a position decided by other than cyclonic laws.

The low has a cap of cloud. This cap is not placed centrally over the low, nor is it symmetrical. It is usually more marked on the advancing or eastern side and on the southern side of the low, and is thickest and lowest at some point a little S. E. of the center. From here it thins out in all directions, but most rapidly toward the rear. The extreme edges, especially in front, are long streaks or fingers of cirrus, and are at great elevations.

The precipitation (rain and snow) is usually greatest where the cloud is densest—that is, somewhat ahead and to the right hand of the center of the low. Snow in squalls and flurries often falls to the rear of a low, especially if it is crowded by a high. The area of precipitation varies enormously with individual storms, and the heaviest rainfalls usually occur with secondaries, to be mentioned hereafter.

Cyclones have an eastward motion in temperate latitudes which has been variously attributed to the general drift of the surface air, to the higher currents or anti-trades, and to



High Winds during Past 12 Hours.

STATION.	Miles.	Direction.
Marquette, Mich...	26	N.
Milwaukee, Wis....	26	N. W.
Chicago, Ill.....	46	S. W.
Grand Haven, Mich.	36	S. W.
Port Huron, Mich..	38	S. W.
Detroit, Mich.....	34	S. W.
Cleveland, O.....	34	S. W.
Oswego, N. Y.....	26	S. E.

Observations taken at 8 A.M. and at 8 P.M. 75th Meridian Time.
Barometer reduced to Sea level and 32° F.
⟶⊕⟶ Storm track and location of Storm Centre.
Date above, time (A.M. or P.M.) below.

○ Cloudless. ◑ Partly cloudy. ⊕ Cloudy. ● Rain. ◍ Snow.
—— Isobars.- - - Isotherms.
Arrows point in the direction the wind is blowing.

No. 3.—Weather-map for Eastern U. S., Nov. 22, 1893, 8 A. M.

of the earth's rotation soon comes in play, and it bends its path to the right of the center. Then comes into action the centrifugal force and the law of preservation of areas, and its path about the center becomes constantly smaller and more circular, while its speed becomes greater. Meanwhile it gets gradually into the central region where aspiration is active, and its spirals begin to rise. Eventually it passes the median plane of the cyclone, the suction weakens, and is finally reversed, the spirals become wider and wider, self-propagation due to the fact that the rain and cloud center is a little in advance of the center of low pressure. They are disposed to follow habitual paths, but this regularity of path is by no means to be relied on in the case of any individual cyclone.

The movement of the cyclone over the station of an observer gives rise to a well-marked series of phenomena lasting from one to three days. The barometer gradually falls, reaches a minimum, then rises rather more rapidly than it

fell. The thermometer gradually rises until the center of the low is passed, when it falls faster than it rose. The fingers of the cirrus are first seen extending up from a point on the western horizon. They gradually extend, and are followed by a sheet of cloud which grows denser and descends lower until the rain-center has passed the meridian, when the weather clears more rapidly than it clouded. The weather thickens and it becomes more and more rainy until the rain-center has passed the meridian, when the rain passes off more rapidly than it came on.

The most interesting series of phenomena, however, are those of the wind. The cyclone brings with it a series of winds of its own, which pass along with it and so gradually sweep over any station in its path. In the resulting and successive changes in wind-direction which are possible, there are three distinct cases depending on whether the storm-center passes to the N. or S., or centrally, over the station. If the center passes to the N., the wind starts in as southerly, passes through westerly, and ends as a northerly wind. It thus takes a clockwise change, or that with the sun. This is called *veering*. If the center passes to the S., then the wind passes from southerly to northerly through the E., or against the sun, which is called *backing*. If the center passes over the station, the wind is southerly when it is coming on and northerly when it is going off. There is no veering or backing, but the wind simply reverses with a longer or shorter interval of relative calm. This is a remarkable phenomenon in violent cyclones, in which cases the calm center or "eye of the storm" is especially large and well marked. Vessels have found the eye of the storm, with its tremendous choppy seas but no wind, to be about as destructive as the winds themselves.

If a line is drawn through a center of low-pressure and in the direction of motion, then we have a right-hand half and a left-hand half of the storm. In the northern hemisphere the right hand (or generally southern) half of a violent storm is the more dangerous because the air there moves with the velocity of the cyclonic wind *plus* the velocity of progression of the storm as a whole. The left-hand half is the less violent half because the velocity of the air there is that of the wind *minus* that of progression.

If a line be also drawn through the center, but perpendicular to the preceding, the storm is divided into four quadrants, of which the front right-hand one is the most dangerous, most cloudy, and most rainy.

Storms.—The larger storms (or atmospheric disturbances accompanied with precipitation) are the more intense lows or cyclones; the smaller ones are secondaries or minor whirls (in size not intensity) in the general whirl of the cyclone.

One path of storms comes up from the West Indies. This is the path of hurricanes. Another comes up from the Philippine islands. This is the path for typhoons. These are both violent cyclones of tropical origin. (See HURRICANE.) Typhoons are also known in the vicinity of the Friendly islands in the South Pacific and in the vicinity of the Mascerene islands in the western part of the Indian Ocean. The habitual paths of storms in the southern hemisphere are not yet known except for small areas.

The *secondaries* are minor whirls, often imperfect as whirls, which are imbedded in the general whirl of the cyclone, and most generally in the right-hand anterior quadrant. They are most common in extensive and humid lows, and appear generally in the hotter moist seasons and in the hotter hours of the day. They are local in character and brief in duration. Among them are TORNADOES, THUNDERSTORMS, HAILSTORM, and CLOUDBURST (*qq. v.*). They afford a large percentage of the rainfall of warm seasons—the more the nearer the tropics are approached. In the tropics these minor disturbances appear to form locally, and independently of any general storm.

Highs or Anti-cyclones.—In the highs the air descends from above and flows out. The outflowing winds here take also a spiral direction, but with dextral turn (in the northern hemisphere) or opposite to that taken in cyclones. The curvature of the spiral is here gentle and the velocity generally slight. The motion of anti-cyclones is generally less rapid and more erratic than that of cyclones. They appear in the W. and disappear in the E., like cyclones, but their paths are usually on more southerly latitudes; while the cyclones usually leave the continent by the way of New England or the provinces, the highs usually leave by the Middle Atlantic coast.

Gales are not unusually associated with highs, though they are generally at a distance from the center; are most frequent when a high is not far distant from a preceding low, and are not accompanied with much precipitation. The Texan NORTHER (*q. v.*) is a gale due generally to an anti-cyclone in higher latitudes. A COLD WAVE (*q. v.*) is a phenomenon of the advancing edge of a winter high following closely on an unseasonable low. Where the cold wave is accompanied by a fall of fine, cold-weather snow, in sharp acicular crystals with a high wind, it becomes a BLIZZARD (*q. v.*), which is dangerous.

Vertical Change.—The pressure of the air decreases with elevation in free air or on mountains, but the change is modified somewhat by temperature. The pressure at sea-level supports a column of mercury about 30 inches long. At 1,000 feet elevation (temperature 40°) it is 28·90 inches. At 8,000 feet it is only 22·14 inches. The rate of fall decreases with increase of elevation. The temperature falls with elevation in the free air, but at a rate which varies with the season, the cloudiness, and the humidity. The sun's rays are hotter at an elevation, but the air is thinner and less warmed up by the sun. Glaisher, in his remarkable balloon ascent of Sept. 5, 1862, with the temperature of 59° F. at the ground, found it 41° at a height of 1 mile; 32° at 2 miles; 18° at 3 miles; 8° at 4 miles; and 2° at 5 miles. The cirrus clouds are formed of ice particles, and the temperature where they are found must be considerably below freezing, or the sun would melt them. Their average height is above 29,000 feet in middle latitudes. Hermite's pilot-balloon probably went to the height of 10 miles, and the automatic thermometer registered —58° C., or —72° F., though with a break in the record and some doubts as to interpretation. The absolute humidity at 1,000 feet in balloons is on the average 88 per cent. of that on the ground, at 10,000 feet 31 per cent., and at 20,000 feet 11 per cent. On mountains the percentages were somewhat greater at higher elevations—for instance, 16 per cent. at 20,000. The wind increases in velocity with ascent, reaching a maximum at a moderate elevation, perhaps 4,000 to 5,000 feet.

Periodic Changes.—The diurnal rotation of the earth causes a well-known series of periodic changes. The air-pressure usually undergoes a double variation of small amplitude, with maxima between 9 and 11, morning and evening, and minima between 3 and 5 in the afternoon and early morning. This appears to be a tidal phenomenon. The temperature has a single maximum early in the afternoon, and a minimum at about sunrise. This is simply a result of solar and terrestrial radiation, and is dependent for the amplitude on the state of the sky and other sheltering conditions. The diurnal curve of absolute humidity runs fairly parallel to that of temperature at extra-tropical coast stations. Inland, however, and in the tropics, the afternoon maximum is cut out by rising currents of warm air, due to the heating by the sun. There results a double variation, with maxima morning and evening. The diurnal curve of relative humidity runs in a direction the reverse of that of temperature on which it depends.

The clouds show a distinct diurnal variation, but it is obscured and complex because it depends on the kind of cloud. For instance, the cumulus cloud is a day cloud, and is most common on summer afternoons. The clearest times of day are about sunset and sunrise. The wind shows a distinct diurnal change in velocity, being highest in the afternoon and lowest toward morning. It also shows diurnal changes in direction, which vary with the topography. The best-known case is that of land and sea breezes, occurring on coasts in the tropics and elsewhere, where it becames heated inland during the day. This wind pours in from the sea in the daytime and seaward at night.

The annual changes are even better marked and known. In the interior of continents the annual change of air-pressure is well marked with a maximum in winter and a minimum in summer. On the oceans and coasts it is usually slight and irregular. The changes in temperature and in the elements depending on it—as wind, clouds, and precipitation—are well known, as they make the seasons which so profoundly affect all human activity. The maximum hot weather usually occurs about the middle of July, and the maximum cold about the middle of January. Spring comes in the U. S. both from the S. and from the W., and autumn departs in much the same way.

Many other periods have been suspected and investigated without entirely satisfactory results. A period agreeing with the sun's rotation—between 26 and 27 days—bids fair to commend itself eventually. The change of the weather with the sun-spot period (averaging 11·1 years) also appears

to be proven, but the relation is apparently of a complicated character, giving different results at different stations. Yet the coincidences are too numerous to be rejected as without significance.

Lunar periods—whether the revolution of the moon (27 or 28 days), the lunation (about 29 days), the saros (18 years 11 days), or the meteoric cycle (19 years)—have all failed to get a foothold in scientific respect, though much time has been put on them, and they appear theoretically probable. Weather periods depending on individual planets have entirely failed to commend themselves to scientific students, though many paradoxes rely on them for forecasts which have received some popular approval and confidence. Even purely astrological meteorology has its adherents.

Other and longer periods have been suggested—as 35 years and 100 years—and striking coincidences can be found for them, but they prove elusive when the attempt is made to inspect them more closely. In general, there is reason to believe that weather changes run in cycles, because this is the method of nature, especially in the phenomenon of fluids, but it appears also probable that the periods of the weather are very numerous, and generally mutually incommensurable. As a matter of experience, no cycles have proved useful in predicting the weather excepting only the diurnal and annual ones.

alluded to. Some of the leading principles for the U. S. may be stated as follows:

1. Lows appearing in view to the W. of the meridian of Lake Huron generally direct their course across the Great Lakes; those appearing in view to the E. of this meridian usually pass up northward in a path parallel to the Atlantic coast. All usually leave the vicinity of the U. S. on the latitude of New England or the provinces.

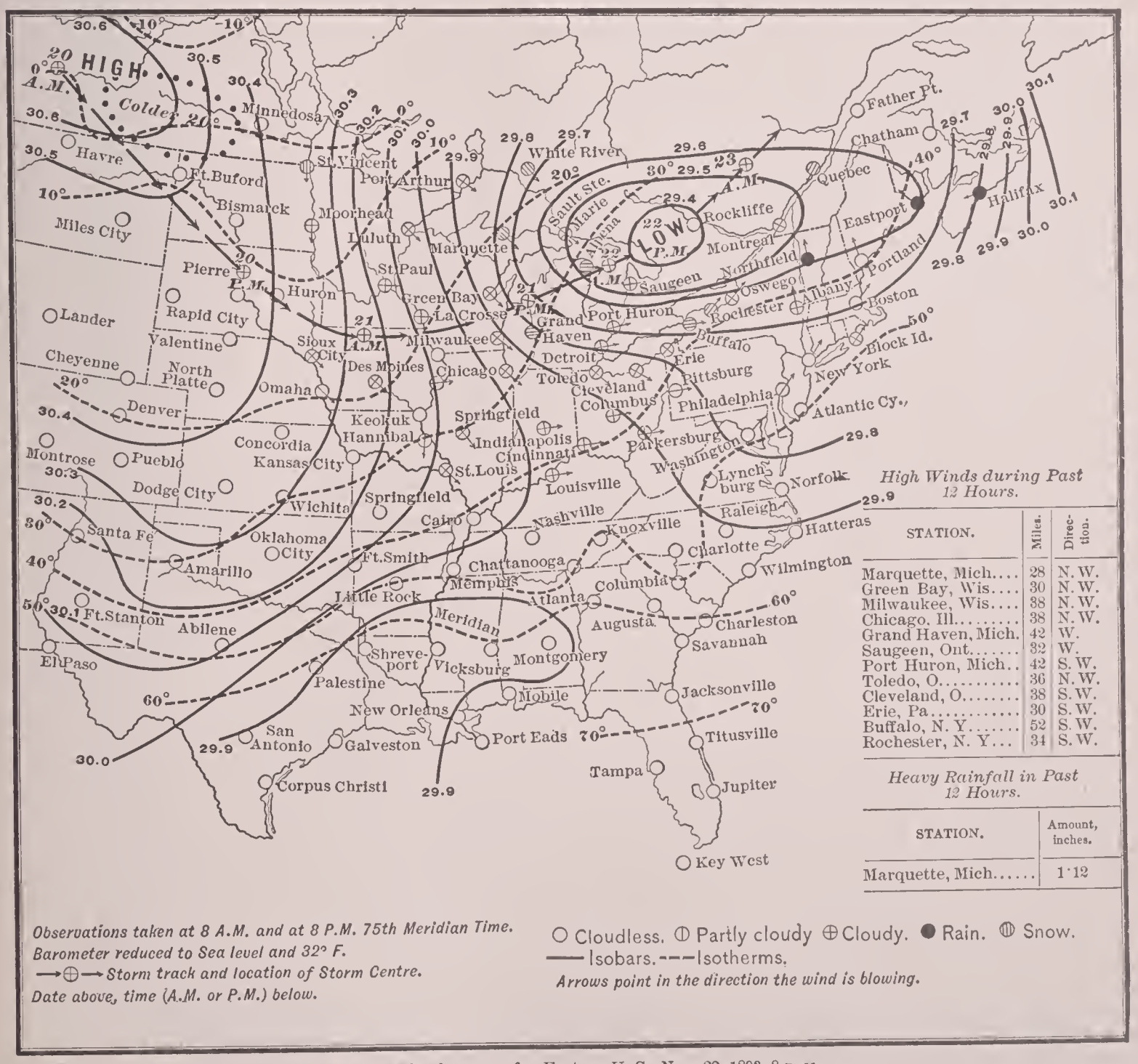
2. Highs usually take a more erratic course, with more varying velocity. They usually leave the U. S. on the latitudes of the Middle Atlantic coast.

3. Lows are more intense, better defined, and run on more southerly courses in the cold than in the hot season. In July and August they are especially weak, ill-defined, and erratic. The highs are more inclined to become stationary in summer than in winter.

4. The lows from the West Indies are the most violent. Next to these the most violent are from the high N. W. Those from the W., S. W., and Gulf are generally gentle, and the last usually afford abundant precipitation.

5. Severe local storms generally occur to the S. of a very moist and unseasonably warm low, especially if the latter extends a trough of low pressure to the southward.

Many local signs, crystallized into the form of popular weather proverbs, are of use in predictions. This is espe-



High Winds during Past 12 Hours.

STATION.	Miles.	Direction.
Marquette, Mich....	28	N. W.
Green Bay, Wis....	30	N. W.
Milwaukee, Wis....	38	N. W.
Chicago, Ill.....	38	N. W.
Grand Haven, Mich.	42	W.
Saugeen, Ont.....	32	W.
Port Huron, Mich..	42	S. W.
Toledo, O.....	36	N. W.
Cleveland, O.....	38	S. W.
Erie, Pa.....	30	S. W.
Buffalo, N. Y.....	52	S. W.
Rochester, N. Y...	34	S. W.

Heavy Rainfall in Past 12 Hours.

STATION.	Amount, inches.
Marquette, Mich.....	1·12

Observations taken at 8 A.M. and at 8 P.M. 75th Meridian Time.
Barometer reduced to Sea level and 32° F.
→⊕→ Storm track and location of Storm Centre.
Date above, time (A.M. or P.M.) below.

○ Cloudless. ◑ Partly cloudy ⊕ Cloudy. ● Rain. ◍ Snow.
—— Isobars. - - - Isotherms.
Arrows point in the direction the wind is blowing.

No. 4.—Weather-map for Eastern U. S., Nov. 22, 1893, 8 P. M.

Forecasts for short periods ahead (thirty-six hours generally in the U. S.) are made by nearly all the official weather services by means of the weather-map. The general principles on which such forecasts are made have already been

cially true of the sunset signs, as they indicate the character of westward or approaching weather.

The verification of predictions is difficult. With the best means available the forecasts of the Weather Bureau give a

verification of 85 or 90 per cent. The precipitation is especially important in public estimation, but the exact time and place of its occurrence are especially hard to forecast. Verified by the same methods, the popular paradoxes in weather forecasts get only about 50 per cent., but a generous public forgets their failures and remembers their successes.

Experimental Meteorology.—This science is considered one of observation rather than of experiment, yet it has an experimental side of great interest. The electric spark, differing from lightning only in magnitude, can now be easily made. The cloudy condensation of aqueous vapor can be produced with the aid of artificial dust particles, and so controlled as to reproduce the color phenomena of the sky, though not the different species of clouds. Weyher (*Am. Met. Journal*, vii., 17) has succeeded in mechanically producing, on a small scale, whirls and vortices, which represent familiar forms of natural whirlwinds and waterspouts. These lack the self-perpetuating power of water vapor in the presence of strong contrasts of temperature, as found in nature, but Espy thought he had a means of obtaining this by a great fire under suitable meteorological conditions. He tells, in his second congressional report, of the burning of a cane-brake in Florida one hot afternoon, which resulted in, or was at least soon followed by, a cloud-formation and a heavy shower. His theory was that the fire caused a stationary whirl of relatively small magnitude, but large enough to raise a mass of moist air so high that it was chilled by expansion, and condensed and dropped its surplus moisture.

A series of experiments on the production of rain was authorized by Congress, and conducted by R. G. Dyrenforth, in Texas, in the years 1891 and 1892. Powerful explosions were produced on the earth and in the air, with results which to the experimenter and his aids appeared favorable, but to many onlookers, especially to those whose scientific training made them most competent to judge, they appeared unfavorable. It was generally agreed that the methods were expensive and noisy, and that an explosion in a cloud might bring down a few drops of rain, but further than this there was no general agreement. A secret method of rain-making, said to be due to an Australian named Melbourne, was tried in the western part of the U. S. during the summers of 1892 and 1893, with more favorable results. See also CLIMATE, FLOODS, LIGHTNING, RAIN, WEATHER BUREAU, etc.

LITERATURE.—The literature of meteorology is very large. Among current journals may be mentioned: *American Met. Journal* (Ann Arbor and Boston, since 1884); Symons's *Monthly Met. Magazine* (London, since 1866); *The Quarterly Journal* of the Royal Met. Society (London); and the *Met. Zeitschrift* (Berlin). The later books in English are: Waldo, *Modern Meteorology* (1893); Abbe, *Deductive Methods in Meteorology* (with Rep. Chief Sig. Off., 1889), and *Met. Apparatus and Methods* (with Rep., 1887); Ferrel, *Popular Treatise on Winds* (1889), and *Recent Advances in Met.* (with Rep. Chief Sig. Off., 1885); Greely, *American Weather* (1888); Abercromby, *Seas and Skies in Many Latitudes* (1888), and *Weather* (1887); Scott, *Elementary Meteorology* (1883); Swainson, *Handbook of Weather Folklore* (1873). For meteorological tables, see Hazen, *Met. Tables* (1888); *Smithsonian Met. Tables* (Misc. Coll., 844, 1893); and the very complete and authentic *Tables mét. internationales* (Paris, in three languages, 1890). Harrington's *Met. Work for Agricultural Institutions* (Exp. Stations, Bull., No. 10, 1892) contains many suggestions for meteorological work. The meteorological bibliographies of the Signal Service and Weather Bureau afford a guide to the literature generally. The weather-maps of the U. S. meteorological service (now about 20,000 in number) and international maps of the same service afford a very large mass of material for work.

MARK W. HARRINGTON.

Meteors [from Gr. *μετέωρος*, in the air. See METEORITE]: a term used to denote many different objects and phenomena, generally of short duration, that have their place in the atmosphere. Thus there are *aërial meteors*, as winds, tornadoes, etc.; *aqueous meteors*, as fogs, rain, snow, hail, etc.; *luminous meteors*, or those due to the action on light of elements in the air, as rainbows, halos, parhelias, mirages, etc.; *electrical meteors*, as lightnings, auroras, etc.; and *igneous meteors*, as shooting or falling stars, star-showers, bolides or fireballs, aërolites or meteorites, etc. In present usage the term *meteor* is generally limited to the last group, or to the igneous meteors.

Upon any clear night a person looking upward will from time to time see a bright star-like point of light appear in the sky, move rapidly several degrees in a right line across the heavens, and as suddenly disappear, the whole flight lasting usually only a fraction of a second. This is a *shooting* or *falling star*. On certain nights these shooting stars have been seen in immense numbers. Thus on the morning of Nov. 13, 1833, they came so thickly as to be described as a fiery snow-storm. On Nov. 12, 1799, Nov. 13, 1832, Nov. 14, 1866, Nov. 14, 1867, Nov. 14, 1868, Apr. 4, 1095, Oct. 24, 1366, Nov. 27, 1872, and on many other nights that could be named, they came by thousands. On the night of Aug. 10–11 every year three or four times the usual number are to be seen. The brighter of these displays are called *star-showers*.

Varieties of Meteors.—The shooting stars are of all degrees of brightness. Some are so faint that one looking at them can not be certain that he sees anything, and some are visible only in a telescope. Others may be brighter than the planets, or even than the moon. These are called *bolides* or *fireballs*, or by older writers *flying dragons*. Sometimes they are seen in full daylight. The larger fireballs often explode into fragments, the parts chasing one another across the sky or scattering in different directions. In some cases terrific explosions, as of distant and numerous cannon, are heard over all the region a few minutes after the disappearance of the body. These are called *detonating meteors*. At times from these detonating meteors come down stony fragments, scattering themselves over a region miles in extent, and usually striking the ground with enough force to bury themselves in soft earth 1 or 2 feet. These fragments are called *aërolites* or *meteorites*. See METEORITES.

Height.—By observers near each other the track of a shooting star is seen in the same part of the heavens; but when two observers see the same track from two stations 50 or 100 miles apart, it appears in different parts of the sky. Hence the actual altitude can be determined. It is found that they are not seen higher than about 100 miles from the earth, and they rarely come lower than 30 miles unless they send down fragments. While they are thus very far above the region of clouds, they are still more distinct in place from all other astronomical phenomena, excepting, perhaps, the auroras and twilight.

Numbers.—Shooting stars are seen on any clear, moonless night. One person would on the average see not less than eight per hour, but the number increases through the night, so that about three times as many can be seen just before dawn as in the evening hours. A large group watching together can see five or six times as many as one person, or an average, at midnight, of 40 or 50 per hour.

Trains.—Many of the shooting stars leave behind them a bright cloud of phosphorescent light. Often this disappears in a fraction of a second or in two or three seconds. Frequently, however, a bright one leaves in its path a narrow bar of light several degrees long. This contracts in length and broadens, sometimes changing into a small round cloud, which slowly floats away; but usually it retains its elongated form, and after a fraction of a minute is seen to lose its straightness. If it lasts several minutes, the cloud gets twisted forms, the result, no doubt, of winds in the upper air and of currents produced by the meteor itself. One such train lasted forty-five minutes, and they have been reported as lasting more than an hour.

Color.—The meteors and their trains have various colors—white, green, blue, yellow, scarlet, etc. Those which are seen on Nov. 13 of various years leave a bluish train. The body and train of a large meteor may give in its various parts all these colors.

Duration of Flight.—The duration of the flight is generally less than a second of time, but the brighter ones may last several seconds. The fireball of July 20, 1860, was in sight over half a minute, which was, however, an extreme instance, for its path was very long. It was first seen over the State of Michigan, and last seen when it was 200 or 300 miles E. of New York city.

Velocity.—Some meteors move through the air with a velocity of 8 or 10 miles, and some with a speed of 40 or more miles, a second. The mean velocity is about 30 miles a second, or 100 times that of a cannon-ball.

Meteors are Astronomical Phenomena.—It is now universally admitted by astronomers that igneous meteors are caused by small bodies which have been traveling about the sun in their orbits, and striking the earth's atmosphere are burned by the intense heat due to the concussion and friction. These bodies before they come into the air are called *meteoroids*.

Meteoric Showers.—On the morning of Nov. 13, 1833, from about three o'clock till daylight, large numbers of shooting stars were seen throughout the western hemisphere. The very important fact was noticed that wherever the observer might be, the paths of the meteors across the sky were always directed from a point in the constellation Leo, and that this point kept its place among the stars notwithstanding the earth's rotation. This fact could be explained only by assuming that the paths of the meteors through the air were straight lines parallel to each other, and were directed from the constellation Leo; also that the meteors were of cosmical not of terrestrial origin. Further research established that there had been star-showers on the following earlier dates:

Nov. 13, 1833;	Oct. 19, 1202 (O. S.);
" 12, 1799;	" 17, 1101 "
" 9, 1698;	" 15, 1002 "
Oct. 28, 1602 (O. S.);	" 14, 934 "
" 25, 1533 "	" 15, 931 "
" 23, 1366 "	" 13, 902 "

These dates show a cycle of about thirty-three years, with a change of date of about three days in a century, the apparent change of twelve days in the seventeenth century being due in the main to the difference between old and new style. The cycle, the change of date, and the radiation all implied that the meteors belonged to a group of bodies revolving about the sun in similar elliptic orbits. It was also found that only five possible orbits could explain the cycle and the radiation, and that one, and only one, of these explains the change of date. This is an orbit whose period is $33\frac{1}{4}$ years, inclination 17° 45′, eccentricity about $\frac{9}{10}$, and motion retrograde. According to expectation, the meteors appeared again in thousands on the morning of Nov. 14 in 1866, 1867, and 1868.

The swarm was looked for in 1899 and 1900, but for some unexplainable reason did not appear.

Comet 1866 I.—A comet passed its perihelion in Jan., 1866, which has an orbit very nearly identical with the common orbit of the meteors as thus determined. The comet is traveling with the group, and near the head of it.

Comets 1366.—A star-shower occurred in Oct., 1366. Two or three days afterward a comet appeared in the northern heavens, and traveled along the track of the meteors. A week later a second comet followed along the same path. Probably both were members of the group.

Dimensions of the Leonid Meteor Stream.—These meteors, because of their radiation from the constellation Leo, are called *Leonids.* The denser part of the stream of meteors is traversed by the earth in from one to three hours, which implies an actual thickness of 20,000 to 50,000 miles. It takes three or four years for the stream to pass the node, which implies a length of many hundreds of millions of miles. The breadth in its own plane is unknown. The numbers seen per minute in the middle of the brighter of these star-showers imply that the meteoroids have in the center of the stream, as they travel through space, a mean distance from their near neighbors of from 25 to 50 miles.

The August Meteors and Comet 1862 III.—There are shooting stars every year on Aug. 9–12, numbering on the morning of the 10th or 11th, with a clear, moonless sky, 200 or 300 per hour for four observers. They radiate from the constellation Perseus, and are hence called *Perseids.* The comet 1862 III. has an orbit that very nearly cuts the earth's orbit at the point where the earth is on Aug. 10. If a stream of meteoroids were moving with this comet, as the Leonids move with comet 1866 I., they would appear like the Perseids, the radiant being in the same place in Perseus. Hence it is reasonable to assume that the Perseids and comet 1862 III. have like orbits.

The Biela Comets and the Andromedes.—A comet of short period, making three circuits in 20 years, was discovered in 1772, and observed in 1805, 1826, 1832, 1845, and 1852. It 1845 it was seen to be separated into two parts, about 150,000 miles from each other. In 1852 the two comets were about 1,200,000 miles from each other. Since that time they have never been seen. The earth's orbit came very close to the comet's orbit, the earth crossing the comet's path at first early in December, but afterward, owing to the action of Jupiter on the comet, late in November. Shooting stars were seen in considerable numbers Dec. 7, 1798, and Dec. 8, 1838, and at the latter time were observed to radiate from Andromeda; they are hence called *Andromedes.* From this same point in the sky any meteoroids traveling along the orbit of the Biela comets, and coming into the air, would be seen to radiate. On Nov. 24 and 27, 1872, large numbers of Andromedes were seen in Europe and America, forming on Nov. 27 a star-shower of brilliant character. The whole forms a stream, more or less intermittent, hundreds of millions of miles in length. See COMET.

The April Meteors and Comet 1861 I.—Shooting stars in large numbers have been observed in certain years on Apr. 20, radiating from a point in the constellation Lyra. They are hence called *Lyriads.* They seem to be connected with the comet 1861 I. in the same way as the star-showers with the comets already described. Brilliant displays of shooting stars were seen in China on this day B. C. 687 and B. C. 15, and in Europe A. D. 1095 and A. D. 1122, which probably were Lyriad meteors.

Numbers of Sporadic Meteors.—Meteors which do not belong to a group are called sporadic. By considering the number of such meteors visible each hour, their distribution over the sky, and the average relative velocity of the meteoroids in space—all of which can be determined with a certain degree of accuracy—we find that there are in the region through which the earth is traveling 10,000 or 15,000 meteoroids in each volume of the size of earth. In other words, each meteoroid that would, in coming into the air, under favorable circumstances, furnish a meteor-track visible to the naked eye, occupies an average space equal to a cube whose edge is 200 or 300 miles. The number of the meteoroids that enter the atmosphere daily is not less than 10,000,000. If we include those smaller meteors which can be seen only in the telescope, that number may be multiplied twenty or forty fold.

Theory of the Meteors.—The preceding facts lead to the following theory of meteors, which is now universally accepted. A meteoroid is a small solid body describing its long elliptic orbit about the sun, like any comet. The number of such small bodies is so great that every day many millions of them come within 4,000 miles of the earth's center, the number being but little increased by the earth's attraction. They are entirely invisible until, at a height of less than 100 miles from the ground, they enter air dense enough to resist their motion and create light. Their velocity being enormous, generally from 10 to 400 miles a second, an intense heat is developed by the air directly in front of the body. The anterior surface is in consequence melted away, the melted matter being wiped off by the air. This streams back, forming in part the apparent flame, and the train of the meteor proceeds many miles before it is entirely destroyed. Under favorable circumstances of velocity, chemical and mechanical constitution, and size, the meteoroid is not entirely scattered, but, breaking up into fragments, comes to the ground in a shower of stones. These stones often show traces of the flow of melted matter, also evidences of successive fractures, and even the partially developed cracks which with further action would have become fractures; but for this action of the air in arresting and destroying the meteoroids, we should be intolerably pelted with them. The meteorites are all evidently fragments, not separate formations. They are in the heavens, to some extent at least, grouped in streams along the orbits of known comets, and hence have some common origin with them. The continuity of these streams, the double and multiple character of Biela's and other comets, and the steady diminution of comets in brilliancy at successive returns, seem to argue a continuous breaking up of the comet into fragments by some cause—probably by the sun's heat. The meteoroids, however, are not constituents of either the comet's coma or its tail.

LITERATURE.—The literature of this subject is extensive. See, in particular, the various articles in *The American Journal of Science,* in the *Astronomischen Nachrichten,* in the *Monthly Notices* of the Royal Astronomical Society, and in the annual reports of the luminous meteor committee of the British Association for the Advancement of Science; also, the following separate works: Schiaparelli, *Note e Riflessioni sulla Teoria astronomica delle Stelle cadenti* (Florence, 1867), or its German translation by Boguslawski (Stettin, 1871); Kirkwood, *Meteoric Astronomy* (Philadelphia, 1867); and *Comets and Meteors* (Philadelphia, 1873).

H. A. NEWTON.
Revised by S. NEWCOMB.

Meters, in prosody: See METRES.

Meters: appliances for measuring; especially any instrument for recording the quantity or force of a fluid actuating it. For a full description of the meter used for measuring illuminating gas, see GAS-LIGHTING; for the water-meter,

see WATER-METER. In electricity the meter is a device for measuring, for commercial purposes, the energy developed in an electric circuit. The measure of electrical activity in practical units is the *watt*, which is the product of the current flowing and the difference of potential existing between the terminals or extreme limits of the circuit under consideration. By Ohm's law this is the equivalent of the square of the current multiplied by the resistance of the circuit. These statements hold only in cases in which the activity is due to a steady current. When alternating or variable currents are used the expression is more complicated. The *energy developed* is the product of activity and time, and the practical units are the *watt-hour* and the *kilowatt-hour* (1,000 watts for one hour). In the early days of electric lighting the horse-power hour was the prevailing unit. This, which is equal to 746 watt-hours, has been abandoned. Electric meters are from the nature of the case *watt-meters*, under which title some details of the construction of the best-known types will be found. It may be said that the most successful forms are those in which a small electric motor, so designed as to revolve with a speed proportional to the activity of the circuit, actuates a counting device. The latter, which should be direct-reading, generally consists of a set of dials similar to those upon gas-meters. Recording ammeters have also been used as electric meters to some extent. Another form is the zinc voltameter, which has been found a fairly accurate device for measuring the energy supplied to glow-lamp circuits, etc. See ELECTRICITY, ELECTRIC LIGHTING, AMMETER, GALVANOMETER, and WATT-METER. E. L. NICHOLS.

Method in Education: See the Appendix.

Methodism: the system of doctrines, polity, and worship of the religious body called Methodists. The title "Methodists" was applied to Wesley and some of his Oxford associates not in derision, but as expressive of the regularity of their religious habits, especially their punctual devotion to the ritualistic services of the Church, for the members of the Oxford "Holy Club," as it was called, were not only extremely "High Church," but exceedingly "ritualistic." They were distinctively the "ritualistic party" of their day, notwithstanding the very simple practical character and comparative disregard for ritualism which the Methodistic movement subsequently assumed. The little society, formed in 1729, grew slowly, and consisted in its sixth year of only fourteen members, the most memorable of them being John and Charles Wesley and George Whitefield. (See WESLEY.) The departure of the Wesleys to America terminated the history of the "Oxford Methodists" and the existence of the "Holy Club." The return of the two brothers to England, however, revived the denominational epithet, for by the next year (1739) they and Whitefield had spread a religious sensation over much of the United Kingdom. They were excluded from the pulpits of the national Church, and had to preach in the open air, and in many places they and their adherents were denied the Eucharist at the church altars. They were therefore compelled to unite their followers in "societies," to give them the sacraments, and provide for them places of assembling and worship. The year 1739 is considered the true epoch of Methodism. In that year Wesley began the erection of his first chapel at Bristol, opened his famous "Old Foundry" in London, and formed in the latter city his first "society," which he says (in the introduction to his *General Rules*) was the "rise of the United Society"—that is to say, of organized Methodism. In the same year "bands" were formed, for the first time, in the city of Bristol, and it is the date of the first publication by the brothers of their *Hymns and Sacred Poems*, the beginning of that Methodistic psalmody which has spread over most of the Protestant world, and which has been the chief liturgy of the denomination.

Thus had the "great Methodistic movement" begun. It soon extended over Great Britain and into Ireland. Additional "societies" were continually formed; *General Rules* were prepared for them by John and Charles Wesley jointly. These "Rules" are the recognized "terms of membership" throughout the Methodist communion, and they expressly declare that no other "condition" than such as they define "is previously required of those who desire admission to these societies." They are singularly liberal, being "remarkable," says a Methodist writer, "as containing not a single dogmatic condition of communion." They are thoroughly practical, requiring as the "only condition" "a desire to flee the wrath to come and be saved from sin," and the exemplification of this desire, first, by the avoidance of certain specified vices; secondly, "the doing good of every possible sort, and as far as possible, to all men," especially in certain specified respects. Wesley, though at first, as he acknowledges, a "High Churchman," and as strict a "ritualist" as the Anglican Church possessed in his day, had now become one of the most liberal of men. Throughout the remainder of his life he refers often to the liberality of the terms of membership in his societies, and demands of all good men the sacrifice of sectarian bigotry and cooperation in practical religion. Though he now formed "societies," not churches technically or strictly considered, yet when, many years later, he prepared a form of organization for the Methodist Episcopal Church in the U. S., he still retained the *General Rules* as presenting the only condition of membership, and inserted in a separate part of the book an abridgment of the Anglican Articles, not as an obligatory symbol to be virtually subscribed, but as a merely indicative standard of the best theological opinions. Members of the Church were to be amenable not so much for their individual opinions as for making strife and trouble in the denomination by them. It can not be questioned that John Wesley was not only immeasurably in advance of his own age, but also far in advance of ours in "evangelical liberality."

The societies rapidly increased, and Wesley and his few clerical coadjutors were soon compelled to organize more thoroughly their converts if they would not labor in vain. The societies were therefore divided into "classes" of about twelve persons each, and placed under the inspection of select "leaders." They met weekly, sang, prayed, and related their Christian experience. The "class meeting" has since been the germ of almost every Methodist church in the world. Each member contributed a penny a week and a shilling a quarter for the support of the cause, and thence arose the whole financial system of Methodism. The clerical laborers could not supply the increasing local societies; laymen of natural talents were therefore recognized, first as "exhorters," and then as "local preachers," to conduct their public services in the absence of their clerical guides. (See MAXFIELD, THOMAS.) Wesley soon called out some of his ablest "local preachers" into the general field, to travel and preach continually, like himself, his brother, and Whitefield; and thence arose the lay *itinerant ministry*—one of the greatest factors in the Methodist movement throughout the world. To give regularity to the labors of these lay evangelists, they were assigned to different sections of the kingdom; thence came the famous Methodist "circuit"—of incalculable service, especially in the early frontier settlements of the New World, for it sometimes put under the regular ministrations of one or two "itinerants" parishes 500 miles in extent. Over a given number of these circuit preachers presided a select itinerant, and thence arose the "district," with its "presiding elder" in North America, its "chairman" in Great Britain. This officer assembled the preachers and other "official members" of each circuit four times a year, for the better regulation of their work; thence arose the "quarterly conference"; a similar gathering from all the circuits of a district constituted the "district conference"; the yearly gathering of all the preachers of all the districts, for the revision of their entire work and its redistribution for the ensuing year, made the "annual conference." The latter, however, preceded, chronologically, the other forms of "conference," Wesley having held the first session in 1744. In the U. S. the great territorial range of the denomination has since 1792 rendered necessary a quadrennial session called the "general conference," composed since 1812 of delegates from all the annual conferences.

Besides these peculiarities, Methodism has some minor functions or distinctions which have contributed much to its popular effectiveness. Its "love-feast" was borrowed, through its early Moravian associates (see WESLEYS), from the agapæ of the primitive Church. Bread and water are distributed among the assembly at the opening of its service, and the rest of the time is spent in the narration of Christian experience. The "band meeting" was also copied from the Moravians. Each sex met in its own bands; the "class meeting" has generally superseded this institution. The "watch-night" is usually celebrated on New Year's Eve, its services closing with silent prayer at midnight. It originated with the early Methodist converts among the Kingswood colliers. It had been their custom to close the old and hail in the new year with drunken orgies. Method-

ism reclaimed hosts of these poor people, who changed to this new and devout form their observance of New Year's Eve, and gave it to the denomination throughout the world. The lay "prayer meeting" is universal among Methodists, and has been claimed as original with them, at least in the modern Church. (Smith's *History of Methodism*, vol. i., book iii., chap. ii.) It is characterized by great freedom and fervor, and especially by its popular psalmody. Both sexes have equal liberty of prayer and exhortation in it.

The *theology of Methodism* may be said to be substantially that of the Church of England, though it eliminates the alleged Calvinistic teachings of the Thirty-nine Articles. Wesley was thoroughly Arminian, and his followers, with the exception of the Welsh Calvinistic Methodists, are universally such. The "minutes" of his early conferences record many discussions with his assembled preachers on theological subjects. Certain compilations from these documents, together with his sermons and his notes on the New Testament, are recognized as the theological standards of the English or Wesleyan Methodists. In the U. S. his abridgment of the Anglican Articles is the only authoritative Methodistic standard. It does not include his views of the "witness of the Spirit" and of "sanctification," which, though subjects of much interest to American Methodists, are left freely to individual opinion and discretion. These two doctrines have usually been considered, by outside critics of Methodism, as peculiar to its theology. Neither Wesley nor any subsequent authority of the denomination would admit them to be so. They consider them to be not only biblical, but generally admitted truths in Greek and Latin Christendom. Wesley did not even go as far in his teachings regarding the "witness of the Spirit" as many of the older Protestant theologians went in the doctrine of "assurance." According to him, the Spirit, not by any marvelous demonstration, outward or inward—"not by an inward voice, though He may do this sometimes"—gives the peaceful impression to the justified man that his sins are forgiven. To use his own words, "the Spirit so works upon the soul by His immediate influence, and by a strong though inexplicable operation, that the stormy wind and troubled waves subside, and there is a sweet calm; the heart resting as in the arms of Jesus, and the sinner being clearly satisfied that all his 'iniquities are forgiven and his sins covered.'" In his teachings on sanctification—or "perfection," a word which he used because the Scriptures use it—he taught not absolute moral perfection. "We are no more to expect any man to be infallible," he says, "than to be omniscient." A Methodist writer affirms that "perfection, as defined by Wesley, is not perfection according to the absolute moral law; it is what he calls it, *Christian perfection*—perfection according to the new moral economy introduced by the atonement, in which the heart, being sanctified, fulfills the law by love (Rom. xiii. 8, 10), and its involuntary imperfections are provided for by that economy without the imputation of guilt, as in the case of infancy and all irresponsible persons." See ARMINIANISM.

Although in the foregoing remarks historical references have been made chiefly to Wesleyan or English Methodism, nearly all that has been thus far said is applicable to the many divisions of the denomination; for one of the most noteworthy facts of Methodism is its essential unity. Whatever distinctive prefixes or affixes its numerous bodies may have adopted, they all hold to what they justly consider substantive Methodism. They have very generally the same practical system and interior regimen, and aim at the same type of spiritual life. They all have fraternal relations.

Wesleyan Methodists is the title of the British parent body. The outlines of its early development have already been given. During Wesley's life it was chiefly controlled by his patriarchal authority. He left, however, a *Deed of Declaration*, recognized in 1794 by the high court of chancery, providing for the government of the "connection" after his decease. By this deed the annual conference is composed of 100 traveling preachers, with power to fill vacancies in their number. They are the "legal conference," but the other traveling ministers attend their sessions and share in their debates, without the right of voting. The president of the conference is elected for one year by the "legal conference" and the preachers, but the "legal conference" can negative the nomination of the general body. He has during this term the general supervision of the denomination. The proceedings of the "district" and "quarterly conferences" (above noted) are subject to revision and amendment in the annual conference. Committees appointed by these minor bodies to prepare the principal business of the annual session meet about a week before the latter, and their measures are generally adopted by the "legal hundred." Wesleyan Methodism cannot, under Wesley's *Deed of Declaration*, have "lay representation," but it has nearly its equivalent in these committees, which are composed largely of laymen, and in the Representative Conference, a chamber composed of ministers and laymen, instituted in 1878, which meets previously to the legal conference or "pastoral session," and acts, subject to its ratification, upon matters of temporal and non-ecclesiastical import. Moreover, the draft of appointments of ministers to stations is submitted to the societies every year for the suggestion of desired changes, before its final adoption by the conference. No preacher, however, can be appointed to the same place more than three successive years. The Wesleyans report (1900) 3,174 traveling preachers and 703,138 church members. The parent conference employs in Great Britain and Ireland 2,457 regular ministers. Besides these, there were in 1900 in England alone 19,956 lay preachers. The number of church members in Great Britain and Ireland in 1900 was 510,337; and 7,652 Sunday schools were returned, with 134,812 officers and teachers, and 992,316 pupils. Their missions are carried on in Ireland, France, Switzerland, Austria, Italy, Spain, Malta, Egypt, India, Ceylon, China, South and West Africa, the West Indies, Honduras, and the Bahamas. These missions employ 3,456 paid agents, including 366 who are regularly ordained and are wholly engaged in the work of the Christian ministry. Besides, there are 6,133 lay workers who render important service gratuitously, while the number of church members is 47,372, with 13,625 on trial for membership. The children in the mission schools number 92,488. The parent connection has in Great Britain 743 day-schools, containing 160,787 pupils, with an average attendance of 129,905. The Wesleyans have conferences, affiliated and subordinate to that of England, in Ireland, France, South Africa, and West Indies. The conferences in Australia and New Zealand are now independent of the parent body, and form the Australasian Wesleyan Methodist Church, a body returning (1900) 775 ministers, 8,783 lay preachers, 3,438 churches, 118,984 members, 397 Sunday-schools with 21,618 officers and teachers and 214,734 pupils, with missions in the South Sea Islands and New Guinea. A union of all the various Methodist bodies in Australia under the name of the United Church of Australia is likely to be effected, negotiations to that end having (1901) reached a stage near completion. The Wesleyans publish a quarterly review, 8 monthlies, 6 weeklies, and several missionary and Sunday-school periodicals. Some of these are in their foreign fields; most of them are official, others are independent. They have 4 collegiate institutions, 4 theological schools, 2 important normal seminaries, and numerous academies or boarding-schools.

The *Calvinistic Methodists* arose from a difference between Whitefield and Wesley respecting the Calvinistic doctrines. Wesley, as we have seen, was thoroughly Arminian, Whitefield as thoroughly Calvinistic. After Wesley's celebrated sermon on "free grace" they pursued separate though parallel lines of public labor. Personally they became cordial friends again, but their followers were never reunited. The Calvinistic Methodists were finally organized in three denominations. The first was called *Lady Huntingdon's Connection*. Her ladyship was their liberal patron and their chief director. She purchased or built for them numerous chapels. Their pastors were settled, they used the liturgy of the national Church, but their system of government was essentially congregational. They early established a theological school, which still exists under the title of Cheshunt College. They have not shared the prosperity of the other Methodist bodies.

The second body of Calvinistic Methodists, the *Whitefield Methodists*, no longer exist as a "connection" or denomination, but some of their early churches survive among the independent congregations of England.

The third and greatest result of Calvinistic Methodists bears the title of the *Welsh Calvinistic Methodists*. Welsh Methodism was independent of English Methodism, both in origin and organization. Its first "societies" were formed in 1735. The chief founders were Howell Harris, Griffith Jones, Daniel Rowlands, and Thomas Charles, the last named surviving long enough to shape the later history of the denomination. Its first "association" was held in 1742, two and a half years prior to the English Methodist Confer-

ence, under Wesley, in London. In 1811 it was more thoroughly organized, and in 1864 the organization was completed by the constitution of the General Assembly. The Church is Presbyterian in doctrine and polity, and is a member of the Presbyterian Alliance. The latest statistics (1900) are: In Wales, 1,572 chapels and 879 other buildings apart from chapel houses and manses, 158,114 communicants, 319,261 hearers, and collections for the year of £283,903. In the U. S. they had in 1900, 89 ministers, 158 churches, 12,152 members, and 13,954 officers and pupils in Sunday-schools.

The *Wesleyan Methodist New Connection* is the title of an organization originally composed of 7 preachers and about 5,000 seceders from the parent connection, who for certain alleged grievances withdrew in 1797, under the leadership of Alexander Kilham, an able preacher, who had been expelled the preceding year for his zealous advocacy of liberal changes in the system of government which Wesley had established. The New Connection adopted equal lay and ministerial representation in its conference. It extended into Ireland, and for a considerable time was the refuge of members of the elder body who were dissatisfied with their restricted liberties. The ministry of this denomination (1900) comprises 209 traveling and 1,122 local preachers, and its membership is 41,043. It has 672 churches, and 490 Sunday-schools with 10,903 officers and teachers and 83,578 pupils.

The *Primitive Methodists* form one of the most important branches of the great Methodist family. Lorenzo Dow introduced the camp-meeting from the U. S. into England about 1807. William Clowes, a Wesleyan local preacher, approved and labored in these "open-air" assemblies. Hugh Bourne, a layman, but an influential chapel trustee, saw in them an important means of reaching multitudes of the common people who could not otherwise be brought under religious influence. He defended them in a pamphlet; counter publications were issued by the preachers of Burslem and Macclesfield circuits. No small agitation ensued, and in 1807 the conference denounced camp-meetings, and "disclaimed connection with them." In 1808 Bourne was expelled from the connection; two years later Clowes was also expelled. They continued, however, their "out-door meetings," organized their converts in classes, and in 1810 established the Primitive Methodist connection. It retained the doctrines and internal discipline of Wesleyan Methodism, and attempted to restore the primitive simplicity of the latter in dress, manners, and living. It revived Wesley's custom of "out-door preaching," and licensed women to preach. Its church government is notably liberal toward the laity, two-thirds of its annual conference being laymen. The Primitive Methodists have done much good among the neglected classes of England; they have also established several foreign missions. They have in 1901, 1,100 ministers, 198,874 members, 59,929 teachers and 460,783 pupils in Sunday schools, and 4,575 chapels, providing sittings for 1,042,335 hearers. In the U. S. they have 74 ministers, 90 churches, and 6,549 members.

The *Primitive Wesleyans of Ireland* must not be confounded with those of England, above noticed. The Irish body was distinguished by its partiality to the Established Church in Ireland, and originated in that partiality. As early as 1795 the British conference allowed its preachers to administer the sacraments to their people, under specified restrictions. The Irish conference (a branch of the former) voted in the next year that it was not expedient for the preachers within its territory to avail themselves of this concession. About twenty years later (1816), in compliance with an extensive demand of the people, the concession of the parent conference was adopted. In a vote of 88 members there was a minority of 26 which sturdily insisted that their people should still resort to the Established Church for the sacraments. This, it was argued, was Wesley's design down to his death regarding all his societies, except those of America, where the Anglican establishment had ceased to exist. Adam Averell, one of the most commanding members of the Irish conference, withdrew from the connection, leading with him the minority and about 10,000 members. Wesleyan Methodism lost by this schism at least one-third of its numerical strength in Ireland. The Irish Primitives had no great success, and in 1878 they returned to the parent body.

Besides the above, there are minor sects of Methodists in England, among which may be mentioned: (*a*) The *Independent Methodists*, who, beginning with one church at Warrington in 1797, were soon associated with churches in Manchester and Macclesfield, and formed a union in 1805 at Manchester. The annual meeting of 1808 at Macclesfield comprised churches from eight places. Each church controls its own affairs by the entire membership or by representatives. They have no salaried ministers. Local societies have various names, such as Independent Methodist, Free Gospel Church, Christian Brethren, Benevolent Methodist, Christian Lay Church. Their joint name was changed in 1843 to *The United Free Gospel Churches*, and they include (1901) 153 chapels and missions, 8,377 members, 372 ministers, and 26,194 Sunday-school pupils. (*b*) The *Protestant Methodists*, chiefly seceders from the Wesleyan societies of Leeds, who became disaffected in 1828 because the societies placed an organ in one of their chapels. More than 1,000 communicants, including 56 class-leaders and 28 local preachers, combined in the schism. (*c*) The *Wesleyan Methodist Association*, originated in 1835 by a secession chiefly under the direction of Rev. Dr. Samuel Warren, who with his followers opposed the introduction of theological schools among the Wesleyans. Though Wesley himself had proposed such means of ministerial education, it was assumed by the seceders that they were incompatible with the genius of Methodism, and would be adverse to its prosperity. The *Protestant Methodists* of Leeds united with these Association Methodists in 1836. (*d*) The *Reformed Methodists* originated in an extraordinary proceeding of the parent Wesleyan conference in 1849, when six of its members, some of them eminent men, were arraigned before that body and half of them reproved, the other half expelled, under an accusation of disguised hostility to the conference and of secret co-operation with the Wesleyan Methodist Association. It was alleged by the accused and their many friends that the action of the conference was precipitate, and violated the legal formalities in such cases required. It excited profound agitation throughout the connection, and no less than 100,000 Wesleyans seceded. These last-mentioned three bodies were consolidated in 1857 under the title of the *United Methodist Free Churches*. They have adopted a "liberal" system of church government, admitting laymen to their annual conference or assembly, and giving independent jurisdiction to the circuits over their interior or local affairs. They report (1900) 436 traveling and 3,379 local preachers, 91,717 members, and 195,429 Sunday-school pupils. (*e*) The *Bible Christians*, sometimes called Bryanites from William O'Bryan, a Methodist of Cornwall, who preached on independent lines in unevangelized parishes for about six years, and then organized the first society in 1815 in Devonshire. The first conference was held at Baddash Launceston, in Cornwall, Aug. 17–26, 1819, and was attended by twelve preachers. Here the question whether women should preach was discussed and decided affirmatively. They report (1900) 291 traveling and 1,858 local preachers, 34,883 members, and 57,939 Sunday-school pupils. (*f*) *The Wesleyan Reform Union*, formed in 1859, a remnant of the schism of 1849 (who were unwilling to be merged in the United Methodist Free Church), numbering, in 1900, a membership of 7,187, Sunday-school pupils 20,025, with 18 salaried and 496 unsalaried preachers. It will be observed that secession has played a conspicuous part in the history of English Methodism. The frequency of this evil is attributable largely to the ardent popular elements which it has been the task of the denomination to gather and improve, but still more perhaps to the restricted and rigid ecclesiastical system which Wesley's *Deed of Declaration* has entailed upon the parent body. Every schism in the history of Methodism has been occasioned by ecclesiastical or economical provocations; no theological defection or controversy has ever seriously disturbed the denomination in any part of the world.

Methodism has had its chief mission in the New World, where by its peculiar practical system, especially by its ministerial "itinerancy," it has spread the provisions of religion coextensively with the ever-extending emigration, until it has become the largest Protestant denomination of the U. S.

The *Methodist Episcopal Church* is the title of the earliest Methodist organization in the U. S. Philip Embury, with other Wesleyan emigrants from Ireland, began to hold meetings for preaching and prayer in New York city as early as 1766. In the next year Capt. Thomas Webb, a British officer, who like Embury had been a Wesleyan local preacher in England, visited the little flock, and preached to them in his regimentals, exciting much popular interest. The captain also preached on Long Island, in New Jersey,

Philadelphia, Delaware, and Maryland, and is honored as one of the chief founders of American Methodism. Embury's congregation increased rapidly in New York. In 1767 they worshiped in a rigging-loft, which was thronged, and in 1768 they built the famous old "John Street chapel," supposed to be the first Methodist church erected in the Western hemisphere, though about the same time Robert Strawbridge (another Irish Wesleyan) began to preach, formed societies, and built a small chapel on Sam's Creek, Frederick co., Md. Some Methodist authorities still consider it doubtful which had priority, Embury or Strawbridge; the Church generally, however, recognizes the date of Embury's labors (1766) in New York as the epoch of American Methodism. In 1769 Wesley sent over two of his itinerants, Pilmoor and Boardman, who labored successfully in and about New York and Philadelphia. They were followed in 1771 by Wright and Asbury. The latter became the representative character and most effective bishop of the denomination, and did more for its outspread and permanence than any other man in its history. In 1773 Wesley sent over two more itinerants, Rankin and Shadford; and this year is also memorable for the session of the first Methodist conference in North America. It was held in Philadelphia, and reported 1,160 members of society and 10 preachers—the same number of the latter as constituted Wesley's first conference in England twenty-nine years before. Notwithstanding the disturbed condition of the country during the ensuing Revolutionary war, the cause prospered, and in 1784 enrolled 15,000 communicants. There were now 84 preachers, traveling 46 "circuits," for by this time a considerable native ministry had been raised up. Hitherto, the Methodists had been dependent on the colonial English Church for the sacraments, none of their own preachers having yet been ordained; but in this year Wesley ordained two of his English itinerants, Whatcoat and Vasey, to the function of presbyters, and consecrated Rev. Dr. Thomas Coke as a bishop, and sent them to America with authority to organize the scattered societies as a distinct Church, under the title of "The Methodist Episcopal Church in the U. S. of America." He sent with them a printed liturgy and formulas for ordinations, the sacraments, marriage, burial of the dead, etc., abridged from the *Book of Common Prayer*, and substantially the same as those still in force in the Methodist *Book of Discipline*. Coke and his two presbyters assembled a general conference about Christmas at Baltimore, where the plan appointed by Wesley was adopted, and Asbury (at Wesley's suggestion) was ordained successively deacon, presbyter, and bishop. Wesley was led to these extraordinary measures by the abolition of the authority of the English Church establishment in the colonies, by the urgent demand of his American people for the sacraments, and by his repeated failure to obtain relief for them in the ordination of some of his preachers by the Bishop of London.

A consolidated and distinct Church had at last come into existence in North America. It retained the ecclesiastical system of English Methodism, as well as its theology, except that its chief administration was placed in the hands of bishops. As it rapidly extended over the continent its annual conferences were multiplied, until in 1792 regular "general conferences" were created, meeting quadrennially, and comprising all the traveling preachers who could attend. It was found necessary at last, by the growth of the ministry, to make the general conference a *delegated* body. It assembled as such, for the first time, in 1812, at the Old John Street church, New York. The ratio of delegates to the number of traveling preachers has been necessarily changed from time to time. Lay representation in the general conference was granted in 1872, when not more than two lay delegates were admitted from each annual conference. In 1900 the number of lay delegates was made the same as that of the ministerial delegates, and the general conference now consists of one of each order for every forty-five ministers in the annual conferences.

The quadrennial general conference is the supreme assembly of the Church—legislative, judicial, executive. It elects the bishops, who are, in fact, but its executive agents; it makes all laws except minor local regulations, which are left to the annual conferences: it tries judicial appeals from the annual conferences; it is itself under constitutional restraints, called "Restrictive Rules," which can be suspended or changed only by the concurrence of specified majorities in the general conference and in all the annual conferences. American Methodism has now a quarterly conference for each circuit; a district conference, wherever desired, for all the circuits which are under the care of each presiding elder; annual conferences for larger sections of the country, embracing often considerable portions of one or more States; and a general conference, comprehending all the annual conferences. The work of the denomination is thus under periodical supervision in a series of sessions extending from a quarter of a year to four years. The preachers are appointed at the annual conferences for one year, but they can be reassigned for any number of years to the same appointment. The bishops make these appointments, aided by the presiding elders; the latter can be continued six years on the same district. The bishops are required by an organic law of the Church to travel at large. The whole nation is their common diocese. The denomination has a powerful publishing institution called the "Book Concern," with above $3,000,000 capital. It has two large establishments—one in New York, the other in Cincinnati—with branches and depositories in other cities from Boston to San Francisco. It issues a bi-monthly review, two monthly magazines (one in German), a monthly Sunday-school journal, several weekly Sunday-school and tract papers in different languages, and thirteen weekly religious newspapers. There are also over twenty unofficial or independent religious journals issued in various parts of the Church. Its theology and ecclesiastical economy have been sufficiently indicated in the preliminary remarks of this article. Though the denomination maintains episcopacy and the two ministerial orders of deacons and presbyters, it does not claim for them divine right or scriptural obligation. It regards them only as expedient for its own peculiar working system. Episcopacy it esteems merely as an office, not as an "order." The English Methodists have neither bishops nor deacons, but the American Methodists recognize the Wesleyans as a genuine Church. Wesley did not believe that any particular system of church polity is *enjoined* in the Holy Scriptures, and the claim of any denomination to validity *as* a Christian Church does not rest, in the estimation of Methodists, on its form of organization, but on theological and moral grounds.

One of the most momentous events in the history of the Methodist Episcopal Church was its division, by the separation from it of all the conferences (save one) in the slaveholding States, and their organization as the METHODIST EPISCOPAL CHURCH SOUTH (*q. v.*). It would be impossible here to enter into the arguments, pro and con, of this great ecclesiastical controversy, nor is it desirable. Later national events have extinguished the chief cause of the strife, and fraternal and conciliatory measures have been taken by both parties, and organic reunion is a subject of serious if not hopeful discussion. Both churches have since the civil war had signal success.

There were in 1900 in the Methodist Episcopal Church 150 annual conferences and missions, 22 bishops, 16,059 traveling preachers, 14,126 local preachers, 2,929,674 lay members, 19,341 Sunday-schools, with 1,568,883 pupils and 205,429 officers and teachers, 27,230 churches and 11,189 parsonages, and property in churches and parsonages amounting to $136,964,660. It has 56 universities and colleges, 8 colleges and seminaries for women, 25 theological schools, 60 classical seminaries, and 99 foreign mission schools. It has foreign missions in Mexico, South America, Sweden, Norway, Denmark, Germany, Switzerland, Italy, Bulgaria, Africa, India, Japan, China, Korea, and Malaysia. In Africa it has 2 conferences (Liberia and Congo); in China 2; in Germany 2, with a publishing-house and a theological seminary; in Sweden 2; and 1 conference each in Mexico, Finland, Norway, Switzerland, Italy, and Japan. It has 5 conferences in India, where, particularly in the north, very successful work is now in operation. Its home missions are numerous and very fruitful, especially among the German and Scandinavian population. Besides the German conferences already mentioned in the U. S. and Germany, its German domestic work includes 276 missionaries, 42,222 members and probationers, 21,614 pupils in Sunday-schools, 309 churches and chapels, valued at $1,743,821, 3 colleges, 2 orphan asylums, a weekly journal, a Sunday-school periodical, and a monthly magazine. The Scandinavian domestic missions have 235 missionaries, 272 churches, 26,030 members and probationers, 15,254 pupils in Sunday-schools, with church property valued at $1,133,094, a weekly journal, and a weekly Sunday-school paper. The total sum contributed for home and foreign missions in 1900, including the receipts of the woman's societies, was $1,987,368.43.

The foreign missions returned in 1900 a total of 182,957 church members. The order of deaconesses was officially recognized and organically connected with the Church in 1888. The organization of the young people of the Church for Christian work was formally introduced into the *Discipline*, in 1892, by the adoption of the Epworth League. See EPWORTH LEAGUE.

The *Methodist Protestant Church* arose from a controversy in the Methodist Episcopal Church against the alleged exclusively clerical government of the denomination. The seceders opposed episcopacy and demanded lay representation. They organized at a convention held in Baltimore, Md., in 1830, which in a session of about twenty days formed a constitution, retaining the doctrines and essential discipline of the elder Church, but excluding episcopacy and establishing equal lay and clerical representation in the government of the Church. At this convention there were 83 delegates representing 80 ministers and about 5,000 members; and at their first general conference in 1834 they reported nearly 500 preachers and about 27,000 members. Its annual conferences have presidents elected by ballot. It has a delegated general conference, composed of laymen and preachers sent from its annual conferences. They were themselves divided by the controversy on slavery into the Methodist Protestant Church of the Northwestern States, and the Methodist Protestants of the Southern States; in 1858 the Northern branch assumed the title of the *Methodist Church*, proposing to combine under this name the various Methodist sects which have rejected episcopacy. The two branches were reunited in 1877 under the old title Methodist Protestant Church. They have (1900) 59 annual conferences, 1,645 traveling and 1,135 local preachers, 177,066 members and 4,250 probationers, 2,001 churches, and 1,881 Sunday-schools, with 16,680 officers and teachers, and 126,031 pupils. They have publishing-houses at Baltimore and Pittsburg, and colleges at Yadkin, N. C., Bowdon, Ga., Adrian, Mich., Kansas City, Mo., and Westminster, Md., the last named having also a theological department.

The *Wesleyan Methodist Church* originated chiefly in the anti-slavery controversy; the question of lay representation, however, became one of the motives of its organization. Some of the most zealous anti-slavery preachers in the Methodist Episcopal Church called a convention at Utica, N. Y., in 1843, where the new Church was formed on a basis identical in theology and internal discipline with that of the elder body, but excluding episcopacy and presiding elders, and providing lay representation. They have annually elected presidents of conferences and stationed chairmen of districts. Their preachers are appointed by a committee, the conference having authoritative revision of the appointments. Local preachers as well as laymen have representation in the annual and general conferences. At the time of the organization of this body it reported 6,000 members, with 300 preachers, traveling and local. It reports (1900) 595 ministers, 506 churches, and 17,201 members. A late Sunday-school report gives 471 schools, with 1,948 officers and teachers, and 17,290 pupils. Its publishing-house is at Syracuse, N. Y.

The *African Methodist Episcopal Church*, whose members are sometimes called *Allenites*, was organized at Philadelphia in Apr., 1816, under the guidance of Richard Allen, afterward Bishop Allen. They considered themselves disparaged and oppressed in the Methodist Episcopal Church, and, finding no redress, formed themselves into an independent body, consecrated Allen as their first bishop, and adopted a system of government substantially the same as that of the parent Church. The Church has grown rapidly, and has (1900) 65 annual conferences in the U. S., Africa (4), West Indies (3), and British America (3), 14 episcopal jurisdictions, 5,439 traveling and 8,409 local preachers, 663,706 members, and 20 colleges, with 165 teachers and 5,237 students; together with a publishing-house in Philadelphia, a quarterly review, and other periodicals.

The *African Methodist Episcopal Zion Church* originated in a secession of Negroes from the Methodist Episcopal churches of New York city in 1820. They retained all the distinctive features of the parent Church, but elected their bishops quadrennially until 1880, when the tenure of the office was made for life or during good behavior. These officers were not consecrated by formal ordination previously to 1888, at which time a provision requiring the laying on of hands was inserted in the ritual. They report (1900) 9 bishops, 3,200 itinerant preachers, 1,906 churches, 520,000 members, more than 600 Varick Societies of Christian Endeavor, with upwards of 20,000 members. They have a college and several high schools, maintain a publishing-house at Charlotte, N. C., and publish a quarterly and several weekly periodicals.

The *Colored Methodist Episcopal Church in America* consists mostly of former African members of the Methodist Episcopal Church South. After the civil war the colored members of the Methodist Episcopal Church South desired a separate organization; this desire was acceded to, and the new Church was accordingly formed on Dec. 16, 1870, at Jackson, Tenn. It has (1900) 1,427 churches, 2,039 ministers, and 204,317 members, with 5 episcopal districts and as many bishops; maintains several high schools; has a publishing house at Jackson, Tenn.; and publishes one weekly journal and several Sunday-school papers. In its theology and polity it is a copy of the Methodist Episcopal Church South, and the latter extends to it parental care, without trenching on its independence. It includes but a fragment of the former numerous African membership of the Methodist Episcopal Church South; some of these remain in the latter, some have joined the Methodist Episcopal Church, and thousands have been absorbed in the two African Episcopal Churches above mentioned.

The *United Brethren in Christ*, though bearing the same name as the Unitas Fratrum, or Moravians, have no relations with the latter, but are Methodists, and are often called *German Methodists*. In theology and polity they are nearly identical with the Methodist Episcopal Church, having bishops, a general conference, and annual conferences. They date from 1765, when their first society was organized by Philip William Otterbein. Their first annual conference was held in Baltimore in 1789, but their present organization was formed and their name adopted at the conference held in 1800. They report (1900) 1,846 ministers, 4,112 churches, and 223,972 members, with extensive domestic missions and foreign missions in Japan and West Africa. They have a publishing-house at Dayton, O. The *United Brethren in Christ* (*Old Constitution*), numbering about 800 churches and about 26,000 members, are those who since 1889 refuse to acknowledge the revised and amended confession and constitution of that date, and maintain that the old constitution is the only organic law of the Church.

The *Evangelical Association* is also an organization of German Methodists, sometimes called *Albrights*, from the name of their principal founder, Jacob Albright. They were organized in 1800, and their first general conference was held in 1816. They have (1900) 27 annual conferences, 877 traveling preachers, 1,617 churches, and 96,345 members. Their publishing-house is at Cleveland, O. This Church suffered a division in 1894, when the *United Evangelical Church* was formed. The latter body has (1901) 493 itinerant and 215 local preachers, 1,003 organized congregations, and 62,523 members.

The *Free Methodist Church* was formed at Pekin, Niagara co., N. Y., in 1860, chiefly by friends of two preachers of the Methodist Episcopal Church who were expelled from the Genesee conference. They disclaim episcopacy, but have an elective *superintendent*, whose term of service is four years, and insist on congregational singing, excluding instrumental music; on free seats in the congregation; on extempore preaching; on plainness of dress and living; and especially on the doctrine of Christian perfection. They have (1900) 975 ministers, 857 churches, and 26,353 members. *The Free Methodist*, a weekly journal, is published in Chicago.

The *Methodist Church, Canada*, is the final resultant of the union of several distinct organized bodies of Methodists effected at the united general conference in Belleville, in Sept., 1883. Sporadic Methodism existed in Canada as early as 1780, but its first organic planting was in 1791 by the Methodist Episcopal Church, when William Losee was appointed to Kingston circuit under Jesse Lee, presiding elder of the New England district of the New York conference. A steady increase for twenty years resulted in 1811 in two districts, Upper and Lower Canada, with 3,117 members. The war of 1812–15 reduced the membership nearly one-half. The Canadian annual conference was formed in 1824, and in 1828, the general conference approving, the *Methodist Episcopal Church in Canada* was organized. Meanwhile during the war (1812–15) and the years following the missionaries and societies of the *British Wesleyan Church* appeared, soon followed as early as 1824 by those of the *New Connection Methodists*, the *Bible Christians*,

and the *Primitive Methodists*, all from England. In 1832 a union of the Methodist Episcopal Church in Canada and the British Wesleyans was prematurely formed on the English basis, but broken again in 1834–35, when the former reappeared, though numbering at this time only one-twelfth as many as the Wesleyan body. In 1840 the Canadian and British Wesleyans were separated, but reunited in 1847 as the *Wesleyan Methodist Church in Canada*. In 1874 the Wesleyan Methodist Church in Canada, the New Connection Methodists, and the Wesleyan conferences in the Maritime Provinces united as the *Methodist Church of Canada*. Finally, in 1883, a basis of union having been agreed upon, the Methodist Church of Canada, with 1,216 ministers and 128,644 members, the Methodist Episcopal Church in Canada, with 259 ministers and 25,671 members, the Primitive Methodist Church, with 89 ministers and 8,090 members, and the Bible Christian Church, with 79 ministers and 7,398 members, united under the title of *The Methodist Church, Canada*. They have (1900) 2,032 ministers and ministerial probationers, 2,290 local preachers, 284,901 members, 3,405 Sunday-schools with 33,023 officers and teachers and 267,654 pupils, and 1,850 Epworth Leagues with 74,920 members; 533 home and foreign mission stations, 3 book and publishing houses, 4 periodicals, and 10 educational institutions.

Among the Negro settlers of Canada about the year 1834 certain ministers of the African Methodist Episcopal Church organized societies, and about 1838 these societies were organized into the Canadian annual conference of that Church. The *British Methodist Episcopal Church* was organized Sept. 26, 1856, at Chatham, Ontario, in accordance with a privilege granted in answer to a memorial presented by the Canadian annual conference of the African Methodist Episcopal Church to the general conference of that body the same year. It was united with the African Methodist Episcopal Church in 1884.

The following tables will supplement the statistics given in the preceding account:

BRITISH METHODISTS.

DENOMINATIONS.	Ministers.	Lay preachers.	Church members and probationers.
Wesleyan Methodists:			
Great Britain	2,202	19,956	481,061
Ireland	255	598	28,276
Foreign Missions	379	2,000	60,680
French Conference	37	101	1,730
South African Conference	207	3,522	84,082
West Indian Conferences	94	891	47,309
Methodist New Connection	209	1,122	41,043
Independent Methodist Churches	372	.....	8,379
Wesleyan Reform Union	18	496	7,187
Bible Christians	291	1,858	34,883
Primitive Methodists	1,100	16,459	198,874
United Methodist Free Churches	436	3,379	91,717
Welsh Calvinistic Methodists	1,137	.....	158,114
Australasian Methodist Church	775	8,783	118,984
Methodist Church in Canada	1,790	2,290	284,901

METHODIST CHURCHES IN THE UNITED STATES.

DENOMINATIONS.	Ministers.	Churches.	Members.
1. Methodist Episcopal	16,059	27,230	2,929,674
2. Union American Methodist Episcopal	125	155	15,500
3. African Methodist Episcopal	5,439	5,630	663,706
4. African Union Methodist Protestant	106	88	3,563
5. African Methodist Episcopal Zion	3,200	1,906	520,000
6. Methodist Protestant	1,645	2,001	177,066
7. Wesleyan Methodist	595	506	17,201
8. Methodist Episcopal South	6,227	14,572	1,470,520
9. Congregational Methodist	325	330	20,000
10. Congregational Methodist (Colored)	5	5	319
11. New Congregational Methodist	192	366	4,000
12. Zion Union Apostolic	30	32	2,346
13. Colored Methodist Episcopal	2,039	1,427	204,317
14. Primitive	74	90	6,549
15. Free Methodist	922	944	27,292
16. Independent Methodists	8	15	2,569
17. Evangelical Missionary	48	13	2,010
Evangelical Bodies:			
1. Evangelical Association	877	1,617	96,345
2. United Evangelical Church	493	1,003	62,523
United Brethren:			
1. United Brethren	1,846	4,112	223,972
2. United Brethren (Old Constitution)	619	786	26,296
Welsh Calvinistic Methodists	89	158	12,152

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Revised by JOHN F. HURST and WILLIAM H. LARRABEE.

Methodist Episcopal Church South: a division of the Methodist Episcopal Church in the U. S. formed in 1846. The subject of slavery was discussed with painful interest in 1844 at the General Conference in New York and measures were adopted in the interest of peace for a separation of the Church into two distinct organizations. This is concisely set forth in an account of the organization of the Methodist Episcopal Church South, inserted in the *Discipline* of 1846 as follows: "In the judgment of the delegates of the several annual conferences in the slaveholding States, the continued agitation of the subject of slavery and abolition in a portion of the Church, the frequent action on that subject in the General Conference, and especially the proceedings of the General Conference of the Methodist Episcopal Church of 1844 in the case of the Rev. James O. Andrew, D. D., one of the bishops, whose wife owned slaves, produced a state of things in the South which rendered a continuance of the jurisdiction of that General Conference over the conferences aforesaid inconsistent with the success of the ministry in their proper calling. This conviction they declared in solemn form to the General Conference, accompanied with a protest against the action referred to, assured that public opinion in the slaveholding States would demand, and that a due regard to the vital interests of Christ's kingdom would justify, a separate and independent organization. The developments of a few months vindicated their anticipations. The Church in the South and Southwest, in her primary assemblies, her quarterly and annual conferences, with a unanimity unparalleled in ecclesiastical history, approved the course of the delegates, and declared her conviction that a separate jurisdiction was necessary to her existence and prosperity. The General Conference of 1844 having adopted a *Plan of Separation* and provided for the erection of the annual conferences in the slaveholding States into a separate ecclesiastical connection, under the jurisdiction of a Southern General Conference, the delegates of the aforementioned conferences in a published address recommended that a convention of delegates from the said conferences, duly in-

structed as to the wishes of the ministry and laity, should assemble at Louisville, Ky., on the first day of May, 1845. The convention met, delegates having been formally appointed in pursuance of this recommendation, and after a full and minute representation of all the facts in the premises, acting under the provisional *Plan of Separation*, declared by solemn resolution the jurisdiction hitherto exercised by the General Conference of the Methodist Episcopal Church over the conferences in the slaveholding States *entirely dissolved*, and erected the said annual conferences into a separate ecclesiastical connection, under the style and title of *The Methodist Episcopal Church South*, the first General Conference of which was held in the town of Petersburg, Va., on the first day of May, 1846." By this measure were severed from the parent Church 1,474 traveling preachers, 2,550 local preachers, 330,710 white members, 124,811 Negro members, and 2,978 Indian mission converts, making an aggregate of 462,428. The *Plan of Separation* was conceived in the most fraternal spirit, and its acceptance by the South was urged by such distinguished Northern men as Drs. Olin, Elliott, and others, who believed that the Church in the South would be ruined if Bishop Andrew were deposed from the episcopate (as virtually proposed in the pending resolution), and in the North if he exercised his episcopal functions in the Northern conferenees.

The Southern conferences organized according to the provisions of the *Plan of Separation*, and at the first General Conference (in 1846) Joshua Soule, senior bishop of the Methodist Episcopal Church, and Bishop Andrew adhered to the Southern branch, and were recognized in their episcopal character; and William Capers, D. D., and Robert Paine, D. D., were elected and consecrated as their colleagues. Lovick Pierce, D. D., was appointed to bear the fraternal regards of the conference to the General Conference of the Methodist Episcopal Church which met in Pittsburg in 1848, but that conference declined to receive him in his official character, and repudiated the *Plan of Separation* as null and void. A refusal to divide the Church property with the Southern Church led to litigation, which was finally terminated by a decision of the Supreme Court of the U. S., which recognized the validity of the *Plan* agreeably to the claim of the Methodist Episcopal Church South. The court affirmed that according to its provisions "the religious association known as the Methodist Episcopal Church in the U. S. of America, as then existing, was divided into two associations or distinct Methodist Episcopal churches, as in the bill of complaint is alleged." At first the bishops of the Methodist Episcopal Church (North) declined to exercise their functions in the South; but during the civil war (1862–65) and since, in obedience to the instructions of their General Conference, they have organized annual conferences in all parts of the South, as have also the "Afriean" and "African Zion" connections, thus taking from the Methodist Episcopal Church South a large part of its colored members, of whom it numbered nearly 200,000 in 1860. At the General Conference of the Methodist Episcopal Church in 1872, messengers were appointed to bear fraternal greeting to the General Conference of the Methodist Episcopal Church South, which met in Louisville in 1874. The manner in which these messengers fulfilled their mission and were received by the conference was highly creditable to both parties. The conference responded fraternally to their communications, and authorized the bishops to appoint commissioners to bear fraternal greetings to the General Conference of the Methodist Episcopal Church, which met in 1876, and to adjust existing difficulties between the two connections. The venerable Dr. Lovick Pierce, who served on a similar errand in 1848, was appointed (in connection with Dr. James A. Duncan, president of Randolph-Macon College, and Chancellor Garland, of Vanderbilt University) to lead this fraternal commission, but was too feeble to attend. Since this conference perfect fraternity has existed between the two churches. The adjustment of all existing difficulties in the way of fraternity was referred to a joint commission of ten members (five from each Church), which met at Cape May, N. J., in Aug., 1876. The action of this commission was indorsed by the next succeeding General Conferences of both churches. Though all the Arminian Methodists in the world agree in the great essentials of Methodism, yet there is considerable difference in matters of polity, which render organic union difficult, but do not interfere with fraternal intercourse. The two Methodisms, e. g., differ as to the relative powers of the bishops and the general conference—the Methodist Church South holding that the bishops are a co-ordinate branch of the government, and can not be *deposed* by a *delegated* general conference, except as they may be excommunicated by regular process of trial; which was the vexed question that divided the Church in 1844. The Methodist Episcopal Church has made an addition to the terms of membership not sanctioned by the Methodist Episcopal Church South, and altered the general rule on slavery, which the Methodist Episcopal Church South has canceled as not being in the *General Rules* as drawn up by John Wesley. There are also minor differences in the organization and powers of district and quarterly conferences.

As the great theater of the civil war covered the region occupied by the Methodist Episcopal Church South, it suffered greatly thereby. Churches, parsonages, seminary buildings, etc., were destroyed or alienated from the Church in many places; thousands of its members perished; and after the surrender the greater part of its Negro membership was taken into other folds. The Church rallied its fortunes with wonderful energy. The statistics for 1900 report 47 conferenees and missions, 6,227 traveling ministers, 11 bishops, 5,151 local preachers, 1,470,520 members, total of ministers and members, 1,481,898; churches, 14,572, valued at $23,012,400, on which an indebtedness exists of $631,055. There are under the control of the church 147 schools and colleges, which report 1,126 teachers, 17,205 pupils, endowment funds to the amount of $2,890,515, and property valued at $5,698,950. The contributions from missions were $400,850. The publishing-house, located in Nashville, is a magnifieent institution; it is supervised by a book committee appointed by the General Conference, and managed by two book agents. It employs an editor of books and of *The Christian Advocate*, a weekly sheet, the organ of the General Conference; and also a Sunday-school secretary, who edits a Sunday-school magazine, *The Sunday-school Visitor*, and other publications in that department. There are many other weekly papers issued in various parts of the connection. A theological and literary *Quarterly Review* is published at Nashville. The board of missions has its bureau in the publishing-house; it employs three secretaries, and superintends the missions in China, Japan, Korea, Mexico, Brazil, Cuba, and among the Indians. The foreign missions return 10,959 church members. The domestic missions are managed by the several annual conferences within whose bounds they are located. The property formerly held by the Church for the colored people has been legally transferred (as also the members for the most part) to the Colored Methodist Episcopal Church in Ameriea. The Vanderbilt University (located at Nashville, Tenn.), the largest and best-endowed institution of learning in the South, is wielding a powerful influence in the Church. The Church Extension Society supplies destitute places with comfortable houses of worship. See *Disciplines*, *General Minutes*, and *Journals* of the General Conferences of the Methodist Episcopal Church and Methodist Episcopal Church South; Redford's *Organization of the Methodist Episcopal Church South*; Myers's *Disruption of the Methodist Episcopal Church*; Howard's *Reports of the Supreme Court*; McTyeire's *Manual of the Discipline* and *History of Methodism*; Summers's *Commentary on the Ritual of the Methodist Episcopal Church South*; Peterson's *Handbook of Southern Methodism*; and the article on METHODISM.

Revised by WILBUR F. TILLETT and WM. H. LARRABEE.

Methodists: See METHODISM.

Methoma'nia [from Gr. *μέθη*, strong drink, drunkenness + *μανία*, madness, mania]: See DIPSOMANIA.

Methyl Alcohol, Methyl Hydrate, Carbinol, Pyroxylic Spirit, or **Wood-naphtha** ($CH_4O = CH_3OH$) [*methyl*, from Gr. *μέθυ*, spirit, wine + *ὕλη*, wood, is a word clumsily constructed to represent *wood-spirit*]: a liquid found associated with acetic acid in the watery product from the distillation of wood; it may also be formed (1) by treating methyl chloride with potassic hydrate; (2) by distilling oil of wintergreen, which is chiefly methyl salicylate, with potassic hydrate.

Preparation of Commercial Wood-spirit.—The crude watery liquid (*pyroligneous acid*) obtained by the distillation of wood is redistilled; the first tenth which passes over is rectified over slaked lime, whereupon considerable ammonia is given off; sulphuric acid is then added, which fixes the remaining ammonia and precipitates some tarry matter: the liquid is redistilled and rectified several times over quicklime. Oak-wood yields about 2 gal. crude wood-spirit to the cord. The crude product has a strong aromatic odor,

and turns brown on keeping. It contains considerable quantities of acetone, methyl acetate, ethyl acetate, and lignone or xylite, which is the dimethyl acetate of ethylene.

The purification of crude wood-spirit is effected by saturating it with fused calcic chloride, with which the methyl alcohol forms a compound which is not decomposed by a temperature of 100° C. It is then heated over a water-bath as long as anything volatile is given off. It is then distilled with water, and the product is rectified over quicklime. A purer product is obtained when the crude product is distilled with strong potash or soda lye previous to the treatment with calcic chloride. To obtain perfectly pure methyl alcohol an ether of methyl, as the oxalate, must be first prepared from the wood-spirit.

Properties.—Methyl alcohol is a colorless, mobile liquid, having a purely spirituous odor, like that of common alcohol. Sp. gr. = 0·8142 at 0° C. It boils at 66°–66·5°, It burns with a pale flame, and is used as a substitute for alcohol in spirit-lamps. It mixes with water, alcohol, and ether, and dissolves fixed and volatile oils and most resins. It unites directly with some substances, forming compounds like the alcoholates, in which it takes the place of water of crystallization; with calcic chloride it forms $CaCl_2.2CH_4O$; with anhydrous baryta, $BaO.2CH_4O$; with potassium and sodium, KCH_3O and $NaCH_3O$. By oxidation it is converted into formic acid, $CH_4O + O = HCHO_2 + H_2O$. Calcic hypochlorite (bleaching-powder) converts it into chloroform.

Impurities.—The impurities of ordinary wood-spirit are aldehyde, acetone, and very small quantities of other substances. Acetone is the most objectionable impurity, if the alcohol is to be used in the preparation of aniline colors.

Revised by IRA REMSEN.

Metics (in Gr. Μέτοικοι): the foreigners who resided in Athens. In 309 B. C. they numbered 10,000. They had to choose a protector from among the Athenian citizens to represent them in all official acts. In return for this protection the men paid a capitation tax of 12 drachmæ (about $2.40), while widows paid 6 drachmæ. Neglect to pay this tax was punished with sale into slavery, as was also the illegal assumption of the active rights of citizenship. They might not marry free-born Athenian women, nor own real estate, but still they had to pay the extraordinary war taxes. In solemn processions they acted as bearers of parasols and vases. In return for special services to the state they might be advanced to the position of *Isoteleis*, which freed them from the capitation tax and from the necessity of having patrons, and put them on an equal footing with the free-born citizens as far as regarded the owning of real estate and the performance of liturgies, but did not confer upon them the right to vote. J. R. S. STERRETT.

Me'tis (in Gr. Μῆτις): a daughter of Oceanus and Tethys. She was the personification of wisdom, and was the first wife of Zeus, who swallowed her because of a prophecy that her child would dethrone its father. In this way it came about that Athene was born from the head of Zeus himself, and Metis ceased to be dangerous to him. J. R. S. S.

Metonic Cycle: See CYCLE.

Meton'ymy [from Lat. *metony'mia* = Gr. μετωνυμία, liter., change or transfer of name; μετά, over, across + ὄνομα, name]: a figure of speech in which an ordinary term is displaced by one which naturally suggests it, on account of some constant relation, as of cause and effect, occasion and result, or of contact in time, place, or use. Thus an action-name is used to denote the concrete result of an action, as *union*, in the sense of a united body, or to denote an object which conditions the action, as *dwelling* in the sense of *house*. So the name of a poet is used for his works, the name of an inventor for his inventions, of a discoverer for his discovery, of a king for his people, of a general for his army, etc. Other relations determine the metonymy in, e. g., *throne* for *king*, *house* for *audience*, *cuisine* for *cooking* or *food*, etc. As in the case also of metaphor (see METAPHOR), these occasional transfers of terms often result in permanent changes of signification; thus *beads*, prayers, has been permanently transferred to a mechanism used in connection with prayer. See METAPHOR and SYNECDOCHE.

BENJ. IDE WHEELER.

Mètre, or **Meter** [from Fr. *mètre*, meter, from Gr. μέτρον, measure]: the linear base of the metric system of weights, measures, and moneys. Theoretically, it is the $\frac{1}{10000000}$th part of the quadrant of a terrestrial meridian; actually, it is the length of a bar of platinum designed to represent that dimension (3·280899 feet = 39·37079 inches), now deposited in the Palace of the Archives of France in Paris. See METRIC SYSTEM.

Metres, or **Meters** [from Gr. μέτρον, measure, measure in poetry, metre]: the adaptation of speech to measurement by rhythmical units. Particular results of the process are called *metres*, the science of meter is called *metric*, and the art of composing meters is called *versification*. For general principles and definitions, see PROSODY, RHYTHM, QUANTITY, and VERSE.

I. DACTYLIC METRES.—The fundamental foot is the dactyl (– ◡ ◡), which may be replaced by the spondee (– –). The most common verses are—

1. *Hexameter*, composed of two cola, with cæsura between. See HEXAMETER.

2. *Pentameter* (so called), composed of two catalectic trimeters, with invariable cæsura (diæresis). Rhythmically this verse is a hexameter. The true pentameter is rare and even doubtful. It is confined to lyric poetry, and is usually not truly dactylic.

3. *Tetrameter*, used in Greek and Latin chiefly in lyric systems, and in Latin to form distichs with hexameters, as,

Quo nos cumque feret melior fortuna parente,
Ibimus, o socii comitesque.

4. *Trimeter.* — The trimeter and trimeter catalectic (– ◡ ◡ – ◡ ◡ –) are important elements of longer verses, but are scarcely used in Greek as independent verses. In Latin the trimeter catalectic alternates with the hexameter in the first Archilochian stanza, as,

Diffugere nives, redeunt jam gramina campis
Arboribusque comæ.

5. *Dimeter.*—The *versus adonius* of Sappho, sometimes called a dactylic dimeter, is logaœdic:

– ◡ ◡ — ◡, risit Apollo.

In English, feet containing three syllables with stress on the first are usually read rather as tribrachs, or at least are triseme; so that the so-called spondees are usually read as trochees. Still the name "dactylic" is used of this kind of meter. Though it is not very common, every variety of it occurs from the monometer, or single foot, to the hexameter with the last foot complete (– ◡ ◡). Each verse presents the three varieties: acatalectic, catalectic *in disytlabum*, catalectic *in syttabam*, as in these hexameters:

Now with a sprightlier springiness bounding in triplicate syllables.
Welcome once more to a home that is better perchance than the old one.
Would there be sorrow for me? there was love in the passionate shriek.

II. ANAPÆSTIC METRES.—The fundamental foot is the anapæst (◡ ◡ –), which may be replaced by the spondee (– –) or the dactyl (– ◡ ◡); but four shorts must not fall together. The rhythm is especially adapted to the march; hence the dipody, representing a single step of both feet, is the measure.

1. *Tetrameter* (*Catalectic*).—This verse, exclusively used in certain parts of ancient comedy, consists of a dimeter and a catalectic dimeter, with cæsura (diæresis) between. The last entire foot is always an anapæst. The scheme, therefore, is

◡ ◡ – ◡ ◡ – ◡ ◡ – ◡ ◡ – ‖ ◡ ◡ – ◡ ◡ – ◡ ◡ – – – ⏑

Ἄγε δὴ φύσιν ἄνδρες ἀμαυρόβιοι, φύλλων γενεᾷ προσόμοιοι.

2. *Dimeter and Hypermeter.*—In both tragedy and comedy a series of dimeters with an occasional monometer, closing with a catalectic dimeter (called *paræmiac*), is often used, forming a *system* or *hypermeter*, which is recited continuously, as if it were one long verse. Hence the end of each colon except the last is treated exactly as the end of the first colon of the tetrameter, having none of the privileges of a verse-end:

ὦ μέγα σεμνὴ Νίκη, τὸν ἐμὸν
βίοτον κατέχοις
καὶ μὴ λήγοις στεφανοῦσα.

These systems are used sometimes as marches, sometimes in dialogue between the chorus and actors, and in comedy it often forms the close (ἔκθεσις) of a passage of tetrameters. The acatalectic dimeter has cæsura in the middle.

The catalectic dimeter, or parœmiac verse, was also used continuously in songs to be sung by soldiers as they marched.

There is also a looser lyric composition, in which the parœmiac may be used several times in succession. In both the latter cases the spondee may be used anywhere.

Sometimes a passage of dimeters is divided into several systems, the end of each being indicated by the parœmiac.

In Latin the parœmiac is not employed as in Greek, the tetrameter is little used and is sometimes acatalectic.

In English the most usual verse is the tetrameter, that is, *four feet*, called "dimeter" in the ancient languages, as,

When the lowlands shall meet thee in battle array.

Or, with rhyme between half-verses, and parœmiac close:

Not a soul of them all could the dangers appall
Of the hazardous *pons asinorum*.

Occasionally other verses are used, containing from two up to seven feet. The rhythm is more readily produced than the dactylic, as the latter requires an initial stress that is often inconvenient.

III. Trochaic Metres.—The fundamental foot is the trochee (– ⏑), which may be replaced by the tribrach (⏑ ⏑ ⏑), the irrational choree (– >, ⏑ ⏑ >), the light dactyl (– ⏑ ⏑, – ⏑⏑), and, in lyric poetry, the triseme syllable (–̆). The measure is the dipody (– ⏑ ÷ ⏧; Lat. also – ⏧ ÷ ⏧). The rhythm is light and lively.

1. *Tetrameter.*—The complete tetrameter was little used, but the catalectic was much employed in certain parts of Greek comedy and (especially the older) tragedy, and also in the Latin drama. It consists of a dimeter and a catalectic dimeter, usually, though not always, separated by cæsura (diæresis):

– ⏑ – ⏧ | – ⏑ – ⏧ ‖ – ⏑ – ⏧ | – ⏑ – ∧

The substitution of two shorts for one long, and in Latin the admission of irrational feet into the odd places, lend the verse great variety of form. (See Iambic Meters.) Examples:

χρημάτων ἄελπτον οὐδέν ἐστιν οὐδ' ἀπώματον.

In qua civitate tandem te arbitrare vivere.

Hipponax used a tetrameter scazon with long penultimate syllable.

2. *Dimeter and Hypermeter.*—Sometimes, especially as the close (ἔκθεσις) of a passage of tetrameters, a series of continuously recited dimeters terminating with a catalectic dimeter, thus forming a system or hypermeter, was employed, especially in Greek comedy. In Latin the catalectic dimeter (or tetrapody) without irrational feet occurs with other verses, as,

Tunditur dies die.

3. *Tripody or Ithyphallic.*—This is a colon, chiefly used in asynartete verse. It is no doubt sometimes a dimeter with syncope (παρέκτασις). Thus, ζώϊον κάκιστον may be either – ⏑ – ⏑ – ⏑, or – ⏑ – ⏑ ⌙ – ∧.

In English there is a considerable variety of trochaic verses, but the most common is the octameter (corresponding to the classical tetrameter). Its cola are usually separated into distinct verses, as,

Tell me not in mournful numbers,
Life is but an empty dream.

But sometimes the two run continuously, as in *Locksley Hall*:

In the spring a young man's fancy lightly turns to thoughts of love.

It is impracticable to place the stronger stress uniformly on the odd feet in English, nor is it probable that this was done by the ancients.

IV. Iambic Metres.—These are the metres in which the fundamental foot is the iambus. The movement of the verse is more vigorous than the trochaic, and can not be treated as trochaic with anacrusis, though the form would be the same. For a detailed treatment, see Iambic Metres.

V. Ionic Metres.—The fundamental foot is the *ionicus a minori* (⏑ ⏑ – –), or the *ionicus a majori* (– – ⏑ ⏑). Resolution (⏓) and contraction (⏑⏑) often occur, and by anaclasis (ἀνάκλασις, breaking up) the first of the two shorts may be placed between the two preceding longs; that is, the dichoræus (– ⏑ – ⏑) may be substituted for the *ionicus a majori* whether the verse begins with anacrusis (⏑ ⏑) or not. The movement is plaintive, and can scarcely be sustained in English.

1. *Dimeter.*—This verse, with or without anaclasis, is occasionally used in the Greek drama. Sometimes syncope occurs. The schemes therefore are—

(*a*) ⏑ ⏑ – – ⏑ ⏑ – –
(*b*) ⏑ ⏑ – ⏑ – ⏑ – –
(*c*) ⏑ ⏑ – – ⏑ ⏑ ⌴, or ⏑ ⏑ – – ⏑ ⏑ – ∧̄,

with some other variations. Scheme (*b*) is much used in the late Anacreontics, with occasional reversion to scheme (*a*):

(*a*) ἐν ἁμίλλαισιν ἀνάγκας.
(*b*) ἐσορᾷς τάδ' ὦ Διὸς παῖ.
(*c*) ἀχαλίνων στομάτων.

2. *Trimeter.*—The trimeter is rare, occurring a few times in Greek lyrics and in an ode of Horace (iii., 12) in connection with dimeters, forming a sort of system. Most of the passages where the dimeter and trimeter are found in lyrics allow (if some of them do not require) division into other verses than these.

3. *Tetrameter Catalectic, or Galliambic.*—The original form of this verse was—

⏑ ⏑ – – ⏑ ⏑ – – ‖ ⏑ ⏑ – – ⏑ ⏑ –

which by anaclasis became—

⏑ ⏑ – ⏑ – ⏑ – – ‖ ⏑ ⏑ – ⏑ – ⏑ –

By resolution and occasional contraction in both these schemes the verse assumes many forms. There is difference of opinion which of the two forms was felt to be fundamental, but there is reason to believe that sometimes the one was intended and sometimes the other. There is occasional reversion to the original form in one colon or the other. The extant examples, though the verse is of Greek origin, are almost entirely confined to the celebrated *Attis* of Catullus (Ode lxiii.), beginning—

Super alta vectus Attis celeri rate maria.

⏑ ⏑ – ⏑ – ⏑ – – ‖ ⏑ ⏑ – ⏑ ⏑ ⏑ ⏑ ⏓

The second colon here is not ⏑ ⏑ – | ⏑ ⏑ ⏑ | ⏑ ⏓ with iambic rhythm, though this seems the true scansion in some verses. The movement of these verses of Catullus is wild and weird to suit the subject-matter.

The *Boadicea* of Tennyson is often erroneously called galliambic.

Other ionic verses (such as the Sotadean, – – ⏑ ⏑ | – – ⏑ ⏑ | – – ⏑ ⏑ | – – ∧̄, nearly always with anaclasis) are of little importance.

VI. Choriambic Metres.—The foot is the choriambus (choree or trochee + iambus, – ⏑ ⏑ –). The difference between ionic and true choriambic rhythm results from the opening foot. Real choriambic meter is very rare, and is confined to lyric poetry. So-called choriambic verses are usually (according to some, *always*) logaœdic, the seeming choriambus being –⏑ ⏑ ⌙ or –⏑ ⏑ –, as in Hor. Od. i., i., 1:

Mæcenas atavis edite regibus,
– > –⏑ ⏑ ⌙ ‖ –⏑ ⏑ – ⏑ ⏓

or Hor. Od. i., xviii., 1:

Nullam, Vare, sacra vite prius severis arborem.
– > –⏑ ⏑ ⌙ ‖ –⏑ ⏑ ⌙ ‖ –⏑ ⏑ – ⏑ ⏓

These are the *asclepiadeus minor* and *major*. (See Logaœdic Meters.) The triseme syllable always closes a word; hence a pause may often be used (–⏑ ⏑ – ∧) in reciting.

VII. Antispastic Metres.—"Choriambic" verses sometimes begin with a δισύλλαβον ἀδιάφορον (two either long or short syllables, ⏓ ⏓). These syllables are now called a *basis*. When they form an iambus (⏑ –) the ancients divided thus, ⏑ – – ⏑ | ⏑ – – ⏑ | , and called the meter *antispastic* (ἀντισπαστικός, from ἀντίσπαστος, drawn in opposite directions), and the foot (⏑ – – ⏑) *antispast*. The metre has no real claim to recognition.

VIII. Cretic Metres.—The fundamental foot is the cretic (– ⏑ ÷), which derived its name from the frequent use of the rhythm by the ancient Cretans in dance melodies. By resolution the first pæon (– ⏑ ⏑ ⏑) and the fourth pæon (⏑ ⏑ ⏑ ÷) become its substitutes. In Latin the form – > – is allowed. The rhythm is confined to lyric poetry. The verse chiefly used is the tetrameter, as,

ἦλθες οὐ πρίν γε δεῖν, ἴσθι σαφές, ἀλλ' ὅμως.
– ⏑ – – ⏑ – – ⏑ ⏑ ⏑ – ⏑ –

Te sequor, quin vocas spectatores simul.
– ⏑ – – ⏑ – – > – – ⏑ ⏓

In English the rhythm is impracticable, and even in the music of modern times its use is very rare. It is difficult

for us to avoid making it trochaic with triseme syllables, – ◡ ⌞ – ◡ ⌞, or with pauses, – ◡ – ∧ – ◡ – ∧. Sometimes seeming cretics are really trochaic.

IX. Bacchic Metres.—The feet are the bacchius (◡ ⏑ ⏑) and the antibacchius (⏑ ⏑ ◡). If the first long be removed from a cretic verse (see VIII.) a rhythm based on the bacchius results, and if a long be prefixed the antibacchic rhythm results; but both are called simply bacchic. Except in Latin comedy (where three longs may form the foot) the meter is little used, as,

τίς ἀχώ, τίς ὀδμὰ προσέπτα μ' ἀφεγγής.
◡ – – ◡ – – ◡ – – ◡ – –

Verses of various lengths occur. Sometimes the last long is omitted. Occasionally a seeming bacchic verse is really trochaic with triseme syllables. The context must be considered. The rhythm marks intense interest.

X. Dochmiac Metres.—The measure is the complex foot, ◡ ⏑ ⏑ ◡ ⏑, called dochmius (δόχμιος, aslant), probably from its peculiar, abnormal rhythm. By the use of irrational syllables for the shorts and two shorts for the longs, the foot assumes about twenty different forms in actual use. The movement denotes extreme agitation resulting usually from overwhelming grief. Dochmii are found only in Greek lyric poetry (κομμοί and ᾠδαὶ ἀπὸ σκηνῆς), and are sometimes mixed with bacchii or iambi in the same verse; and often dochmiac verses are mixed with iambic trimeters. Examples of a dipody and a monopody are:

ἰὼ δυσκάθαρτος Ἄιδου λιμήν,
τί μ' ἄρα τί μ' ὀλέκεις.
◡ ⏑ ⏑ ◡ ⏑ ◡ ⏑ ⏑ ◡ ⏑
◡ ◡ ◡ ◡ ◡ ◡ ⏑

To reduce the rhythm to ordinary triple time it has been proposed to read verses like the second one cited ◡ ◡ ◡ ◡ ◡ ◡ ⏑, which makes the fundamental form ◡ – ⏑ ◡ ⏑ ∧. The foot ◡ – seems to occur in other meters in Pindar; but both there and in the doehmius it is better to treat it as in the case of syncope in modern music, and read ◡ ⏑. The treatment of iambi and bacchii mingled with dochmii will depend on the view taken of the dochmii themselves, and metricians disagree.

XI. Logaœdic Metres.—Logaœdic rhythm is a modified form of the trochaic. The relative stress of the ictus-syllable is thought to have been less marked than in ordinary trochees. Logaœdic metre was much used in the lyric parts of the Greek drama and by some of the lyric poets, and many of the verses were borrowed, and in some cases modified, by Horace, and a few by Catullus. For a detailed treatment of this metre, with illustrative examples, see Logaœdic Metres.

XII. Dactylo-epitritic Metres.—The rhythm is a combination of dactyls with epitrites (⏑ ◡ ⏑ –). The cola of either sort may be catalectic. The elements most in use are ⏑ ◡ ◡ ⏑ ◡ ◡ ⏑ –, ⏑ ◡ ◡ ⏑ ◡ ◡ ⏑, ⏑ ◡ ⏑ –, ⏑ ◡ ⏑, which are combined in various ways. Anacrusis is sometimes found. There is difference of opinion as to the correct scansion. In practice it is best to make the dactyls and spondees of the dactylic elements, and the trochees and spondees of the epitritic elements, all equal to each other by slight change of the tempo of the trochees. One favorite method is to read the trochees ⌞ ◡. The rhythm is confined to Greek lyric poetry, and was much used by the tragedians and Pindar. Samples are:

ἀλλ' ἐπεύξασθαι μὲν ἐγὼν ἐθέλω.
⌞ ◡ – – | – ◡ ◡ – ◡ ◡ –
ὀξυκόμαν κε βαθὺν πόντον περάσαις.
– ◡ ◡ – ◡ ◡ –, – | ⌞ ◡ – –

The name (ἐπίτριτος = containing one and a third) "epitritrite" is derived from the fact that apparently the spondee is one and a third times the length of the trochee, or θέσις : ἄρσις :: 3 : 4; but the ancients always spoke of metrical forms from the standpoint of the words (μέρη λέξεως) rather than the rhythm.

XIII. Asynartete Metres.—Asynartete (ἀσυνάρτητος, unconnected) verses are composed of heterogeneous members. In Greek there were a good many, but most of them are represented by very few fragments. In Horace the following occur:

1. *Greater Archilochian.*

– ⏑ – ⏑ – | ⏑ – ◡ ‖ – ◡ – ◡ – ⏑
Solvitur acris hiems grata vice veris et Favoni.

The last two syllables may be ⌞ ⏑, but the trochees should not be read with triple ratio (⌞ ◡). Some make the dactyls cyclic.

2. *Elegiambic* (Archilochian).

– ◡ ◡ – ◡ ◡ ⏑ ‖ ⏑ – ◡ – ⏑ – ◡ –
Sribere versiculos amore percussum gravi.

Hiatus and syllaba anceps are allowed before the diæresis.

3. *Iambelegic* (*Horatian*).—This is like the preceding with the cola interchanged:

⏑ – ◡ – ⏑ – ◡ ⏑ ‖ – ◡ ◡ – ◡ ◡ –
Deformis ægrimoniæ duleibus adloquiis.

The elegiambic and iambelegic may each be read as two verses.

XIV. The Saturnian Verse.—This verse was used by the Romans before Ennius introduced the Greek dactylic hexameter. We have only a few short inscriptions and some fragments composed in it, and there is a dispute whether the stress is determined by the quantity or by the word-accent, as in English. According to the first theory the fundamental scheme is

◡ ⏑ ◡ ⏑ ◡ ⏑ ⏒ ‖ ⏑ ◡ ⏑ ◡ ⏑ ⏒
Dabúnt malúm Metélli Naévió poétæ.
The queen is in her parlor, eating bread and honey.

According to the other theory (letting ⏑ denote an accented or half-accented syllable, and ◡ an unaccented syllable), the scheme is

⏑ ◡ ⏑ ◡ ◡ ⏑ ◡ ‖ ⏑ ◡ ⏑ ◡ ⏑ ◡
Dábunt málum Metélli Naévió poétæ.
In her parlor the queen sits, eating bread and honey.

Under either theory the verse exhibits many licenses.

Milton W. Humphreys.

Metric System: a system of weights and measures designed to remove the confusion arising out of the excessive diversity of weights and measures prevailing in the world, by substituting in place of the arbitrary and inconsistent systems actually in use a single one constructed on scientific principles and resting on a natural and invariable standard. The proposition for the creation of such a system originated in 1790 with Prince Talleyrand, then Bishop of Autun. He recommended the length of the pendulum beating seconds in latitude 45° as a suitable linear basis, and introduced into the National Assembly of France a decree embodying this proposition and providing for a scientific determination of the exact length of this pendulum by a commission to be composed in equal numbers of members of the French Academy of Sciences and of the Royal Society of London. This decree, with some modification, was adopted, and the king, Louis XVI., was requested to open a correspondence on the subject with the King of Great Britain, which he did; but, owing to the temper and the public troubles of the times, this overture met with no response. Similar applications to other nations were more successful, and in subsequent proceedings, Spain, Italy, the Netherlands, Switzerland, Denmark, and Sweden participated by sending delegates to an international commission. The system itself was, however, matured by the labors of a committee of the Academy of Scienees, embracing Borda, Lagrange, Laplace, Monge, and Condoreet, five of the ablest mathematicians of Europe. Their report, dated Mar. 19, 1791, after considering the comparative fitness, as a standard of length, of the pendulum and of the earth itself in some one of its natural dimensions, decided in favor of the latter, and recommended as the standard unit of linear measure $\frac{1}{10000000}$th of the quadrant of a terrestrial meridian. The report was communicated to the Assembly and received its sanction. Committees of the Academy were then charged with the duty of making the necessary determinations of the standard units, including those of capacity and weight as well as that of length. An arc of the meridian passing through Paris and extending from Dunkirk to Barcelona was measured trigonometrically by Delambre and Méchain, an operation of immense labor which occupied seven years; the object being to ascertain with the greatest exactness the length of the linear base, called the meter. It was resolved to make the unit of volume equal to the capacity of a cubical vessel measuring one-tenth of a meter on its edges; and the standard of weight, the actual weight of distilled water which should fill such a vessel at the temperature of maximum density. The weight of a given volume of water under these conditions was made a

subject of elaborate investigation by a committee of the Academy, and in conformity with the results obtained the standard unit of weight, called the *gramme*, was fixed at $\frac{1}{1000}$th part of the standard weight above mentioned, which, being 1,000 grammes in weight, is called the *kilogramme*.

On the fourth day of the month Messidor, in the seventh year of the republic "one and indivisible," the international commission above referred to, after having carefully tested the accuracy of the standards prepared by the committees of the Academy, proceeded in a body to the Palace of the Archives in Paris, and there deposited the standard meter, a simple bar of platinum, which represents the linear base of the system, and the standard kilogramme, a simple cylinder, also of platinum, which represents the unit of metric weights. The value of these units had, however, been ascertained much earlier with an accuracy sufficient for all practical purposes: and by a law passed on Aug. 1, 1793, the metric system was established as the only legal system of weights and measures for France and the French colonial possessions. The system has since been successively adopted by Holland, Belgium, Spain, Portugal, Italy, the German empire, Greece, Roumania, British India, Mexico, New Granada, Ecuador, Peru, Brazil, Uruguay, the Argentine Confederation, and Chili. Switzerland, without adopting the system in full, has given to all her standards metric values, and Denmark has done the same for her standard of weight. Austria has adopted the system for custom-house purposes, and Turkey has introduced a metric measure of length. In Great Britain the use of metric denominations in business transactions has been made legally permissible; but, by a singular inconsistency, the metric weights and measures themselves are not allowed to be kept in tradesmen's shops and employed in actual commerce. In the U. S., metric weights and measures were legalized by an act of Congress passed July 27, 1866, and at the same time the bureau of weights and measures at Washington was directed to prepare and furnish to the executive authorities of the several States authenticated standards for the verification of metric weights and measures used in commercial affairs. The aggregate population of the countries in which the metric system has been established by law amounts to nearly 350,000,000; of those in which it has been partially introduced, to about 70,000,000; and of those where its use is legally permissible, to 70,000,000 more. It has thus been adopted by largely more than half of the civilized and Christian world.

The question whether the prototype meter of the archives is really, with great severity of exactness, $\frac{1}{10000000}$th part of a terrestrial quadrant is regarded as a futile one, and of no great practical importance from the point of view of metrology; the fact being that we are not sufficiently well acquainted with the figure of the earth to warrant the adoption of it as a basis for a system of measurement.

The desirability of settling all doubts as to the stability of the system and the permanency of its unit-bases, as well as of providing authenticated copies of the prototype standards to be distributed to the governments of all metric nations, and of securing such standards against the danger of alteration in all coming time, led to the assembling at Paris, in the year 1870, of an international commission to consider and adjust all questions connected with this subject. In this commission, thirty independent powers were represented. The deliberations of the commission, interrupted by the war of that year between France and Germany, were subsequently resumed, and resulted at length in an international convention providing for the maintenance at Paris of an International Bureau of Weights and Measures, to be supported by *pro rata* contributions from all the signatory powers, and charged with the care of the prototype standards, and with the duty of constructing and verifying copies of those standards not only for the powers interested but for other governments, or even for corporations and individuals who should apply for them and should be willing to pay the expense attending their construction and comparison. This convention was signed in Mar., 1874, the diplomatic representative of the U. S., Mr. Washburne, being, by consent and direction of the President, one of the signers. It was resolved by this commission that the prototype meter and the prototype kilogramme of the archives shall be recognized and perpetuated forever as the true bases of the system, without regard to any doubtful questions which have been raised as to the exactness of their correspondence with their theoretic values.

The units of the metric system are five—viz.: 1. The meter (the unit of length) = 3·280899 feet = 39·37012 inches.

2. The are (the unit of surface) = the square of the meter = 119·60332 sq. yards.

3. The liter (the unit of capacity) = the cube of one-tenth of a meter = 0·26418635 gal. = 1·0567454 quarts = 2.1134908 pints.

4. The stere (the unit of solidity) = one cube meter = 35·336636 cubic feet = 1·308764 cubic yards. This unit has fallen into general disuse.

5. The gramme (the unit of weight) = 15·43234874 grains troy.

Each unit has its decimal multiples and submultiples; that is, weights and measures ten times larger or ten times smaller than the unit of the denomination preceding. These multiples and submultiples are indicated by prefixes placed before the names of the several fundamental units. The prefixes denoting multiples are derived from the Greek language, and are *deka*, ten; *hecto*, hundred; *kilo*, thousand; and *myria*, ten thousand. Those denoting submultiples are from the Latin, and are *deci*, tenth; *centi*, hundredth; and *milli*, thousandth.

The unit of itinerary measure is the kilometer, which is equal to 0·62138 mile.

The unit of land measure is the hectare, equal to 2·47114 acres.

The unit of commercial weight is the kilogramme, equal to 2·20462125 lb. avoirdupois.

The system of French moneys is connected with that of metric weights by the creation of a coin of standard silver (nine parts pure silver and one of alloy) to represent the monetary unit, called the franc, having the weight of exactly 5 grammes; the coins of higher and lower denominations being multiples and submultiples of this. As in the coinage system of France gold and silver are equally standard metals, it is necessary that their relative values, weight for weight, should be determined by an arbitrary ratio. This ratio is fixed by law at $15\frac{1}{2}$ to 1; and accordingly the twenty-franc piece of gold, commonly (though not legally) called the napoleon, has the weight of twenty times 5 grammes divided by $15\frac{1}{2}$, which is equal to 6·4516 grammes of standard gold. See UNITS and WEIGHTS AND MEASURES.

Revised by E. L. NICHOLS.

Metrodo'rus (in Gr. Μητρόδωρος): (1) a philosopher of Chios (330 B. C.); (2) an Epicurean of Athens (277 B. C.); (3) a rhetorician and statesman of Scepsis under Mithridates Eupator (140 B. C.); (4) a philosopher of Stratonicea (110 B. C.); (5) a freedman of Cicero; (6) a writer of epigrams in the time of Constantine the Great. J. R. S. S.

Met'ronome [Gr. μέτρον, measure, measure in poetry and music + νέμειν, deal out, distribute, divide]: in music, an instrument for the measurement and regulation of time. As the directive terms usually prefixed to musical compositions, such as *adagio*, *lento*, *andante*, *allegro*, etc., can only give to the performer an approximate idea of the rate or velocity intended by the composer, various means have been employed to indicate the speed with more precision. The metronome, invented by John Maelzel, a mechanician in the service of the Emperor of Austria, and brought into use in the early part of the nineteenth century, is a simple but ingenious contrivance by which any degree of slowness or rapidity can be marked, and practically shown with the greatest exactness. The instrument is small and portable, in form between that of the pyramid and the obelisk, and consists of an inverted steel pendulum (8 or 9 inches long), on which is a sliding weight which may be moved up or down the pendulum, and thus brought opposite to any of the figures on a graduated scale in its rear. The pendulum is moved by simple wheelwork, and makes a loud tick for every vibration. The sliding weight determines the rate of vibration. If it is near the point of suspension, the motion will be rapid: and the rapidity decreases in proportion as the weight is moved toward the remote end. In practical use the object is to ascertain how many minims, crotchets, etc., of a given piece of music are to be performed in one minute. The numbers on the scale have therefore reference to a minute of time—i. e. when the weight is placed at 50, fifty beats or ticks will occur in each minute; when at 100, one hundred beats in a minute, etc. The rate at which any piece of music is to be played is thus easily found when the metronome mark is placed by the composer at the beginning. For example, ♩ = 50, means that when the sliding weight is placed at that figure on the graduated scale, the

pendulum will vibrate *once for every minim* in the music, and that there will be fifty minims (or their value in other notes) in a minute of actual or clock-time.

Metropolis City: city (founded in 1839 on the site of Fort Massac, built by the French and Indians about 1700); capital of Massac co., Ill. (for location of county, see map of Illinois. ref. 12–F); on the Ohio river, and the St. L., Alt. and Terre Haute Railroad; 156 miles S. E. of St. Louis. It is in an agricultural region; has high school, graded schools, 6 churches for white people and 2 for colored, public library, and a monthly and 2 weekly newspapers; and contains saw and planing mills, pipe-foundry, wheel and wagon material works, flour-mills, stave, heading, and veneer factories, and pottery-works. Pop. (1890) 3,573; (1900) 4,069.

EDITOR OF "MASSAC JOURNAL-REPUBLICAN."

Metsys, QUINTIN: See MESSIS.

Mettam, CHARLES: See the Appendix.

Metternich, met'er-nich, CLEMENS WENZEL NEPOMUK LOTHAR, Prince: statesman; b. at Coblentz, May 15, 1773; studied jurisprudence at Mentz and Strassburg; was employed by the Austrian Government in diplomatic service at The Hague in 1794, but returned to Vienna after the conquest of the Netherlands by the French; married in 1795 the granddaughter and sole heiress of Prince Kaunitz; was employed at the Congress of Rastadt (1797–99), and went in 1801 to Dresden as ambassador, in 1803 to Berlin, and in 1806 to Paris; on Oct. 8, 1809, was made Minister of Foreign Affairs, and on May 25, 1821, chancellor of the empire, which positions he held till Mar. 13, 1848. With great shrewdness he kept Austria out of the great conflict of 1813 until she could make her own conditions for her participation, and at the Congress of Vienna (1814), of which he was unanimously chosen president, he procured for Austria a great extension of territory and a prominent position in Germany and Italy. For the next thirty years he actually stood at the head of the continental politics of Europe, and by the congresses of Aix-la-Chapelle (1818), Carlsbad (1819), Vienna (1820), Laybach (1821), Verona (1822), Münchengratz (1833), Töplitz (1835), etc., and by the aid of the Holy Alliance, he succeeded in suppressing almost every national or liberal movement in Europe. He completely worked out his system within the boundaries of Austria, which by censorship, police, etc., was almost hermetically shut out from the rest of Europe. Nevertheless, on Mar. 13, 1848, the revolution in Vienna compelled the prince to flee for his life. He resided in London till Nov., 1849, when he returned to Vienna, where he lived in retirement till his death July 11, 1859. A collection of his writings (*Denkwürdigkeiten*) has been published and an autobiography (8 vols., Vienna, 1880–84).

Metz: a city and fortress of Germany; in Alsace-Lorraine; on the Moselle (see map of German Empire, ref. 6–C). The town is beautifully situated on both sides of the river, which divides into several arms, surrounded by mountains, and is one of the strongest fortresses in the world. Seven strong forts—Plappeville and St.-Quentin to the W., St.-Eloy to the N., St.-Julien to the N. E., Les Battes to the E., Quenlen to the S. E., and St. Privat to the S.—crown the hills around it. It is the seat of the highest authorities of Lorraine, of a bishop, of a civil and commercial tribunal, etc., and has an academy, a college, two seminaries, a school of artillery, a museum with collections of Roman antiquities, coins, and pictures, a library containing 30,000 volumes, and an arsenal. The most important public buildings are the Cathedral of St. Stephen, a Gothic structure, begun in the thirteenth century, the nave finished in 1392, the choir in the sixteenth century, with a tower 387 feet high, containing a bell weighing 260 cwt.; the Church of St. Vincent, begun in the thirteenth century; the Church of St. Eucharius, built in the twelfth century; and the Palace of Justice, built in the eighteenth. The esplanade has beautiful walks; opposite stand magnificent barracks. Brushes, fur, felt, leather, paper, soap, silk, woolens, embroideries, drugs, etc., are manufactured, and a brisk trade is carried on in wine, timber, corn, and hides. Pop. (1890) 60,186.

Metz, whose ancient name was *Divodurum* or *Mediomatrica*, was destroyed by Attila in the fifth century, then became the capital of Austrasia, fell, on the division of the empire of Charlemagne, to Germany, and was established as a free imperial city, governed by a count in the name of the emperor. In 1444 the French besieged the city without taking it, but in 1552 Henry II. gained possession of it under pretense of bringing aid to the Protestant German princes. The Emperor Charles V. besieged it in vain from Oct., 1552, to Jan., 1553. By the Peace of Westphalia in 1648 the authority of France over Metz, as well as over Toul and Verdun, was acknowledged and guaranteed. By the war of 1870–71 the state of affairs was entirely changed. The fortress, which had been much strengthened by Napoleon III., formed the principal point of support for the imperial army drawn up along the German frontier, and after the first defeats at Weissenburg and Wörth it served as a retreat for the largest part of the army, numbering more than 180,000, under Marshal Bazaine. Prince Frederick Charles inclosed Metz with an army of 200,000 men, and thus the memorable siege began which ended with the surrender both of army and fortress. On Oct. 27, 1870, the capitulation was concluded, according to which the fortress was to be occupied by the Germans, and the French army to go to Germany as prisoners of war. The French army, including the sick and the national guard, comprised 173,000 men, with 6,000 officers and 3 marshals. The war material, worth 80,000,000 francs, comprised 800 cannon, furniture for 85 batteries, 66 mitrailleuses, 300,000 muskets, an enormous number of sabers and cuirasses, 2,000 wagons, etc.; 53 eagles and colors were taken. By the Peace of Frankfort (May 10, 1871) Metz was ceded to the German empire, and the German military administration has strengthened the fortress. See BAZAINE.

Metzger, KARL ALBERT EMIL: geographer; b. at Coblentz, Germany, Oct. 19, 1836; was gazetted second lieutenant in the Prussian engineers (pioneer corps) in 1856, but the following year he resigned and entered the Dutch service, going to Java, and entering the trigonometrical survey department. From 1865 to 1875 he was actively engaged in trigonometrical work in Java, when he returned to Europe, settled in Stuttgart, and devoted himself to geographic studies. He had an intimate knowledge with the far East, and was a frequent contributor to scientific journals. His principal work was his *Weltlexicon* (1888), or gazetteer of the world, intended for those interested in commerce and industry. D. July 6, 1890. M. W. HARRINGTON.

Metzu, GABRIEL: painter; b. at Leyden, Holland, in 1615; d. in 1659. He formed his style on that of Terburg and Gerard Dow, but surpassed both in drawing. He left many genre pictures of great excellence, of which the Louvre possesses the most famous examples, viz.: the portrait of *Admiral Tromp*, *A Soldier Offering Refreshments to a Lady*, *A Chemist Reading near a Window*, and *The Fruit-market at Amsterdam*. W. J. S.

Meun, mön, JEAN, de (JEAN CLOPINEL): poet; b. at Meun-sur-Loire, France, about 1250. He studied in the schools at Paris, and while still thus engaged (1277) he took up the ROMANCE OF THE ROSE (*q. v.*) where it had been left by Guillaume de Lorris and completed it, though in a very different spirit. Later he wrote several other works, though of far less repute than his first. In 1284 he translated for Jean de Brienne, Count d'Eu, the *De re militari* of Vegetius; later still, the *Letters of Abélard and Héloïse*, the *Marvels of Ireland* of Giraud de Barri, the book of the English monk Aelred on *Spiritual Friendship*, and the *De Consolatione philosophiæ* of Boethius. Between 1291 and 1296 (?) he wrote his poetic *Testament*, full of criticisms on his contemporaries, but also of sincere piety. He became a person of wealth and distinction. He died before Nov., 1305. See the *Histoire littéraire de la France*, vol. xxviii., pp. 391–439. A. R. MARSH.

Meur'sius, JOHANNES (Dutch, *De Meurs*): classical scholar; b. at Loozduinen, near The Hague, on Feb. 9, 1579; studied philology; traveled much, and became Professor of History at Leyden in 1610, afterward of Greek, but left Holland, disturbed by the political broils in his country, and accepted a position at the Academy of Soröe in Denmark, where he died Sept. 20, 1639. He was one of the most learned men of his age, and his *Glossarium Græco-barbarum* (1614) and *Athenæ Batavæ* (1625), as well as his numerous monographs relating to the Greek literature, mostly reprinted in Gronovius's *Thesaurus Antiquitatum Græcarum*, are still of interest. He also edited Lycophron's *Alexandra*, Apollonios Dyscolos, Philostratus, and the works of some of the Byzantian historians. His works were edited by Lamie (12 vols. fol., Florence, 1741–63). Revised by A. GUDEMAN.

Meurthe-et-Moselle, mört'ā-mō-zel': a department of Northeastern France; formed on Sept. 11, 1871, after the Franco-German war. It comprises an area of 2,025 sq.

miles; consists of the arrondissements Briey, Lunéville, Nancy, and Toul, and contains some of the most beautiful scenery and some of the most fertile soil in France. Vine-culture is the chief occupation; half of the surface is occupied by vineyards. Capital, Nancy. Pop. (1896) 466,417.

Meuse, Fr. pron. möz: department of Northeastern France, comprising an area of 2,405 sq. miles. It extends along both sides of the river Maas, which is inclosed between two ranges of low hills running parallel with it. The valley is very fertile and produces wheat and good wine: cattle, horses, swine, and bees are reared. The hills contain iron, limestone, and gypsum. Capital, Bar-le-Duc. Pop. (1896) 290,384.

Meuse, or **Maas**: a river of Europe which rises in France, in the south of the department of Haute-Marne. Proceeding N., it crosses the northwest corner of the department of Vosges, traverses the departments of Meuse and Ardennes, and in the wild mountainous region still known as the Forest of Ardennes pours through a wild, romantic gorge; on reaching Givet it enters Belgium, and at Namur, where it receives on the left its largest tributary, the Sambre, almost doubling its volume, changes its course to N. E., and passes Liège, where it is augmented by the Ourthe. At Bommel it draws so close to the Rhine as to be brought into communication with it; resuming its western course and finally turning N. W., it joins the left bank of the Waal, one of the arms of the Rhine, and gives its name to the mighty accumulated flood of these streams. Proceeding W. the Meuse is divided near Dordrecht into two great rivers, one of which bends round to the N., and reaches Rotterdam; the other branch continues W.; and shortly after the two branches again unite and discharge themselves, amid shoals and quicksands, into the North Sea. Total length, 600 miles, of which 460 are navigable.

Mexia: town (founded in 1873); Limestone co., Tex. (for location of county, see map of Texas, ref. 3–I); on the Houston and Tex. Cent. Railroad; 80 miles S. of Dallas, 181 miles N. W. of Houston. It is in an agricultural region; is a shipping-point for cotton, hides, and live stock: and has an academy, 2 public schools, 6 churches, a national bank with capital of $50,000, a private bank, 3 weekly newspapers, flour, planing, and saw mills, canning-factory, carriage and wagon shops, and tin and sheet-iron works. Pop. (1880) 1,298; (1890) 1,674; (1900) 2,393.

EDITOR OF "LEDGER."

Mexican Antiquities: the relics of races inhabiting Mexico before the advent of Europeans. The Toltecs, Aztecs, and other well-known Nahuan peoples followed one another in their occupation of Mexican territory, building and deserting their cities and monuments. Preceding and alternating with them were other nations and tribes of less note. The most striking of the many existing features of pre-Columbian culture in Mexico are the ruins of cities, temples, and monuments. The dismantled remnants of a chain of colossal structures extends from Chihuahua on the N. to Honduras on the S., the best-preserved examples occurring S. of the valley of Mexico. The degree of preservation is, however, not a reliable index of the original stability and perfection of the structures, as some were in ruins when the conquerors landed, and others were so situated that they were exposed to devastation by the Europeans and were totally demolished. Tenochtitlan, Cholula, and Tezcuco, centers of Nahuatl culture and power, were, with the downfall of these peoples, leveled with the ground, while Teotihuacan, Xochicalco, and Mitla, already in ruins, are still standing.

The mural remains of Mexico are often characterized by great massiveness, although they never exhibit pronounced megalithic features. The plan of the buildings was often complex, and the area covered large. The masonry was well constructed of stones laid in mortar. Grout and sun-dried bricks were also extensively used in some sections. The true arch was unknown; doors and windows were bridged by wooden lintels, by slabs of stone, or by smaller stones overlapping.

The walls are often covered with elaborate figures in low-relief and sculptured columns; and slabs and masses of stone, some of enormous size, are found. The Almaraz monolith, discovered on the site of San Juan Teotihuacan, weighs upward of 18 tons. The pottery is varied in form, rich in color, and abounds in æsthetic and symbolic designs. Each section has its distinctive groups of ware, indicating the strong individuality of the tribes and nations. Implements of stone flaked and polished are numerous, and the number of minor carvings, statuettes, charms, and ornaments is very great. Objects of metal are common, and some elaborate ornaments in gold and gold-copper alloy have been preserved. Iron had not come into use.

The most striking features of many of the ruins are pyramids and pyramidal masses of earth, cement, and masonry. This was not so during the period of occupation, as these structures were the nuclei of clusters of ceremonial buildings and of dwellings, traces of which have, as a rule, disappeared. The largest is that of Cholula, which in its present much-altered state is upward of 1,400 feet square at the base and is nearly 200 feet in height. They were built in a great variety of forms, and of such materials as were at hand. They were frequently finished with cement or faced with neat masonry, and were furnished with terraces and stairways, and the truncated summits were generally occupied by public or religious structures. In no case were they simple pyramids serving exclusively as monuments or as receptacles for the dead, as did the pyramids of other countries.

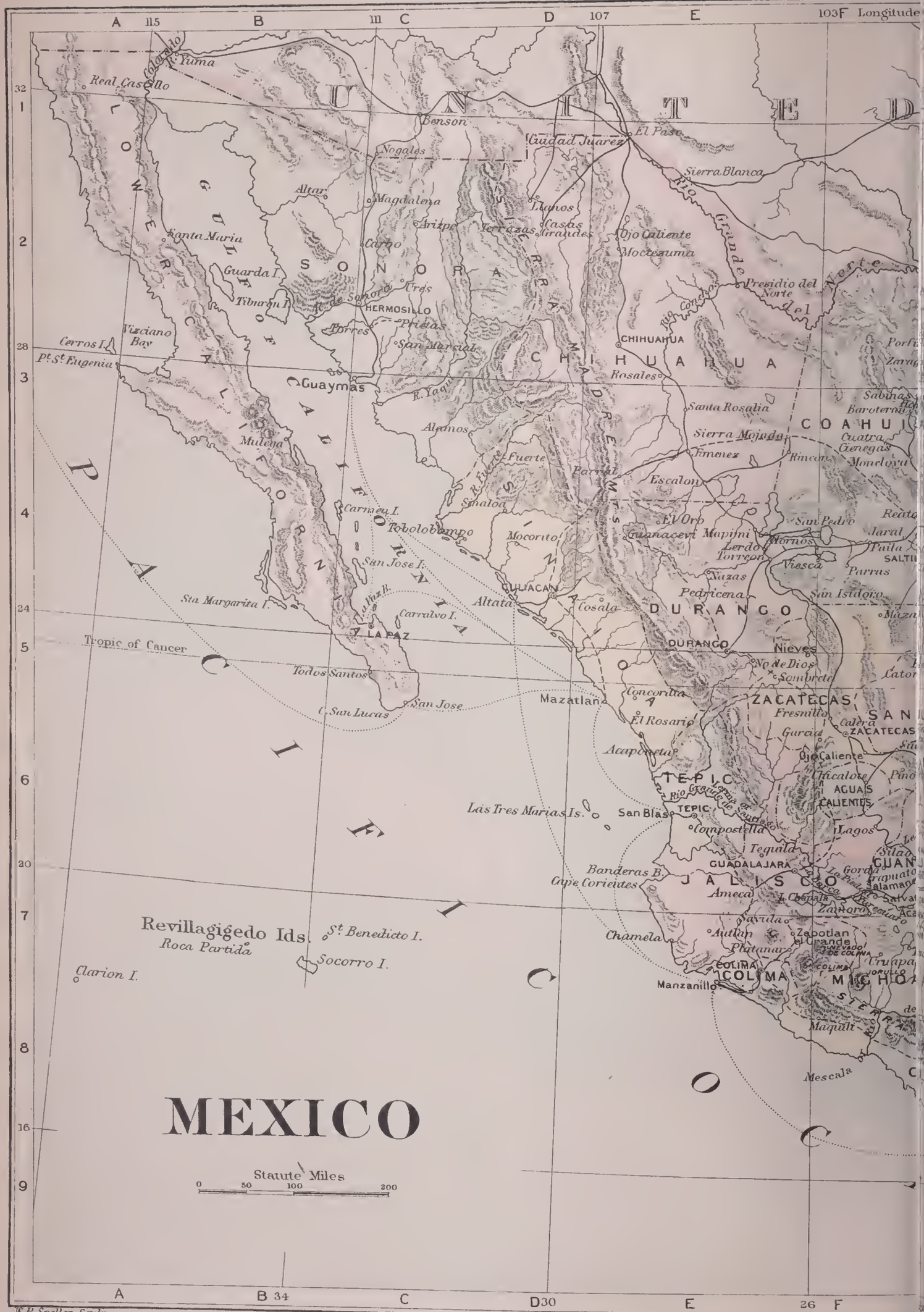
Casas Grandes.—The ancient ruins of Northern Mexico are closely related to the better-known ruins of New Mexico and Arizona. Cliff ruins are found in the mountains, and deserted pueblos are scattered over the valleys of Chihuahua. The most noted example of the latter class is known as the Casas Grandes, in the northwestern part of the state. The principal ruin consists of three or more clusters of rectangular apartments connected by obscure walls, and occupying an area of about 250 feet in width by 800 feet in length. The walls appear to be composed of cement or grout, a mixture of earth, gravel, and cut straw, which was built up in sections by pouring the plastic material into movable boxes of the thickness of the wall, the boxes being moved along when the contents had properly set, just as the Chinese do at the present day. The heavier walls are five feet thick at the base, and still stand to a height approximating three stories. Neither the period of occupation nor the people concerned are known, as the site is said to have been deserted when first visited by the whites. Many less important ruins, mostly reduced to mere heaps of *débris*, are scattered about. Stone was used in localities where it could readily be obtained.

Quemada.—Five hundred miles farther S. in Zacatecas are the ruins of Quemada, of which nothing is known as to period or people, and the relation of these remains to those of other sections is not well made out. The pueblo has been extensive, and evidently was the center of a flourishing community. Its situation resembles that of many of the pueblos of the north, occupying a somewhat precipitous but irregular mesa-like elevation, from 200 to 500 yards wide and half a mile long. It was inclosed where approach was easy by heavy walls of masonry. The plan of the pueblo is irregular, conforming to the topography of the site. The walls, terraces, inclosures, columns, temples, and pyramids, are substantially constructed of uncut, flag-like stones laid in reddish mortar tempered with straw. There are indications of plastering, but no carving or other ornamental work; and no arches, doors, or windows have been noted.

Tula, Tenochtitlan, Texcoco.—Between Quemada and Tenochtitlan, the center of the Nahuan empire, there are numerous interesting remains. Tula, the most northern center of culture with which any historic people is definitely associated, is said to have been a Toltec city of early date and great importance, but explorations conducted by Charnay and others develop little of an architectural kind, and the few relics found may apparently as readily belong to Aztec as to Toltec culture.

On the sites of Tenochtitlan, the Aztec capital, now Mexico, and Texcoco, the Acolhuan capital, its rival, almost nothing is left of the splendid structures of the pre-Spanish period. Two of the most notable pieces of sculpture in America, the Calendar stone and the composite idol, the god of war and the goddess of death, were dug up on the site of the present cathedral of Mexico where the great Teocalli, reached by 120 steps, once stood; and farther out toward the lake excavation discloses layer after layer of art remains representing successive occupations, the lower characterized by the rudest kind of pottery. At Texcoco, on the eastern side of the lake, there are still meagre traces of a number of structures, probably pyramids, and numerous carvings on stone and minor relics of clay.

On the hill of Texcocingo, a few miles beyond Texcoco, there are unique remnants of ancient chambers, and foun-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El Paso
Nogales
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Ojo Caliente
Moctezuma
Santa Maria
Caibo
Terrazas
Aripe
Guarda I.
Tiburon I.
Rio Sonora
Tres
Presidio del Norte
Rio Conchos
HERMOSILLO
Torres
Pitiquito
San Marcial
Vizciano Bay
Cerros I.
Pt. St. Eugenia
CHIHUAHUA
Rosales
Guaymas
R. Yaqui
Santa Rosalia
Sabinas
Baroteran
Alamos
Sierra Mojada
Cuatro Cienegas
Mulege
Jimenez
Rincon
Monclova
Fuerte
Parral
Escalon
R. Fuerte
Sinaloa
Carmen I.
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Tobolobampo
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Jaral
Lerdo
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Tula
SALTILLO
San Jose I.
Viesca
Parras
Sta Margarita I.
La Paz B.
CULIACAN
Altata
Cosala
Pedricena
San Isidoro
Carralvo I.
LA PAZ
DURANGO
Tropic of Cancer
Nieves
Todos Santos
Nombre de Dios
Sombrete
Concordia
Mazatlan
ZACATECAS
San Jose
C. San Lucas
El Rosario
Fresnillo
Calera
Garcia
Acaponeta
Ojo Caliente
TEPIC
Chicalote
AGUAS CALIENTES
Las Tres Marias Is.
San Blas
Compostella
Lagos
Tequila
GUADALAJARA
Banderas B.
Cape Corrientes
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Ameca
Chapala
Zamora
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St. Benedicto I.
Roca Partida
Socorro I.
Clarion I.
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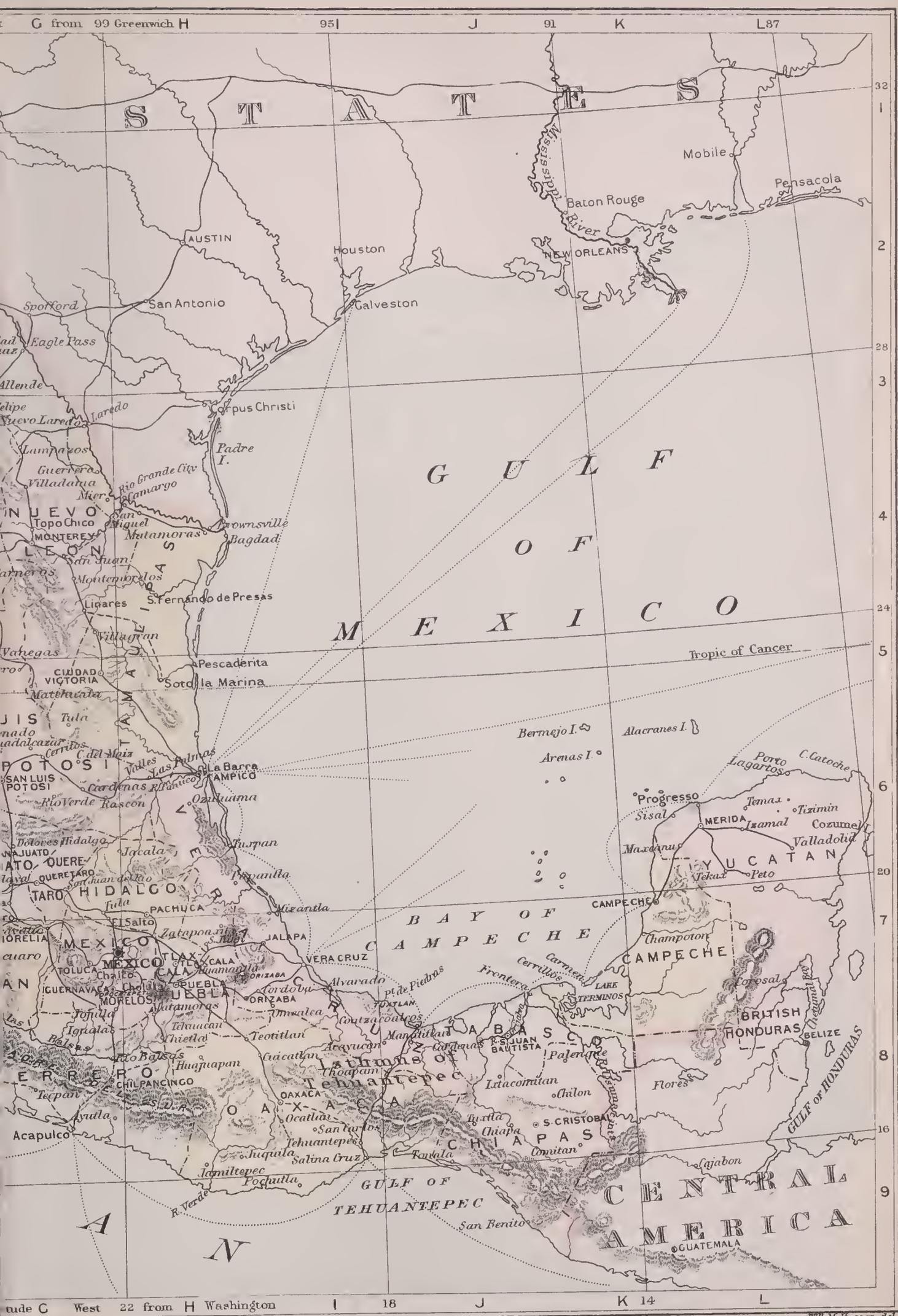
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AUSTIN
Houston
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San Antonio
Sporford
Eagle Pass
Allende
Laredo
Corpus Christi
Padre I.
GULF OF MEXICO
Lampazos
Guerreros
Villadama
Rio Grande City
Camargo
Mier
NUEVO LEON
Topo Chico
MONTEREY
San Miguel
Matamoras
Brownsville
Bagdad
San Juan
Montemorelos
S. Fernando de Presas
Linares
Villagran
Tropic of Cancer
Pescaderita
CIUDAD VICTORIA
Soto la Marina
Matehuala
Tula
Cerritos
C. del Maiz
Valles
Las Palmas
La Barra
TAMPICO
SAN LUIS POTOSI
Cardenas
Rio Verde
Rascon
Ozuluama
Bermejo I.
Alacranes I.
Arenas I.
Porto Lagartos
C. Catoche
Progresso
Sisal
Temax
Tizimin
MERIDA
Izamal
Cozumel
Valladolid
Maxcanu
YUCATAN
Tekax
Peto
Dolores Hidalgo
Jacala
Jacapan
QUERETARO
HIDALGO
Pachuca
Tula
Mizantla
CAMPECHE
BAY OF CAMPECHE
Champoton
CAMPECHE
El Salto
Zatapoaxtla
Jalapa
MEXICO
TOLUCA
Chalco
Cuernavaca
MORELOS
PUEBLA
Cordova
Orizaba
Alvarado
Pt. de Piedras
Frontera
Carmen
Cerritos
LAKE TERMINOS
Tuxtla
Tehuacan
Tehuitzingo
Teotitlan
Acayucan
Coatzacoalcos
Manatitlan
Cardenas
TABASCO
R. S. Juan Bautista
Palenque
Usumacinta R.
Tabasco R.
BRITISH HONDURAS
BELIZE
GULF OF HONDURAS
Isthmus of Tehuantepec
Chilpancingo
Huajuapan
Oaxaca
Ocotlan
Ixtacomitan
Chilon
Flores
Ayutla
Acapulco
Tuxtla
S. CRISTOBAL
Chiapa
Comitan
CHIAPAS
Tehuantepec
Juquila
Salina Cruz
Tonala
Lajabon
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tains and stairways and statuary carved in the solid rock. The hill itself, several hundred feet in height, was in the period of Nezahualcoyotl fairly remodeled by the cunning chisel of the sculptor, and masked and crowned with artificial structures.

Among the ruins of San Juan Teotihuacan, 25 miles N. of Mexico, are two massive pyramids which overlook the crumbling ruins of a once-extensive city, the history of which is almost wholly lost. Aside from the pyramids, the most striking feature is the so-called street of the dead, a broad highway over half a mile in length, bordered by ruined temples, *teocallis*, and other structures. The larger pyramid stands a little to the E. of the highway, and is surrounded by earthen walls and low mounds. It is about 200 feet high, and about 735 feet square at the base; the summit is truncated, and measures 60 by 90 feet. The smaller pyramid is about 140 feet high, and approximates 500 feet square at the base, the flattened summit measuring about 40 by 60 feet. These structures appear to be composed of somewhat heterogeneous materials, having been finished with coatings of cement, and possibly to some extent with facings of stone. There are signs of narrow terraces, and originally spacious stairways probably led up to the temples that crowned the summits. At the south base of the smaller pyramid the roadway expands into a large plaza, near the center of which is a small mound; at the base of this lies a much-mutilated idol of large size and another, found among the mounds on the west side of the court, has been removed to the Muséo Nacionál.

Cholula.—Next in interest to Teotihuacan is Cholula, a more recent center of Toltec power, situated some 60 miles to the S. E. of Mexico and a few miles W. of the city of Puebla. The pyramid found here is one of the most noted aboriginal structures in America. It was stormed and taken by Cortés, by whom the native temple crowning its summit was destroyed and replaced by a Roman Catholic church. It rises abruptly from the plain on the E. to the flat summit, and descends on the W. in a number of terraces, now not clearly defined. Excavations on the N. and E. show a mixed construction, a succession of accumulations composed of adobe bricks, earth, and cement.

Xochicalco.—The ruins of Xochicalco, about 65 miles S. W. of the city of Mexico, are exceedingly interesting. The principal structure is situated upon the summit of an oblong conical hill 2 miles in circumference and 400 feet high. This is surrounded by stone terraces and pierced by mysterious galleries and chambers not yet satisfactorily explored. Like the hill of Texcocingo, this "hill of flowers" was probably at one time fairly remodeled by art and covered with walls and buildings. The summit is level, and is said to measure 280 feet by 328 feet. It is surrounded by a wall, and occupied by a number of ruins, the principal of which is a pyramidal structure 58 by 68 feet at the base, and retaining a height of 20 feet or more. The walls are built of large, accurately dressed blocks of porphyry, brought apparently from a distance of several miles; they contract from the base to a height of perhaps 8 feet; above this they rise vertically for 4 or 5 feet, and then expand in a wide cornice. Above this are remnants of a second story, and it is said that originally there were several stories. the full height being given traditionally as 65 feet. The effect thus suggested would have a close general resemblance to that of the remarkable pyramid of Papantla near the Gulf coast, 150 miles N. W. of Vera Cruz. The entire surface is covered with mythic figures sculptured in low-relief. This structure, which has decided points of resemblance to other important architectural remains in Mexico and Central America, is not assigned, even traditionally, to any particular people.

Mitla.—According to Charnay the remains at Mitla, 15 miles S. E. of Oaxaca, are now reduced to three pyramids and six palaces. The best-preserved group consists of three buildings surmounting low mounds of earth and stone, and forming three sides of a square court. The opposing structures on the E. and W. are nearly obliterated, but that on the N. is well preserved. This building has a T-shaped plan, and was entered from the court by three doorways. The entrance is into a court 36 feet wide and 130 feet in length, along the middle of which is a row of tapering porphyry columns, six in number, that once supported the roof. The walls are faced outside with neatly cut stone in large blocks, laid to form sunken panels of varying size, in which by means of stucco a series of tasteful geometric decorative patterns have been worked. The floor is paved with flat stones, and the inner surface of the walls is of unhewn stone; both were originally plastered. The pyramids are reduced to shapeless mounds. According to Zapotec tradition, Mitla was a great religious center.

Oaxaca furnishes a number of less important groups of ruins, as at Monte Alban, Zachila, and Tehuantepec.

The state of culture attained by the most advanced of the Mexican nations was that of well-advanced barbarism, and if we are to judge by the originality and apparent virility of their genius, there is a strong probability that had they been left alone to work out their destiny they would have passed gradually into the succeeding stages of civilization and enlightenment.

Authorities.—Lord Kingsborough, *Antiquities of Mexico* (1830, etc.); Bancroft, *The Native Races of the Pacific States* (5 vols., 1875); Charnay, *The Ancient Cities of the New World* (1860); Bartlett, *Narrative of Explorations* (1854); Chavero, *Mexico, á traves de los siglos*; Nadaillac, *Prehistoric America.*

W. H. Holmes.

Mexico [from Aztec *Mexitl*, name of a tutelary divinity; Span. *Estados Unidos Mexicanos*, Mexican United States]: a federal republic of North America, occupying the whole width of the continent between the U. S. on the N. and Guatemala and British Honduras on the S. E.; limited on the E. by the Gulf of Mexico and the Caribbean Sea, and on the W. and S. W. by the Pacific Ocean. The main portion, which has been aptly compared to a cornucopia in form, is about 1,950 miles in extreme length from N. W. to S. E., and 750 miles wide in the northern part, dwindling to 140 miles at the Isthmus of Tehuantepec. Besides this main body the republic includes the two peninsulas of Lower California on the N. W., nearly separated by the Gulf of California, and Yucatan, a northerly projection of the southeastern end, between the Gulf of Mexico and the Caribbean Sea. Owing to these peninsulas the coast-line is very extensive, aggregating over 6,000 miles.

Topography.—The main portion of Mexico is essentially a high plateau, framed and traversed by mountain ranges and descending by terraces to more or less extensive strips of lower land on the coasts. The plateau, in Mexico and Puebla, is about 8,000 feet in average height above the sea; thence it falls northward to 3,600 feet at El Paso del Norte. On the western side it is bordered by an almost unbroken mountain chain, the Sierra Madre, which enters the republic from Arizona and traverses it in a S. S. E. direction. In its northern part the axis of this range is at least 250 miles from the western coast, descending to it by a series of terraces, but sharply cut down on the eastern or plateau side; farther S. it is much nearer the ocean. Several rivers cut through the Sierra Madre, forming deep valleys or cañons. The mountains on the eastern side of the plateau are parallel to the Gulf coast and at no great distance from it; but they form rather a series of groups than a connected range. The highest peaks are southward, in Vera Cruz, where the Cofre de Perote attains 13,415 feet. Between lats. 19° 30′ and 18° 30′ an irregular line of mountains, sometimes called the Cordillera de Anahuac, may be traced E. and W. across the country; it does not form a continuous chain, but it embraces all the highest masses and all, or nearly all, the active volcanoes of Mexico. Beginning at the W., the most remarkable peaks are the Nevado de Colima, 14,365 feet, and the Colima volcano, 12,743 feet (these two nearly in the line of the Sierra Madre); the isolated recent volcano of Jorullo in Michoacan; the group formed by Popocatepetl (an active volcano), 17,798 feet, and Ixtaccihuatl, 16,076 feet; Malinche, 13,575 feet; Orizaba (an extinct volcano, also on a line with the eastern border of the plateau), which, according to Scovell and Bunsen, rises to 18,314 feet, being the highest mountain in Mexico, and, with the probable exception of Mt. St. Elias, the highest in North America; and, finally, the active volcano of Tuxtla, near the Gulf coast, S. E. of Vera Cruz. Between and near these mountains there are evidences of plutonic action in numerous extinct craters; and it is noticeable that the volcanic Revillagigedo islands in the Pacific and the Greater Antilles in the West Indies lie in the same line. S. of the Cordillera de Anahuac the whole of Southern Mexico is essentially mountainous, though the ranges are to some extent broken in the Tehuantepec Isthmus; the axes of the ranges, as well as the coast-lines, trend E. and W. Parallel to the Pacific coast the Sierra Madre del Sur is continued into Guatemala. The plateau falls gradually northward, and is divided by subordinate ranges into well-marked basins, which, in turn, are

varied with hills. The best known of these basins is that called the Valley of Mexico or Anahuac, about the city of Mexico; it is over 7,500 feet above the sea, completely inclosed and partly occupied by several small lakes. The *Bajio* of Guanajuato is somewhat similar in character, and there are other basins to the N. W. and N. E. In Northern Mexico the Bolson de Mapimi occupies Southeastern Chihuahua and the adjacent parts of Coahuila and Durango. It is a vast basin, probably at one time the bed of a great inland lake, and still containing shallow bodies of alkaline water which often dry up entirely; but most of the Bolson is completely dry and uninhabitable, forming the Chihuahua desert. The rivers of the plateau have cut deep cañons, as in Jalisco, or wide valleys, as on the eastern side, and along these the lowlands of the coast are often continued far into the interior. The traveler in Mexico is seldom out of sight of high hills or mountains; and the endless variety of surface, with the corresponding differences of vegetation, make Mexico one of the most picturesque countries in the world.

The narrow peninsula of Lower California is little more than a rocky continuation of the Sierra Nevada. Yucatan, except in its southern part, is low; and the northwestern part (Campeachy), with Tabasco, contains a wide strip of forest-covered alluvium.

Islands.—Most of these are near the coast, and unimportant; the most notable are Cozumel, E. of Yucatan; Tiburon and Guarda, in the Gulf of California; and the Tres Marias, off San Blas. The outlying Revillagigedo group, in the Pacific, is sterile and nearly or quite uninhabited.

Harbors.—The Pacific coast has several excellent harbors, including the fine bays of Acapulco and San Blas and the smaller one of Mazatlan. The Gulf ports are all more or less open, and some are mere roadsteads. Vera Cruz, the most important port of the republic, has only a small harbor, imperfectly sheltered by a reef, and during northers ships have frequently been wrecked before the city. An extensive breakwater, now (1894) in course of construction, is intended to furnish an effectual shelter.

Rivers and Lakes.—The rivers of Mexico generally rise on the plateau or among the mountains, rapidly descend to the eastern or western lowlands, and, after passing through a small extent of alluvial land, enter the Gulf or the Pacific. They are therefore essentially highland streams, generally small, swift, obstructed by rocks, falls, and rapids. A few only are navigable for short distances, especially the Grijalva and its branch, the Usumacinta, in Tabasco. The former is regularly ascended by small steamers to San Juan Bautista, 90 miles, and during floods considerably farther; and the latter is said to be navigable for 150 miles, but is very crooked. The Rio Grande del Norte or Rio Bravo, on the confines of the U. S., is 1,500 miles long, or much longer than any exclusively Mexican river; but it is navigable only for a short distance and for vessels of light draught. The Pánuco, on the northern boundary of Vera Cruz, forms, with its connecting channels and lagoons, a waterway of some importance; and numerous small rivers of Vera Cruz, Tabasco, and Campeachy admit light-draught vessels near their mouths. Yucatan has no rivers of importance. On the Pacific side the largest rivers are the Lerma, or Rio Grande de Santiago, flowing through Jalisco and forming a deep cañon, and the Mescala, or Rio de las Balsas, which rises in Puebla and reaches the ocean on the confines of Guerrero and Michoacan. Neither of these is navigable; the scheme for improving the Mescala as a means of interoceanic communication is probably impracticable. The rivers of Sonora, though of considerable length, are useless as waterways. The Colorado enters the northern end of the Gulf of California, flowing for a short distance through Mexican territory. The largest Mexican lake is the beautiful Lago de Chapala, on the confines of Jalisco and Michoacan. Various small lakes are scattered over the plateau, the most important being those about the capital, MEXICO (*q. v.*). The swampy depressions of the Bolson de Mapimi hardly deserve the name of lakes. Of the many lagoons along the Gulf coast the most important are the Laguna de Terminos, in Campeachy, and the Laguna Madre, in Tamaulipas.

Geology.—The very complicated geology of Mexico has been studied only in fragments, and no clear general statement of it can yet be given. The higher mountains, especially of the Sierra Madre, are formed of granite, which passes under the general surface of the plateau; but it is here covered and in great part hidden by a tangle of eruptive and metamorphic rocks—porphyries, basalts and trachytes, schists, and crystalline limestones—and these contain the richest mineral deposits. The recent volcanic action along the east and west belt of the Cordillera de Anahuac has resulted in extensive deposits of lava and ash. In the northern and eastern parts of the plateau lower spaces, between the mountains, are largely occupied by unaltered limestones and sandstones, mostly of Mesozoic age. Generally the coast belts show metamorphic and eruptive rocks; but in some places, principally along the Gulf, there are Quaternary deposits or recent alluviums. Yucatan appears to be largely formed of Tertiary limestones. For *Minerals*, see below.

Earthquakes, though frequently felt in Southern and Western Mexico, are seldom severe, and have never, within historic times, been very destructive.

Climate.—From the snow-clad peaks to the hot and moist coast lands and the dry northern deserts, Mexico presents every possible gradation of climate; but, owing to the terraced character of the plateau edges, three zones of temperature are pretty clearly defined in the inhabited lands. Mexicans distinguish these as the *tierra caliente*, hot or tropical land, extending to about 3,000 feet in the latitude of Mexico; *tierra templada*, temperate, 3,000 to 6,000 feet; and *tierra fria*, cold, above 6,000 feet. The latter embraces all the higher parts of the plateau, and is cold only in a relative sense, the climate being, in fact, very mild and equable; at Mexico city, for example (7,350 feet), the mean temperature is about 60° F., commonly descending to 45° or 40° in the early morning, but seldom to the freezing-point. At higher elevations and farther N. the temperature is of course more severe. The *tierra templada*, especially on the terraces facing the Gulf, is called, with reason, the "paradise of Mexico," combining as it does a balmy climate with the most magnificent scenery and a wealth of semi-tropical vegetation. In the coast regions of the *tierra caliente* the mean temperature varies at different points from 75° to 85° F. In general, the winter months are characterized by a somewhat lower thermometer, less frequent rains, and on the Gulf side by frequent "northers," or storms from the N., very destructive to shipping and accompanied by a sudden lowering of temperature. During the summer months the heat in many parts of the *tierra caliente* is oppressive; and at some of the ports—notably Vera Cruz, Progresso, Tampico, Acapulco, Mazatlan, and Guaymas—is nearly always accompanied by epidemics of yellow fever; these rarely extend to the *tierra templada*, and never to the *tierra fria*. Most of Eastern and Southern Mexico has an abundant rainfall. The rainy season, where it can be distinguished, generally extends from May to September; but along the Gulf no part of the year can be called dry; and in parts of Tabasco and Campeachy there is a second rainy season in January and February. The northern and northwestern states, with Lower California, are deficient in moisture except in favored places; and the great Bolson de Mapimi is so dry that much of it is uninhabitable without irrigation. See CLIMATE.

Vegetation.—No country in the world shows so many variations in the aspect of plant life as Mexico. In a few hours' ride one may pass through pine-forests, oak glades, weedy slopes, plains or ravines bristling with cacti, tangled scrub, heavy tropical jungle, and bright-green alluvial meadows; and each of these seems, for the time being, to cover the whole country. The very irregular distribution of the climate zones is evident when one finds in the heart of the plateau valleys filled with tropical growth or fields of sugar-cane, while above them may tower pine-clad mountains and snowy peaks. Sometimes the types of vegetation are strangely combined; thus in the mountains of Guerrero palm-trees grow side by side with pines at the level of 7,500 feet. Broadly speaking, the plants of the *tierra caliente* are tropical in character, those of the *tierra templada* are semi-tropical, and those of the *tierra fria* resemble the temperate flora of the U. S. True forest is generally confined to the mountain-sides and to some alluvial flats along the coast, especially on the Gulf side; the latter is tropical jungle, and the range upward extends to woods principally of oaks, and finally to the high pine-forest. The coast lands, where not alluvial, are generally occupied with a low, scrubby growth, with numerous cacti and spiny plants; and this is prevalent over much of Yucatan. The plateau is commonly more or less open. The number of useful indigenous plants is very great. They include mahogany, tropical cedar, ebony, rosewood, and a large number of other cabinet woods in the lowlands, besides oak and pine in the mountains; rubber, copal, and various gums; jalap, cassia, ipecacuanha, and many other medicinal species; logwood, arnatto, indigo, cartamo,

and other dyes; and vanilla. Two species of *Agave* are particularly valuable, and both are now cultivated on a large scale: the *A. americana*, or the maguey-plant of the high plateau, the juice of which, fermented, is chicha, a national beverage; and the henequen-plant of the lowlands, yielding sisal hemp, now the principal product of Yucatan. There are numerous other vegetable fibers, but little utilized.

Zoölogy.—Mexico, as a whole, is included in the neotropical zoölogical region (see AMERICA, SOUTH), and is generally united with Central America as a sub-region, the Central American. This sub-region, however, is not very clearly defined; in fact, the animals of Mexico, as a whole, closely resemble those of Brazil, differing only in a certain proportion of species and genera. There are the same or very similar monkeys, jaguars, armadillos, rodents and opossums, toucans, parrots, humming-birds and trogans, serpents, insects, and land-shells; and the same types of fishes and alligators are found in the rivers. Owing to the great variety of surface and elevation the fauna is exceedingly rich and varied, though the larger species tend to extinction. As the boundary of the neotropical region nearly corresponds with the northern limit of Mexico, there is naturally a mingling of forms with those of temperate North America. In the hot lands, for example, the jaguar ranges into Texas; and the buffalo formerly roamed over the high plains of Northern Mexico. All the European domestic animals have been introduced.

Cochineal-culture, formerly very important in the southern states, is now almost abandoned, the dye being largely superseded by chemical substances; in 1891 less than $150,000 worth of cochineal was exported. The pearl-fisheries of the Gulf of California were formerly very productive, and are still important.

Minerals.—In mineral wealth Mexico stands in the first rank, and her riches are practically inexhaustible. Nearly all the metals exist; but among them silver is so prominent that it has absorbed much of the enterprise of the country, and may be said to have shaped its history. Among the Aztecs gold, being easily obtained in placer mines, was the chief precious metal, and it first attracted the cupidity of the Spaniards; but as the conquest extended from Mexico toward the N. rich silver districts were discovered in quick succession, the most renowned being those of Guanajuato, San Luis Potosí, Zacatecas, and Durango. These attained an immense development in the seventeenth and eighteenth centuries, when enormous fortunes were made in them and fortunate proprietors sometimes purchased titles of nobility bearing the names of their mines. In 1800 Humboldt estimated that the Veta Madre, or main lode of Guanajuato, had yielded one-fifth of the silver then current in the world. The Valencia mines are said to have produced $226,000,000 from 1776 to 1826, and the Catorce mines of San Luis Potosí yielded $150,000,000 in seventy-seven years. Thousands of mines have been abandoned, especially in Guanajuato, but new ones are constantly being opened. At present the great silver regions are Zacatecas, San Luis Potosí, Chihuahua, Coahuila, Guanajuato, and Hidalgo; but there are mines in nearly all the states. The most common method of reduction is the *beneficio de patio* or mercury process, invented by Bartolomé de Medina in 1557. The hyposulphate or leeching process is now employed in several of the northern districts, and some ores are exported to Germany for smelting. The silver ores generally contain a percentage of gold, and most of the gold now obtained in Mexico is a surplus product of the silver mines. Placer-gold mines are profitably worked in Mexico, Michoacan, Guerrero, and some of the northern states. Cinnabar is widely distributed, but during the colonial period the extraction of mercury was restricted by law in order to protect the Spanish mines; and it is only of late years that the deposits have been worked, principally in Morelos, Guerrero, and San Luis Potosí; owing to the great demand for mercury in silver reduction, these mines bid fair to be largely developed. Lead occurs principally in connection with silver ores, but also separate, especially in Hidalgo and Querétaro, where it is extracted to some extent. Copper deposits are said to be very extensive, notably in Michoacan, Chiapas, and Sonora, but they are generally neglected; the mines of Lower California yield 5,000 tons yearly. Tin, zinc, platinum, bismuth, antimony, etc., have been reported, but have never been utilized. Iron (magnetic ore principally) occurs in immense and very rich beds. The celebrated Cerro del Mercado, near the capital of Durango, is a hill 640 feet high, composed almost entirely of iron ore, which averages 70 per cent. of metal; it is calculated that the hill contains 300,000,000 tons. This and other deposits hardly less rich have been worked only on a small scale, owing principally to the lack of transportation and of coal. Beds of the latter have lately been reported from Coahuila, Sonora, Michoacan, Puebla, Oaxaca, Guerrero, Nuevo Leon, etc. The Coahuila coal is now exported to the U. S. in considerable quantities. That of Sonora is anthracite, and is believed to be very valuable. Efforts are being made (1894) to develop the beds of Puebla and other states. Sulphur exists in large quantities in the volcanic craters; salt is obtained in the coast lagoons and in mines of the northern states, and asphaltum and petroleum are said to be found in paying quantities. Marble of fine quality is mined in Mexico, Nuevo Leon, etc., and appears to be widely distributed. The beautiful Mexican onyx (a semi-transparent alabaster) is quarried in Puebla, and is largely used in the manufacture of ornamental objects. Many kinds of precious stones are reported, but the only ones of importance at present are opals; these are extensively exported, and the best are of fine quality and often very large; the most productive mines are in Querétaro and Guerrero.

Calculations of the amount of precious metals which have been produced by Mexico are always defective. The records of mints and other sources show an output from 1521 to 1891 of $3,570,370,247 in silver and $276,970,173 in gold, but these are probably very far below the true totals. (See *Mints and Coinage* below.) Mining enterprise is now (1894) more active than at any previous period. The aggregate annual product of gold and silver is estimated at from $40,000,000 to $42,000,000. Bancroft calculates that the entire mineral product of Mexico reaches $67,000,000 annually. About 240,000 men are regularly employed in the mines.

Political Divisions, Area, and Population.—Mexico has an area of 767,005 sq. miles, and a population (1895) of 12,578,861. It is divided into twenty-seven states, two territories, and a federal district. The following table exhibits the situations and areas of the several states, with their population, in 1895:

STATES.	Area in sq. m.	Population.
GULF STATES:		
Yucatan	35,203	298,039
Campeachy	18,087	88,121
Tabasco	10,072	134,794
Vera Cruz	29,201	855,975
Tamaulipas	32,128	208,102
PACIFIC STATES:		
Chiapas	27,222	315,120
Oaxaca	35,382	882,529
Guerrero	24,996	417,621
Michoacan	22,874	889,775
Colima	2,272	55,677
Jalisco	31,846	1,107,863
Sinaloa	33,671	258,845
Sonora	76,900	191,281
CENTRAL STATES:		
Puebla	12,204	979,723
Tlaxcala	1,595	166,803
Morelos	2,773	159,800
Mexico	9,247	837,368
Hidalgo	8,917	548,039
Querétaro	3,556	227,223
Guanajuato	11,370	1,047,238
Aguas Calientes	2,950	103,645
NORTHERN STATES:		
San Luis Potosí	25,316	570,814
Zacatecas	24,757	452,720
Durango	38,009	294,366
Nuevo Leon	23,592	309,252
Coahuila	63,569	235,638
Chihuahua	87,802	266,831
TERRITORIES:		
Lower California	58,328	42,245
Tepic	11,275	148,776
Federal district	463	484,608
Totals	767,005	12,578,861

Of this population about 4,500,000 are Indians, descendants of the ancient inhabitants of the country; 5,000,000 are mestizoes or persons of mixed white and Indian (and sometimes Negro) blood; and 2,400,000 are of European (mostly of Spanish) race. Some of the Indians, as the Otomí tribes, show little aptitude for civilization, and others, in the northern states and territories, are practically independent. In general both the Indians and mestizoes show a desire to advance themselves, and frequently they attain the highest social and political positions; President Juarez, for example, was a pure-blooded Indian.

Mexicans are often accused of indolence and lack of enterprise. Considering the great progress which the country has made since 1870, these defects can hardly be charged on

the nation as a whole, though they doubtless exist in some individuals. The long civil wars retarded improvements, encouraged lawlessness, and made the peasant careless of a future whose course he could not foresee. To some extent, at least, they fostered independence and self-reliance, and the many political exiles brought back to their country the advanced ideas which they had gathered abroad. The better class of Mexicans are brave, liberty-loving, intelligent, and quick to adopt new customs. They are hot partisans, but are beginning to see the necessity of majority rule. Slavery is not merely abolished, but its influence is now hardly felt; workmen are well treated and respect themselves, and class distinctions are hardly known. Above all the people are optimistic, and have a thorough belief in their country and its future. Gambling and the lower forms of sport—the bull-ring, cock-fighting, etc.—still have a strong hold on the people, but intelligent men are waking up to the harm which they produce.

Government.—The constitution of Feb. 5, 1857, is in force, but has been several times amended. It is very similar to that of the U. S. The states are free and sovereign in the control of their internal affairs. The federal executive is a president, chosen for four years by indirect popular suffrage. He may be re-elected. In case of his death or absence his place is filled by the president of the senate for the preceding month; formerly the succession was vested in the president of the Supreme Court. The president is assisted by a cabinet of seven secretaries, appointed and removable by him. Congress now consists of a senate and house of deputies. There are two senators from each state and two from the federal district, elected for four years, half the seats falling vacant every two years. Deputies are elected for two years in the ratio of one for every 40,000 inhabitants. The eleven justices of the Supreme Court, with the fiscal and attorney-general, are elected by popular suffrage for terms of six years. The constitution guarantees freedom of speech and religion and freedom of the press, subject only to the regular action of the laws. The great improvement of the country is shown in the marked decrease of crime; the laws are now effectually administered in all except the wildest regions. Brigandage, once the scourge of Mexico, has been nearly extinguished by the action of the severe but salutary law which condemned every brigand to death and made his trial a summary one. The army has been reduced (1894) to about 40,000 men. By the addition of the permanent and general reserves it can be increased to 160,000. The navy is very small.

Religion and Education.—Most Mexicans are Roman Catholics, and until 1857 the Roman Catholic was the state religion. Ecclesiastics had great influence in political affairs, and the Church controlled education and absorbed much of the wealth of the country. Church and state are now absolutely separated, and the laws assure perfect freedom of worship. By the law of Sept. 25, 1873, it was declared that the nation recognized no state religion. Marriage is a civil contract. Monastic orders are prohibited, and (at least in the larger cities) the clergy must wear secular dress in the streets. Ecclesiastical institutions are not allowed to acquire real estate. Public schools are supported by the national and state governments, and are unsectarian. Primary education is compulsory in most of the states, and all classes show a commendable desire to have their children taught. In 1898 there were in the republic 12,358 schools of all grades, with 828,078 pupils. The National University, opened in 1553, has been abolished, its place being taken by schools of law, medicine, and engineering, which are in a flourishing condition. There are various other institutions for higher education in Mexico and in the state capitals supported by public or private means and by the Church. The principal libraries, museum, art school, observatory, etc., are at the federal capital. Literature, as in other Spanish-American countries, has been somewhat unequally developed. In history and the kindred studies of archæology, ethnology, and bibliography Mexican scholars stand deservedly high, but in natural sciences, poetry, and fiction few names of note have appeared. Musical talent is general, and both music and drama are well supported.

Mints and Coinage.—The silver *peso* or dollar is the standard of value; it weighs 27,073 grammes, or 417·7903 grains, 9,027 parts in 10,000 being pure silver. The gold 20-peso piece weighs 522·2340 grains, 875 parts in 1,000 being pure gold; the proportionate value of these, and the value of the silver peso in foreign exchange is of course subject to fluctuations. There are eleven Government mints, which are leased to private individuals, but are subject to inspection. Any person may have gold or silver coined at these mints on the payment of 4·618 per cent. on gold and 4·41 per cent. on silver coins. The total amount coined during the fiscal year 1899–1900 was—silver, 19,979,000 pesos; gold, 698,740 pesos; besides 10,694 pesos in copper cents. A large amount of coin, especially silver, is exported, and the peso is current in many Spanish-American and even Asiatic countries. Counterfeit coins are frequent in the rural districts. Ten or twelve private banks issue banknotes, but no Government paper-money is in circulation.

Weights and Measures.—The metric systems have been introduced, and are coming into general use in large places. In the interior the old Spanish weights and measures are still generally used. The *libra* (pound) is equal to 0·46 kilog.; the *arroba* is 25 *libras*. The *vara* (yard) is 0·837 meter, or 2 ft. 8·9 in.; the league is 6,666⅔ varas.

Finances.—On June 30, 1892, the public debt was officially stated as follows (in Mexican dollars):

External debt, £16,500,000 (at par)	$82,500,000
Internal debt—	
Consolidated 3 per cent.	31,642,850
Railway bonds (Government lines)	22,689,875
Railway debts	15,926,608
Other debts	21,640,177
Total	$91,949,510

In 1900 the outstanding gold debt amounted to £22,628,920; outstanding silver currency bonds to 140,000 dollars. The internal debt July 30, 1899, was 114,542,648 dollars silver, the floating debt 953,619 dollars silver. About 58 per cent. of the revenue is derived from import and export duties, 35 per cent. from internal taxation, and the rest from mints and other sources. The revenue of late years has increased steadily, while expenses have been much reduced; in the fiscal year of 1891–92 the revenue exceeded the expenditures for the first time in the history of the republic. Owing to the fall in the price of silver, the financial conditions since then have been less favorable; but they have been met by a rigid system of economy. In 1899–1900 the revenue was 64,261,078 dollars, the expenditure 58,309,934 dollars. It should be remembered that Mexico has granted in railway subsidies, from 1870 to June 30, 1892, no less than $93,500,000, of which nearly $65,000,000 had been actually paid up to the latter date. In fifteen years $522,000,000 has been expended in public improvements, while the country has met its other obligations.

Means of Communication.—The first railway line—that from Vera Cruz to Mexico, noted for its magnificent scenery and remarkable engineering works—was completed in 1872. Since then, and especially since 1880, the republic has shown great activity in railway building. In 1892 the total length of all Mexican lines in operation was 6,330 miles. These include the Mexican Central, from Mexico to El Paso, and the National, from Mexico to Laredo (these two bringing the capital into connection with the railway system of the U. S.); the Inter-oceanic, from Vera Cruz to Acapulco, etc. Most of these have been built by the aid of Government subsidies with foreign or native capital. The federal Government is now (1894) engaged in the construction of a line across the Isthmus of Tehuantepec. The republic has about 19,000 miles of common roads, some of them good but the greater part execrable, especially in the mountain districts. The lack of bridges is especially vexatious to the traveler by diligence or on horseback, as he is often detained for days by swollen streams. In 1892 there were 31,842 miles of telegraph, mostly national or state property. The telephone, electric light, and tram-cars have been introduced in larger places.

Agriculture.—On the higher lands maize and beans are the most important agricultural products, and the food-staples of the poorer classes; wheat and other cereals grow well in some places, but are not extensively cultivated. Maguey is largely grown in many places, and city markets are regularly supplied with pulque by a special railway service on some lines. In the *tierras templadas* and *calientes* the principal crops, besides maize and manioc, are coffee of excellent quality, especially in Vera Cruz and Colima; tobacco in Vera Cruz, Jalisco, Oaxaca, etc.; cacao in Tabasco and Campeachy; rice in Morelos and the Gulf States; henequen in Yucatan; and sugar-cane in nearly all the states. The cultivation of tropical fruits on a large scale has been undertaken along the Gulf coast, the crops going to the New

Orleans market. Cattle, sheep, and goats are largely bred in some of the northern states.

Manufactures.—The cotton-factories of Puebla, Jaliseo, Vera Cruz, Coahuila, Tlaxcala, and the federal district now employ about 25,000 operatives, and the annual product—principally coarse *manta* or sheeting—is valued at $15,000,000. Carpets, woolen underwear, and cloths are now produced on a considerable scale. There are numerous flour-mills and distilleries, a few breweries, soap-factories, paper-mills, powder-mills, tile-factories, etc. Vera Cruz is the principal center for the manufacture of cigars and cigarettes, though they are made all over the country. The peculiar broad-brimmed Mexican hats, saddles, silver ornaments, jewelry, etc., are generally made at small establishments, but they are of fine quality and the aggregate product is very considerable; to these may be added furniture, clothing, books, etc. The handiwork peculiar to the Indians should be mentioned. It includes various kinds of terra-cotta and glazed pottery, often highly artistic and much prized; feather-work, hammocks, artificial flowers, etc.

Commerce.—The total exports for the fiscal year 1892–93 were valued at $87,509,221, Mexican money. They included the following items:

Silver coin	$27,170,865	Hides	$2,067,156
Silver	6,732,801	Tobacco	1,459,690
Silver ore	10,940,750	Gums	703,572
Argentiferous lead	7,402,641	Ixtle	617,300
Copper	860,379	Vanilla	969,612
Henequen	8,893,071	Woods	1,673,738
Coffee	8,727,119		

The exports, including precious metals, at present largely exceed the imports as recorded. The U. S. receive about two-thirds of the exports and furnish more than half the imports; much of the remaining trade is with England. See Mexico in the Appendix.

History.—Before its discovery by the Spaniards Mexico was occupied by several Indian races, the Nahuas (Aztecs, etc.) being dominant in the southern part of the plateau, with their principal towns about the lakes in the valley of Mexico. (See Aztecs and Mexican Antiquities.) The exploration of the Gulf coast by Grijalva (1518) was followed by the Spanish invasion of the country (1519) and the taking of the Aztec capital, Tenochtitlan, in 1521. (For events of the conquest, see Cortés, Hernando, and Montezuma.) The Spanish colony of New Spain, thus formed, was erected into a viceroyalty, and rapidly became the richest European possession in the New World, with the single exception of Peru. From the new capital at Mexico conquest was pushed over the whole plateau and both coasts, and eventually far into the present territory of the U. S. The first viceroys ruled all the Spanish possessions in North America from the southern boundary of Costa Rica to Florida, as well as the West Indies and the Spanish East Indies. Gradually their authority was restricted in the outlying territories, and in the eighteenth century the East Indies and Guatemala, or Central America, were entirely separated. New Spain was divided into the three "kingdoms" of New Spain, New Galicia, and New Leon, corresponding to Southern, Northwestern, and Northeastern Mexico, to which were added the Territories of Texas, New Mexico, and California, with an undefined extent northward. This vast territory was subdivided into many "intendencies," the bases of the modern states. In the latter part of the eighteenth century the northern part was separated as the "Provincias Internas," though it was reunited to Mexico after the independence. The viceroys ruled with great splendor, and the country experienced no greater disturbances than a few Indian wars and descents of buccaneers on the coast. Enormous fortunes were amassed in the silver mines, in the East Indian trade, which centered at Acapulco, and often by speculation and bribery in office; but commerce was heavily fettered to protect the Spanish monopolies. All important civil and ecclesiastical offices were absorbed by Spaniards. The Creoles or whites born in the country had few privileges, and suffered from unjust and heavy taxation and oppressive laws; and the Indians and mestizoes were kept in a state of degradation and semi-servitude. To these grievances must be added the restrictions on literature and education, the tyranny of the Inquisition, the lack of security for personal liberty, and the venality of the courts. Hatred of the Spaniards naturally produced a desire for independence which found its opportunity in the disturbed state of Spain during the Napoleonic wars. On Sept. 16, 1810, a revolt broke out near Querétaro headed by the priest Hidalgo. It soon assumed formidable proportions, and for a time threatened to drive the Spaniards out of the country, but after several bloody battles it was suppressed and the leaders were shot. (See Hidalgo.) Small bands of insurgents kept up the struggle in the mountains, and the invasion of the northeastern provinces by Mina (1817) did much to foster the spirit of independence. Still loyalty to Spain was by no means dead, and when (1821) a young army officer named Iturbide advanced the plan of an independent Mexican empire under a Spanish Bourbon prince, it was eagerly seized upon even by the avowed republicans, and generally by the army. Iturbide and Guerrero marched on Mexico, and the last viceroy was forced to give in his adhesion to their plan. Spain refused to ratify this treaty with "rebels," and the first Mexican congress made Iturbide himself emperor (June, 1822). This outcome of the struggle was bitterly opposed by the old republicans. After a troubled reign of less than a year Iturbide was deposed and a republic was formed. (See Iturbide.) The term of the first president, Victoria (1824–28), was generally prosperous, but soon after it ended the republic was plunged into civil war, and for many years was subject to the military dictatorship of Santa Anna (*q. v.*). During this period Texas seceded and joined the U. S., leading to a war with that republic (1846–47) which terminated in the cession to the U. S. of all the territory N. of the Rio Grande, and California. The final deposition of Santa Anna (1854) opened the way to the reformed constitution of 1857, but this change involved the long and bitter struggle of the "Reform war," 1857–60. (See Comonfort and Juarez.) The triumph of the reform party under the Indian statesman Juarez was hardly accomplished before France interfered in the affairs of Mexico (1861), and after two years of war made the ill-fated Maximilian emperor. (See Maximilian.) The U. S. finally forced the French to withdraw, leaving Maximilian to his fate. He was soon defeated and shot by the republicans (1867), and Juarez, who had bravely upheld the constitution even when driven from the country, was reinstated, and ruled until his death. Under him the constitution of 1857 was cemented, and the modern era of progress and prosperity was inaugurated. Gen. Porfirio Diaz first attained the presidency in 1877 through a short civil war, but he has ruled with wisdom and firmness, and still (1901) holds the office. See also Spanish-American Literature.

Authorities.—History: Mora, *Méjico y sus revoluciones* (3 vols., 1836); Alaman, *Historia de Méjico* (5 vols., 1849–52); H. H. Bancroft, *History of the Pacific States* (*Mexico*), 6 vols., 1886–88 (a very complete bibliography in vol. i.); also *Popular History of the Mexican People*; Prescott, *Conquest of Mexico*; Noll, *A Short History of Mexico* (1890). Zoölogy and botany: The *Biologia Centrali-Americana*, edited by Godman and Salvin (in course of publication, 1894). General works, travels, and geography: Janvier, *Mexican Guide*; A. R. Conkling, *Guide to Mexico* (1866); *Hamilton's Mexican Handbook* (1883); Bureau of the American Republics, *Handbook of Mexico* (1890); H. H. Bancroft, *Resources and Development of Mexico* (1893); the works of Cubas, Orozco y Berra, Charnay, and Bandelier (on antiquities); Humboldt, Chevalier, Castro, and Brantz Mayer; the travels of Ward and Ober.

Herbert H. Smith.

Mexico: a state of the republic of Mexico; centrally situated in the southern part of the plateau, bordering on Querétaro, Hidalgo, Tlaxcala, Puebla, Morelos, Guerrero, and Michoacan. Area, 9,247 sq. miles; pop. 837,368 (these figures do not include the capital and federal district, which are surrounded by the state). Capital, Toluca. The surface is much broken by mountains of the Anahuac system. On the southern border the giant masses of Popocatepetl and Ixtaccihuatl are in plain sight from the city of Mexico; on the E. the irregular range called the Sierra Nevada separates the valley of Mexico from the plateau of Puebla; on the W. there are other high mountains; and the central range, called the Sierra de las Cruces, culminates in the Nevado de Toluca (14,020 feet), and divides the valley of Mexico from the somewhat similar but higher basin of Toluca. Some of the southeastern valleys are within the *tierra caliente*—i. e. below 3,000 feet—and grow sugar-cane and other tropical products. The silver mines of the state are very productive; mercury, gold, sulphur, and marble of excellent quality are mined. Cereals and maguey (for pulque-making) are the principal products of the higher lands. Mexico is one of the principal manufacturing states, making cotton and woolen cloths, glass and porcelain, saddlery, hats, etc. Public instruction receives much attention.

H. H. Smith.

Mexico (Span. *México*, or *Méjico*): capital and largest city of the Mexican republic; in the federal district; lat. 19° 25′ 45″ N., lon. 99° 5′ 15″ W., and about 7,350 feet above the sea (see map of Mexico, ref. 7–G). The valley of Mexico, in which it is situated, is an inclosed basin, 50 miles long by 35 miles broad, containing six shallow and more or less brackish lakes, some of them now little more than swamps. Formerly these lakes were larger and partly confluent. The site of the city was originally a marshy island in Lake Texcoco. Here, according to their own accounts, the Aztecs settled in 1325, calling their *pueblo* Tenochtitlan and sometimes Mexitl (apparently an appellation of the war-god, Huitzilopochtli), whence the modern name. The island was partially protected from floods by a dike, and was approached by causeways. The chiefs of Tenochtitlan became, during the fourteenth century, dominant over the southern part of the plateau. Opinions differ as to the extent of their power; but the drift of modern research is to reject the idea of an Aztec empire; probably the pueblos and tribes of the plateau remained in a state of semi-independence, though Tenochtitlan extorted tribute from them; some, as Tlaxtala, were certainly free. The Aztec capital was taken by the Spaniards in 1521, after most of the low buildings composing it had been destroyed. (See CORTÉS, HERNANDO.) Cortés made the mistake of building his capital on the ruins of the old city, though there was plenty of high ground near. The waters of the lakes have receded, and the city is now several miles from the nearest of them, though still approached by causeways over low and often swampy ground; canals, bordered by vegetable and flower-gardens, connect the outskirts with Texcoco and Chochimilco; the city drainage, heretofore, has been into the former lake. Having no outlet, these lakes swell with the summer rains, forcing back the polluted water into the city; during the colonial period the waters frequently rose so high as to flood the streets to a depth of several feet, and this during long periods. The inundations have practically ceased, partly owing to the natural decrease of the lakes and partly to the expensive dikes, and to a huge drainage canal which was constructed in the seventeenth century; but these did not dispose of the city sewage. Built on a sub-soil of swamp and without proper drainage, Mexico has always been an unhealthful place, especially in the poorer quarters; intestinal diseases and swamp fevers are very common, and there have been frequent epidemics of typhoid and typhus. Water quickly gathers in very slight excavations, so that it is impossible to dig cellars; the resulting dampness, together with the rarefied atmosphere at this elevation, often induces pulmonary complaints, especially among strangers. It has frequently been proposed to drain away all the lakes, at an enormous expense, and this may eventually be done. Works initiated under Maximilian had for their primary object the disposal of the city sewage, and secondarily the regulation of the level of the lakes. After many interruptions these works were essentially completed in 1894. They include a canal nearly 30 miles long and a tunnel of nearly 7 miles. With these and other sanitary measures, it is believed that the health of the city will be greatly improved. There are two fine aqueducts, bringing a somewhat inadequate water-supply from the hills; that of Chapultepec follows, very nearly, the line of an Aztec aqueduct. Mexico is regularly laid out, with moderately wide streets which cross each other at right angles, and are usually well paved and lighted; tram-cars run through the principal ones to several suburbs. The usual central square (now adorned by a garden) is faced by the cathedral, which is on or near the principal Aztec temple (*teocalli*). The present building was begun in 1573 and consecrated in 1645, though then far from complete; it is regarded as the finest church edifice in Spanish America, and the interior is elaborately decorated, some of the paintings, it is said, being by Murillo. Another side of the square is occupied by the Government palace, on the site of that of Montezuma; it was the residence of Cortés (partly burned by rioters in the seventeenth century, but rebuilt) and of the viceroys. It now contains the principal Government offices, senate chamber, hall of ambassadors, etc., and the Government pawn-shop, an important institution. Other buildings of interest are the offices of the Inquisition (now turned into a medical school), the mint (the oldest in the republic), custom-house, convent of Santo Domingo, various churches, and the numerous charitable institutions. Iturbide's palace, a very large structure, is occupied as a hotel. The Panteon contains many elaborate monuments, the finest being that in honor of Juarez. The better class of dwellings are solidly built of stone, with interior courts; living-rooms are generally on the second floor. The National Museum is especially rich in antiquities, including the sacrificial stone, hideous idols, etc., found near the site of the *teocalli*, and sculptures from the southern states and Yucatan; the mineral collection is very complete. There are several libraries, the most important, and perhaps the most valuable in America, being the Biblioteca Nacional, with 155,000 volumes (in 1892) and a priceless collection of historical manuscripts. The Academy of San Carlos contains more valuable paintings by old masters than any other art-gallery in America. There are excellent astronomical and meteorological observatories; several scientific schools receive Government aid, and are doing good work; and schools of law, medicine, pharmacy, engineering, technology, fine arts, music, etc., take the place of the old university. The city and federal district are well supplied with good public and private schools of all grades. The principal outdoor resorts are the Alameda, a public park and promenade with superb trees; the Paseo de la Viga, along a canal of that name; and the Paseo de Bucareli, continued to Chapultepec in the Paseo de la Reformas, and adorned with a fine bronze equestrian statue of Charles IV. and monuments to Columbus, Guatemotzin, and Cortés. Mexico is now connected by rail with most of the states and the U. S., and is a center of manufactures and commerce. Much of the trade is in the hands of foreigners. Pop. (1895) 344,377. The federal district has an area of 463 sq. miles, and a population of 484,608; it includes, besides the city, the towns or suburbs of Tacubaya, Guadalupe, Tlolpam, etc. H. H. SMITH.

Mexico: city; capital of Audrain co., Mo. (for location of county, see map of Missouri, ref. 3–H); on the Salt river, and the Chi. and Alton and the Wabash railways; 108 miles N. W. of St Louis. It is the seat of Hardin College (Baptist, opened 1872), and has a military academy, a national bank with capital of $50,000, 2 State banks with combined capital of $250,000, and 2 daily, a monthly, and 3 weekly periodicals. The industries comprise the manufacture of flour, fire-brick, wagons, and plows. Pop. (1880) 3,835; (1890) 4,789; (1900) 5,099. EDITOR OF "LEDGER."

Mexico: village; Oswego co., N. Y. (for location of county, see map of New York, ref. 3–G); on the Salmon creek, near Lake Ontario, and the Rome, Water. and Ogdensburg Railroad; 17 miles E. of Oswego. It contains 4 churches, 3 district schools, an academy, a weekly newspaper, and flour and grist mills, carriage-factories, corn-canneries, butter-dish factory, and agricultural-implement works. Pop. (1880) 1,273; (1890) 1,315; (1900) 1,249.
EDITOR OF "INDEPENDENT."

Mexico, Gulf of: a vast inland sea, corresponding in many ways with the Mediterranean; nearly surrounded by the U. S. and Mexico, and partially shut off from the Atlantic by the island of Cuba. It is connected with the Atlantic by two comparatively shallow channels known as the Straits of Florida and the Yucatan Channel. The former has a maximum depth of 344 fathoms and a cross-section of 11 sq. miles; the latter, with a greatest depth of 1,164 fathoms, has a cross-section of 110 sq. miles. These measurements, together with other data, obtained by the U. S. Coast and Geodetic Survey, show that only a part of the Gulf Stream comes from the Gulf, instead of the whole of it, as has been long supposed. The area of the Gulf, cutting it off by a line from Cape Florida to Havana, is 595,000 sq. miles. The 100-fathom line marking the true continental border is distant from the present shore about 6 miles at Cape Florida, 120 miles on the west coast of Florida and the north coast of Yucatan, and 130 miles opposite Louisiana and Texas. Should the surface of the Gulf be lowered 100 fathoms, 208,000 sq. miles, or one-third of its area, would be added to the land. The greatest depth is 2,119 fathoms. A submarine plateau to the N. W. of the center of the Gulf, and below 2,000 fathoms, is known as Sigsbee's Deep, after its discoverer. The northern part of the Gulf has been filled with sediment from the Mississippi, and many facts indicate that the bottom in that region is slowly subsiding on account of the weight of the silt deposited upon it. See also GULF STREAM. Consult *Report of Superintendent of United States Coast and Geodetic Survey for 1883–84*, pp. 619–621. ISRAEL C. RUSSELL.

Meyer, ADOLF BERNHARD, M. D.: ethnologist and ornithologist; b. at Hamburg, Germany, Oct. 11, 1840; was educated there and at the Universities of Göttingen, Vienna, Zurich, and Berlin. From 1870 to 1873 he traveled in the

Philippine and Malay islands; since 1874 he has been director of the Royal Zoölogical and Anthropo-Ethnographic Museums of Dresden. Dr. Meyer's contributions to ornithology and ethnology are numerous, and have appeared in the publications of the leading scientific societies of Europe. Besides these he has, as director, issued sixteen volumes of memoirs and reports of the Dresden Museum. Among his other works are *Abbildungen von Vogelskelette* (4to, parts 1–21, 1879–94); *Die Hirschgeweihsammlung zu Moritzburg* (folio, 62 plates, 1883–87); *Unser Auer-, Rackel-, und Birkwild und seine Abarten* (folio, with atlas of 17 plates, 1887); *Album von Celebestypen* (1887); *Album von Philippinentypen* (1885–89, with 82 plates); and *Gurina im Obergailthal* (Kärnthen, folio, 14 plates, 1885). F. A. Lucas.

Meyer, Eduard, M. D.: ophthalmologist; b. at Dessau, Nov. 13, 1838; studied at the Universities of Halle, Berlin, and Paris, graduating M. D. at Berlin in 1860; settled in Paris, in 1863, to practice his specialty. In 1869 he published *Maladies des yeux*, a work that has passed through a number of editions and has been translated into German, English, Spanish, Italian, and Russian. In 1882 he became coeditor of the *Revue generale d'ophthalmologie*. S. T. A.

Meyer, Georg Hermann, von, M. D.: anatomist and physiologist; b. at Frankfort-on-the-Main, Aug. 16, 1815; studied in the Universities of Heidelberg and Berlin, under Tiedemann and J. Müller, graduating M. D. from the latter school in 1837; in 1840 was privat docent in the University of Tübingen; in 1844 accepted the position of prosector at the University of Zurich, subsequently becoming Professor of Anatomy. His contributions to physiological anatomy are very valuable. Among his works are: *Lehrbuch der physiologischen Anatomie des Menschen* (Leipzig, 1856); *Die Statik und Mechanik des menschlichen Knochengerüstes* (Leipzig, 1873); *Unsere Sprachwerkzeuge und ihre Verwendung zur Bildung der Sprachlaute* (Leipzig, 1880).
S. T. Armstrong.

Meyer, Gustav, Ph. D.: philologist; b. at Gross-Strehlitz, Silesia, Nov. 25, 1850; studied at the University of Breslau; from 1871 to 1874 was teacher in the Gymnasium at Gotha; in 1876 became privat docent in Prague; since 1877 has been Professor of Comparative Philology at Graz in Steiermark; is a member of the Imperial Academy of Vienna; is author of *Die mit Nasalen gebildeten Präsensstämme* (1873); *Zur Geschichte der indogerm. Stammbildung und Declination* (1875); *Griechische Grammatik* (1880; 2d ed. 1886); *Albanesische Studien* (3 vols., 1883–92); *Essays und Studien zur Sprachgeschichte und Volkskunde* (1885); *Reiseskizzen aus Griechenland und Italien* (1886); *Albanesische Grammatik* (1888); *Griechische Volkslieder in deutscher Nachbildung* (1890); *Etymologisches Wörterbuch der albanesischen Sprache*. He is the first authority in the field of Albanian philology. Benj. Ide Wheeler.

Meyer, Heinrich August Wilhelm, Th. D.: Bible commentator; b. at Gotha, Jan. 10, 1800; studied theology in Jena; was pastor at Osthausen (1822), Harste (1831), Hoya (1837), Neustadt (1841); after 1848 he resided in Hanover, and there died June 21, 1873. As early as 1832 his labors as an exegetical commentator upon the New Testament were recognized in Germany as uniting sound learning and the most searching criticism with an orthodox, conservative faith. From that day to the period of his death he was constantly putting forth new editions, masterpieces of exegesis. Unable to finish the New Testament himself, because the wonderful sale of his commentary had obliged him to make these frequent revisions, which were of the most thorough and candid character, he gave Thessalonians to Revelation to others. An English translation of his commentary appeared at Edinburgh under the supervision of Rev. W. P. Dickson, of the University of Glasgow, and Rev. F. Crombie, of St. Mary's College, in twenty volumes, 1873–82, of which there is a greatly improved American edition (11 vols., New York, 1884–88). Revised by S. M. Jackson.

Meyer, Johann Georg, called **Meyer von Bremen**: genre-painter; b. in Bremen, Oct. 28, 1813; d. in Berlin, Dec. 6, 1886. He was a pupil of Düsseldorf Academy; settled in Berlin in 1852; became Professor of the Academy there 1863; was a member of the Amsterdam Academy. He was awarded a medal at the Centennial Exhibition, Philadelphia, 1876. His pictures, almost all of small size, brought high prices during his lifetime, and many of them are owned in the U. S. *The Letter* is in the Wolfe collection, Metropolitan Museum, New York. W. A. C.

Meyer, Julius Lothar, von, Ph. D.: chemist: b. at Varel, in Oldenburg, Aug. 19, 1830; studied medicine in Zurich and Würzburg, then chemistry, mathematics, and physics in Heidelberg and Königsberg; graduated at the University of Würzburg in 1857, his thesis being *Die Gase des Blutes*; taught in the forestry academy of Neustadt-Eberswalde after 1866, in the Carlsruhe Polytechnic Institute after 1868, in the University of Tübingen after 1876, and in that of Göttingen after 1885. D. at Göttingen, Apr. 14, 1895. He contributed many technical papers to chemical periodicals. S. T. Armstrong.

Meyer, Leo, Ph. D.: comparative philologist; b. at Bledeln, in Hanover, July 3, 1830; studied at Göttingen and Berlin; in 1862 became assistant professor at Göttingen; since 1865 has been Professor of German and Comparative Philology at Dorpat in Russia (Livonia); is the author, among other works, of *Gedrängte Vergleichung der griechischen und lateinischen Deklination* (1862); *Vergleichende Grammatik der griech. und lat. Sprache* (2 vols., 1861–65; vol. i., 2d ed. 1884); *Die gotische Sprache* (1869); *Griechische Aoriste* (1879). Benj. Ide Wheeler.

Meyer, Ludwig, M. D.: alienist; b. at Bielefeld, Germany, Dec. 27, 1827; studied in the Universities of Bonn, Würzburg, and Berlin, graduating M. D. from the latter in 1852; began his psychiatric studies in the Berlin Charité Hospital, later going to the Hamburg general hospital; in 1866 was elected professor at the University of Göttingen, and became director of the asylum for the insane. His papers on various topics connected with insanity have been published in the *Zeitschrift für Psychiatrie* and the *Archiv für Psychiatrie*. S. T. Armstrong.

Meyer, Paul: philologist; b. in Paris, Jan. 17, 1840; has been Professor of the Languages and Literatures of Southern Europe at the Collège de France since 1876, director of the École des Chartes, and member of the Académie des Inscriptions et Belles-Lettres. He is also secretary of the Société des Anciens Textes Français, has been one of the editors of the *Romania* since its foundation in 1872, and was one of the first editors of the *Revue critique d'histoire et de littérature*, begun in 1866. Besides many papers in periodicals, such as the two just mentioned, the *Jahrbuch für romanische und englische Literatur*, the *Mémoires de la Société de linguistique de Paris*, the *Bibliothèque de l'École des Chartes*, etc., which are important for the study of the Provençal and Old French languages and literatures, he has also published in separate volumes a number of editions of mediæval texts and other works. Among these are *Barlaam und Josaphat* (1864), an Old French poem, with H. Zotenberg; *Le Roman de Flamenca* (1865); *Les derniers troubadours de la Provence* (1871); *Recueil d'anciens textes bas-latins provençaux et français* (1874–77, not yet complete); *La Chanson de la croisade contre les Albigeois* (2 vols., 1875–79); *Daurel et Beton* (1880); *Girart de Roussillon* (1884), a translation; *Fragments d'une Vie de Saint-Thomas de Cantorbéry* (1885); *Alexandre le Grand dans la littérature française du moyen âge* (2 vols., 1886); *L'Histoire de Guillaume le Maréchal* (vol. i., 1891); *La Chansonnier français de Saint-Germain-des-Prés* (vol. i., 1891), with G. Raynaud. E. S. Sheldon.

Meyer, Victor: chemist; b. in Berlin, Sept. 8, 1848; studied in Berlin; became Professor of Chemistry in Stuttgart 1871, in Zurich 1872, in Göttingen 1885, in Heidelberg 1889; has made exhaustive researches in organic chemistry. Is author of *Pyrochemische Untersuchungen* (with Lauger, 1885); *Die Thiophengruppe* (1888); *Ergebnisse und Ziele stereochemischer Forschung* (1890); *Lehrbuch der Organischen Chemie* (with Jacobson, 1891); *Tabellen zur qualitativen Analyse* (with Treadwell, 3d ed. 1891); *Aus Natur und Wissenschaft* (1892).

Meyerbeer, mī'er-bār, Giacomo (Italianized form of Jakob Meyer Beer: composer; b. in Berlin, Sept. 5, 1791. His father, James Beer, a wealthy Jew, who appreciated culture and had a fondness for art, gave his three sons, Michael, Wilhelm, and Jakob, the full advantages of education. Giacomo (or Jakob) had a genius for music, and enjoyed the benefit of the best teaching that could be commanded. In 1806 he was admitted to Vogler's select school at Darmstadt, and in close intimacy with Karl Maria von Weber, who had already composed operas, he studied hard and successfully for two years. At this time Meyerbeer composed an oratorio, *Gott und die Natur*. In 1812, under Vogler's auspices, the opera of *Jephthah* was produced at

Munich. It failed, and the disconcerted composer, dropping dramatic music for a time, returned to the piano, and achieved great distinction in Vienna. A second opera, *Die Beiden Kalifen*, failed. Italian music alone was popular, and Meyerbeer went to Italy to learn the methods of the Italian school. Thenceforward his labor was successful. His *Romilda e Costanza* (1812) at Padua, his *Semiramide* (1819) at Turin, his *Emma di Resburgo* (1820) at Venice, were received with praise. In 1822 *Margaret of Anjou* was brought out triumphantly at the Scala in Milan. The next year *L'Esule di Grenata* was produced with Lablache and Pisaroni. In 1824 the *Crociato* was received with immense favor at Venice. This closed the first period in the composer's career. The second period opened in Paris, with *Robert le Diable*, which was brought out in 1831, and roused unprecedented enthusiasm, not in Paris only, but in Germany and all over Europe. *The Huguenots* followed in 1836, and added new laurels to Meyerbeer's fame, it being the first of what may be termed "historical" as distinguished from the purely romantic lyric drama. The appearance of *The Huguenots* made an epoch in operatic art. Thirteen years passed before the *Prophète* was completed. In 1854 came *L'Étoile du Nord*, five years later *Dinorah*, also known as *Le Pardon de Ploermel*, both works inferior in dignity to the two preceding. *L'Africaine*, the work of years, waited long for an opportunity, and was not produced till 1865, a year after the composer's death, which occurred in Paris, May 2, 1864. See the *Life*, by Blaize de Bury (1865) and that by Henri Mendel (1868).

Meyersdale, or **Dale City**: borough; Somerset co., Pa. (for location of county, see map of Pennsylvania, ref. 6–C); on the Casselman river, and the Balt. and Ohio Railroad; 113 miles S. E. of Pittsburg. It is in an agricultural and mining region, and has flour and planing mills, iron-foundry, furniture-factory, stoneware-works, large lumber interests, and two weekly newspapers. Pop. (1880) 1,423; (1890) 1,847; (1900) 3,024.

Meynert, Theodor, M. D.: alienist and neurologist; b. at Dresden, Saxony, June 15, 1833; graduated M. D. at the University of Vienna in 1861; in 1865 was docent for the Anatomy of the Brain; in 1866 was prosector of the Vienna Insane Asylum; in 1870 director of the psychiatric clinic and Extraordinary Professor of Psychiatry at the university; in 1873 elected Professor of Neurology; in 1885 made a privy councilor. He was president of the Psychiatric Association, vice-president of the Vienna Medical Society, and a member of the Imperial Academy of Sciences of Vienna. His researches on the anatomy of the brain and his writings on medico-psychological subjects have been of great value in advancing this department of medical science. Among his publications are *Zur Mechanik des Gehirnbaues* (Vienna, 1874); *Psychiatrie Klinik der Erkrankungen des Vorderhirns* (Vienna, 1884). He was coeditor of *Psychiatrisches Centralblatt* from 1871–78, and of *Jahrbücher für Psychiatrie* for 1879. D. May 31, 1892.

S. T. Armstrong.

Meyr, Melchior: author; b. at Ehringen, in the Ries, a fertile plain included by the Franconian and Suabian Jura, Bavaria, June 28, 1810; studied at Munich and Heidelberg; devoted himself to literature; lived in Berlin 1840–52, afterward alternately at Munich and Ehringen, where he died Apr. 22, 1871. His best-known productions are *Duke Albert* (1852); *Stories from the Ries* (1856); *Charles the Bold* (1862); and *New Stories from the Ries* (1871). In the *Stories from the Ries* he gives a series of exquisite pictures of the peasant life of his native country, which rank among the best village tales written in the German language.

Revised by Julius Goebel.

Mey'rick, Frederick: theologian; b. at Ramsbury vicarage, Wiltshire, England, Jan. 28, 1827; educated at Trinity College, Oxford, where he was successively scholar, fellow (1847–60), and tutor (1851–59), and has since held the university office of select preacher (1855–56, 1865–66, 1875–76). He was the chief founder of the Anglo-Continental Society; published *The Practical Working of the Church in Spain* (1851); *The Moral and Devotional Theology of the Church of Rome* (1857); *The Outcast and the Poor of London* (1858); *Is Dogma a Necessity?* (1883); *The Doctrine of the Church of England in Holy Communion Restated* (1885; 3d ed. 1891); *The Church in Spain* (1892); and controversial writings against Roman Catholicism; has contributed to Dr. Smith's *Dictionary of the Bible*, to the *Speaker's Commentary*, to the *Pulpit Commentary*, and to Hodder and Stoughton's *Theological Library*. Editor of the *Foreign Church Chronicle and Review*; was examining chaplain to the Bishop of Lincoln (1868–85); principal of Codrington College, Barbados (1886–87); since 1868 has been rector of Bickling, Aylsham, Norfolk. Revised by S. M. Jackson.

Meyrick, Sir Samuel Rush, LL. D.: archæologist; b. in London in 1783; was educated at Queen's College, Oxford, and became an advocate in the ecclesiastical and admiralty courts, but devoted his chief attention to archæological studies, and contributed innumerable papers to *The Gentleman's Magazine*. His specialty was the collection and illustration of ancient arms and armor, of which he ultimately formed a large collection. Among his works were *The History and Antiquities of the County of Cardigan* (4to, London, 1810); *The Costume of the Original Inhabitants of the British Islands* (1815); *A Critical Inquiry into Ancient Armor* (1824; improved ed. 3 vols., 1844), with more than 100 colored plates; and *Engraved Illustrations of Ancient Arms and Armor, a Series of 154 Etchings* (by Joseph Skelton) *of the Collection at Goodrich Court* (2 vols., 1830). The prints in the last-named work are valuable, but there is little archæological accuracy in the text of any of his publications. D. in London, Apr. 2, 1848. Revised by Russell Sturgis.

Mezeray, māz'rā', François Eudes, de: historian; b. near Falaise, Normandy, in 1610; began his literary career as a poet, but turned soon to historical studies, and published in 1643 the first volume of his *Histoire de France*, which procured for him the patronage of Richelieu, who gave him a pension of 4,000 livres and the title of historiographer. His *Abrégé chronologique de l'Histoire de France* (1668) is considered better than the principal work. D. in Paris, July 10, 1683.

Meze'reon [from Fr. *mézéréon*, from Arab. and Pers. *māzariyūn*, camellia]: in materia medica, the bark of shrubs belonging to the genus *Daphne*, especially *D. mezereum*, *D. laureola*, and *D. gnidium*. They are natives of Europe and Asia, sometimes seen in cultivation in the U. S. They are of the order *Thymeleaceæ*. The bark has strongly irritant-narcotic properties. It was once extensively employed in medicine, and now has a limited use in cases of rheumatism and other diseases. The fresh bark will quickly blister the skin.

Revised by H. A. Hare.

Mézières, mā'zi-ãr': a fortified town; the capital of the department of Ardennes, France; on the Meuse, opposite Charleville, with which it is connected by a bridge. It is 155 miles by rail N. E. of Paris (see map of France, ref. 2–G). In 1520 it was successfully defended by Bayard against Charles V., and his banner is still preserved in the hotel de ville. The anniversary of the deliverance of the town, Sept. 27, is still observed. The present fortifications were planned by Vauban. The school of military engineering originally founded here was successively transferred to Metz and Fontainebleau. The iron industry has gradually been concentrated at Charleville. Pop. (1891) 6,551; (1896) 7,453.

Mézières, Alfred Jean François: critic; b. at Réhon, Moselle, France, Nov. 19, 1826. He studied at the École Normale Supérieure, and then at the French school in Athens, obtaining the degree of docteur-ès-lettres in 1853. In 1854 he was made Professor of Foreign Literatures at Nancy; in 1863 he was given a similar position at the Sorbonne, having already served some time there as *suppléant*. In Jan., 1874, he was elected to the Académie Française to succeed Saint-Marc Girardin. His studies were chiefly in Italian, English, and German literature, and most of his publications have had to do with one or the other of these. We may mention *Étude sur les œuvres politiques de Paul Paruta* (1853); *Shakespeare, ses œuvres et ses critiques* (1861); *Prédécesseurs et contemporains de Shakespeare* (1863), like the preceding crowned by the French Academy; *Contemporains et successeurs de Shakespeare* (1864); *Dante et l'Italie nouvelle* (1865); *Pétrarque, d'après de nouveaux documents* (1867); *La société française, etc.* (1869); *W. Goethe, les œuvres expliquées par la vie* (2 vols., 1872–73). Mézières has contributed much literary criticism to the *Revue des Deux Mondes* and *Le Temps*. Since the Franco-German war he has interested himself in politics as a moderate republican. In 1881, and in 1885, he was elected deputy. Of his more recent publications may be mentioned *En France: XVIII^e et XIX^e siècles* (1883), and *Hors de France: Italie, Espagne, Angleterre, Grèce moderne* (1883).

A. R. Marsh.

Meziriac, me-zĕĕ'rĕĕ'ăăk', Claude Gaspar Bachet: classical scholar; b. in Bourg, France, Oct. 9, 1581. He be-

longed to the Jesuit order, but subsequently became an apostate and married. He was one of the most learned men of his time; is now chiefly known as the author of a commentary to the *Heroides* of *Ovid*, a work full of recondite learning. The first edition (1626) is one of the rarest of books, a second was, however, issued in two volumes by Haye du Sauzet (1716). A. G.

Mezzo, med'zō [Ital., liter., middle, half: Span. *medio*: Portug. *meio*: Roman. *miez*: Fr. *mi* in *midi*, *parmi*, etc. < Lat. *medius*, mid, in the middle]: in music, a term of diminution, signifying the half, middle, or mean between two things of a positive nature or description. Thus a mezzo-soprano voice is one whose range is between the soprano and alto. Mezzo forte (or *m. f.*) is rather loud, and mezzo piano (or *m. p.*) rather soft. Mezzo voce, in like manner, implies the use of only half of the usual force of the voice.

Mezzofan'ti, Giuseppe Gaspardo: linguist; b. at Bologna, Italy, Sept. 17, 1774. At the age of fifteen, besides Greek and Latin, he already knew many foreign European languages. Having entered the priesthood (1797), he was appointed Professor of Oriental Languages and librarian at Bologna. In 1831 he removed to Rome; in 1833 succeeded Angelo Mai as chief keeper of the Vatican library; and in 1838 was made a cardinal. He is said to have spoken over fifty languages, but this faculty was not combined with any great measure of intellectual power. D. in Rome, Mar. 15, 1849. His books and papers became the property of the library of Bologna. There exists but a single printed work of his, an eulogy pronounced in 1819 upon his old master in Greek, Emmanuele da Ponte. See his *Life*, by Charles William Russell (1858; 2d ed. 1863).

Mezzotint Engraving: See Engraving.

Miako, mĕĕ-aa'kō: a Japanese name meaning "metropolis," and therefore synonymous with *Kioto*, frequently applied to the old capital of Japan now called *Sai-kio*, or "Western capital," to distinguish it from Tokio (literally, "Eastern capital"), the present capital of the country.

Miall, Edward: politician; b. at Portsmouth, England, in 1809; was educated at the Protestant Dissenters' College at Wymondley; became an Independent minister at Ware, and afterward preached at Leicester; removed to London in 1840 and established *The Nonconformist*; in 1844 aided in establishing the British Anti-Church Association, later known as the Liberation Society; was an unsuccessful candidate for Parliament in 1845 and 1847; was elected for Rochdale July, 1852; lost his seat 1857; represented Bradford in 1869–74. Mr. Miall was a conspicuous parliamentary advocate of manhood suffrage and an opponent of all religious endowments. He published *Views of the Voluntary Principle* (1845); *Ethics of Nonconformity* (1848); *Title-deeds of the Church of England to her Parochial Endowments* (1861); *Politics of Christianity* (1863); and *Wayside Musings and Reminiscences* (1865). D. Apr. 29, 1881. See the *Life* by A. Miall (1884).

Miami (mī-aa'mĕĕ) **River**: a river in Dade co., Fla.; formed in the Everglades by outlets of Lake Okeechobee. It flows into Biscayne Bay. At its mouth is a fine grove of cocoa-palms.

Miami River: a stream of Ohio; rises in Hardin co., runs in a southwest course, passing the cities of Troy, Dayton, and Hamilton. It is a rapid stream, flowing through a beautiful, fertile, and populous valley, and joining the Ohio below Cincinnati. It is 150 miles long, and furnishes much water-power. Its ultimate source is 1,335 feet above tide. A canal extends along the river.—The Little Miami is a smaller, unnavigable stream, flowing through a fertile and hilly region to the E. of the Miami, and reaching the Ohio 6 miles above Cincinnati.

Miamis: See Algonquian Indians.

Miamisburg: village; Montgomery co., O. (for location of county, see map of Ohio, ref. 6-C); on the Great Miami river, the Miami and Erie Canal, and the Cleve., Cin., Chi., and St. L., and the Cin., Hannibal, and Dayton railways; 10 miles S. of Dayton, the county-seat, 50 miles N. of Cincinnati. It is in a tobacco-growing region, has excellent water-power, and contains several mills and factories, 2 national banks with combined capital of $200,000, and 2 weekly newspapers. Pop. (1880) 1,936; (1890) 2,952; (1900) 3,941.

Miami University: an educational institution at Oxford, Butler co., O.; incorporated in 1809; opened as a grammar school in 1818, and as a college in 1824. It derives its origin from a grant of the township of Oxford, made by Congress to the State of Ohio in 1802, to be held in trust for educational purposes. During the years 1873–84 the institution was closed. The university is non-sectarian, governed by a board of eighteen trustees appointed by the Governor of the State, and receives an annual appropriation from the Legislature. Its library contains 16,000 volumes. President, Rev. David S. Tappan, D. D.

Miantonomoh: sachem of the Narragansett Indians and nephew of Canonicus; assumed the government about 1636, and in that year concluded an alliance with the government of Massachusetts. He aided the colonists in the Pequod war 1637, and was friendly to Roger Williams and other early settlers of Rhode Island, to whom he made grants of land. Having engaged in war with Uncas, sachem of the Mohegans, he was taken prisoner, carried to Hartford, and by the advice and consent of the commissioners of the United Colonies was returned to Uncas to be executed. He was taken to the spot where he had been defeated, Great Plains, near Norwich, and there was put to death by the tomahawk by a brother of Uncas. A simple monument, erected in 1841, marks his grave.

Miao-tse, or **Meao-tse** (literally, sons of the soil): aboriginal tribes who early appear in Chinese history, and who formerly occupied extensive tracts in Central China, especially in the neighborhood of the Tung-ting Lake, but who have been driven by the advancing Chinese into the more inaccessible mountain regions of the S. and S. W., chiefly Kwei-chow and Kwangsi, where they still maintain a practical independence, though in the period Kien-Lûng (1736–95) many tribes were compelled by the presence of superior Chinese forces, which had fallen upon them unawares, to accept Chinese sovereignty. Some have gradually become assimilated to the Chinese, and a few have risen to position among the mandarins. They are divided into about fifty clans, ranged in several larger divisions, known as the Red, the White, the Blue, and the Black Miao, from the color of their dress. Their numbers are unknown.

Physically they are of smaller stature than the Chinese, have regular features, and seem to be ethnically affiliated to the Siamese family. They are skillful hunters, but engage to some extent in the cultivation of the soil. Like the Li of Hainan the young people do their own match-making. Disputes among them are settled by the arbitration of the elders. R. Lilley.

Miaoulis, mĕĕ-ow'lis, Andreas Vokos: revolutionist; b. at Hydra, Greece, in 1770, where he received his surname Miaoulis from his commanding a felucca (Turk. *miaoul*). He devoted himself and his property to the Greek revolution (1821), was made commander-in-chief of the fleet, and by his invincible courage and fertility in expedients gained several brilliant successes over greatly superior Ottoman and Egyptian forces. With self-sacrificing loyalty to the national cause he resigned in favor of Lord Cochrane, and continued to serve as a simple captain. Afterward he was reinstated in his office by Capodistrias, the president of Greece, but opposed the latter's Russian tendencies, joined the opposition, and became much involved in the political controversies of the time. He was a member of the deputation which went to Munich (1832) to offer the Greek crown to King Otho. D. at Athens, June 24, 1835, and was buried at the Piræus, near the supposed grave of Themistocles.
E. A. Grosvenor.

Miasma, or **Malaria**, or **Paludism** [*miasma* is Mod. Lat., from Gr. *μίασμα*, stain, pollution, defilement, deriv. of *μιαίνειν*, stain, taint, pollute]: a term which is said to have been used, with a signification similar to that which it has to-day, as long ago as the time of Hippocrates, who, in his treatise *On Airs*, attributes various diseases to a mixture of the blood with vitiated air. Not long ago the generally accepted teaching of medical writers was not more definite or rational than this; for miasma (malaria) was regarded as an imponderable emanation, usually from marshy grounds, which obtained access to the blood by way of the lungs, and thus poisoned the body. The word miasma has had somewhat different significations at different times: thus it has been used to indicate injurious emanations from the soil or from dead or living vegetable or animal organisms, being synonymous with effluvia. Again it has been applied (especially in Paris) to the influence on health of persons afflicted with infectious diseases. Probably the best modern definition of miasma—excluding that which rests upon a bacterio-

logical basis (to be spoken of later)—describes it as that element in the cause of diseases peculiar to certain locations (usually marshy), which is found in the air of such places, and which is known only by the effects of its operation.

Formerly the production of malaria was loosely attributed to the soil; but in recent years it has been attributed first to the vegetable contents of soil and afterward to minute fungous growths—bacteria. Prof. Léon Colin, of Val-de-Grâce, has proposed the term "telluric intoxication," as more accurately fitting the idea intended by the words malaria or miasm, namely, that certain diseases were produced by the action of air coming from soil, the energy of which is not expended upon vegetation; at present neither this term nor the idea it conveys has much standing in medical circles. The same may be said of the idea that malaria or miasm is derived from decaying vegetable matter. However reasonable these ideas may appear to some conservative students of the causation of disease, and however imperfectly established may appear the hypothesis that malarial diseases are caused solely by invasion of the body by bacteria, this is the view of almost all modern writers on the subject. In 1879 Prof. Tommasi Crudeli, of Rome, and Prof. Klebs, of Prague, found a microscopic fungus in the lower strata of the air of a malarial region in Italy, and in the soil and stagnant waters, which they named *bacillus malariæ*. This organism they cultivated in various media, and separated the solid part of the product of their culture from the liquid by filtration and repeated washing. They then injected the solid residue, properly diluted, under the skin of healthy dogs, and produced in them what the experimenters regarded as typical intermittent fever. This explanation of the causation of malarial fever has recently been to a great extent supplanted by the opinion, first advanced by Laveran, that there is always present in the blood of patients with malarial fever a peculiar organism (hæmatozoön) not found in any other disease. This organism, which is regarded as a parasite, has been carefully studied by Prof. Osler and Prof. Councilman, of Johns Hopkins University, and Prof. Dock, of the University of Michigan. The different forms and phases of malarial fever are (according to this theory) associated with various forms and stages of development of the organism which is sometimes called the *Plasmodium malariæ Laveran*.

These germs are found in the blood-cells, and also free in the blood-fluid. They are seen to have very different shapes, but all the shapes are quite characteristic. The most striking forms are globular masses containing pigment granules, and those of a fairly round shape, with or without one or more flagella. In some cases they are seen to have a body depressed on one side like a saucer, presenting, when seen on edge, the appearance of a crescent. Laveran objects to the use of the term *plasmodium*, on the ground that it is botanically inaccurate, and he prefers to call his germ a *hematozoaire*.

The germ theory of the nature of malaria, though ably supported by the writers named and other observers, has not yet been fully accepted. Prof. von Jaksch, of Prague, a most competent authority, states—after referring to the various bacteriological theories—that the contradictory statements of recent writers show that the question as to the specific cause of intermittent fever is not yet satisfactorily solved—a conclusion which the facts fully bear out. The fact that malarial fevers occur very frequently in the neighborhood of marshy regions has led to the use of such terms as "marsh miasm" and "paludal fever"; but malarial fevers are by no means confined to moist ground; for they have raged with great severity in arid districts, as when the British army, under the Duke of Wellington, was operating in Estremadura and near Ciudad Rodrigo in the Spanish Peninsula. The Campagna near Rome is also a dry region in which malarial fevers are very common. Still miasma, or malaria, is in general most active in the neighborhood of moist ground in which decaying vegetable matter is present. It is also often liberated from soil which has long been undisturbed, as when canals are made or streets are dug up.

The common belief of medical writers is that malaria effects an entrance into the human system by the air-passages; and the very obscurity of this process and the multiplicity of the symptoms, and the vague character of some of the phenomena attributed to malaria, probably serve at times as a cloak to conceal inability properly to diagnosticate cases of other diseases. That which is typical of miasmatic or malarial fevers is the regular repetition of a series of the following phenomena: a chill, a rise of temperature, a sweat, and a period of comparative freedom from any of these symptoms. The various forms of intermittent and remittent fevers will be described under these titles, it will suffice here to merely mention them as the results of miasmatic or malarial influences. Beside these, disturbances of the digestive apparatus, of varying degrees of severity and diarrhœa, as well as nervous disorders, dysentery, etc., are attributed by medical writers to the same agency.

The action of miasm is best combated by all measures calculated to elevate and maintain at a normal standard the vital functions—good food, good air, cleanliness, good habits, and courage. Removal from suspected regions, and the administration of certain drugs, chief among which is quinine, will often cut short the progress of pronounced cases of malarial intoxication, while other cases end in death or permanent disability. CHARLES W. DULLES.

Micah: one of the minor Hebrew prophets; b. at Moresheth, near Gath. He lived in the latter half of the eighth century B. C., and was a contemporary of Isaiah. Mic. iii. 12 is quoted in Jer. xxvi. 18 to justify the latter in foretelling the destruction of Jerusalem. Micah's prophecies are written in a vivid, poetical style, and refer chiefly to the fate awaiting the two Hebrew nations. The style is not unlike that of Isaiah. Micah deals with social and popular rather than political sins. He named Bethlehem as the birthplace of the Messiah (Micah v. 2).

Micas [*mica* is Mod. Lat. in form, from Lat. *mi'ca*, crumb, grain, but evidently connected in meaning with *mic'are*, shine]: a group of very interesting and widely spread minerals, belonging to the Unisilicates, and containing silicic acid, with varying proportions of the alkalies, magnesia, lime, and protoxides of iron, with the sesquioxides of aluminium, iron, and manganese, usually a little flourine, and more rarely titanium. Titanium occurs to the extent of 7 or 8 per cent. in the rare mica *astrophyllite*, which also contains zirconia. *Lepidolite*, which is confined to a few localities, and the very rare *cryophyllite* contain an important percentage of lithia, with a little rubidia and cæsia. The micas occur generally in thin, shining scales, usually transparent, but opaque in some very dark varieties of *biotite* and *lepidomelane* (an iron-potash mica). More rarely, some of the micas are found in large plates, and occasionally six-sided prisms. Unless decomposed they are distinguished by a very easy cleavage, splitting readily into extremely thin, elastic laminæ, and showing usually a pearly luster on the cleavage faces. The most important micas are *phlogopite*, *biotite*, *lepidolite*, and *muscovite*. Phlogopite, or *magnesia mica*, contains magnesia as well as potash, among the protoxides, with very little of the oxides of iron. It is orthorhombic, with an optic-axial divergence of 3°–20°. It is light colored, usually yellowish brown, and very liable to alteration. Phlogopite occurs chiefly in serpentine, crystalline limestone, and dolomite. Biotite (*magnesia-iron mica*) is hexagonal, generally dark green or black, and is similar in composition to phlogopite, but with 5–10 per cent. of sesquioxide of iron; sometimes much more. Lepidolite is very interesting, because it contains the rarer alkalies. Muscovite (*potash mica*) contains principally potash among the protoxide bases, with some soda, and among the sesquioxides alumina, with generally 2 or 3 per cent. of sesquioxide of iron. It is orthorhombic, and has an optic-axial divergence of 44°–78°. Muscovite includes nearly all common mica, and is a constituent of granite, gneiss, and mica-schist; it is also found sometimes in shales and other sedimentary rocks in small scales, and may occur in eruptive rocks and granular limestone. Being usually of light color, quite transparent, and very tough, it becomes valuable when found in plates of considerable size, and is then used in stoves for doors, etc. There are very few localities where marketable mica is found, the supply for the U. S. being almost confined to mines in Haywood, Yancey, Mitchell, and Macon cos., N. C., where the mineral is found in granite rock with coarse feldspar, and to Grafton co., N. H., where the Palermo mine is now the principal source of sheet mica. It has also been mined to some extent in South Dakota, Wyoming, and New Mexico, but not in quantities nor of high quality. In recent years the production has amounted to about 75,000 lb., valued at $100,000. A considerable quantity is imported into the U. S. from Canada, the principal deposits being in Ottawa County. American dealers in mica have lists of 193 sizes, ranging from 1½ by 2 inches to 8 by 10 inches as the standard sizes. The preparation of ground

mica for use in the manufacture of wall-paper has become a separate industry. See BIOTITE.

Revised by CHARLES KIRCHHOFF.

Mica-schist: a metamorphic, stratified, schistose, crystalline rock, always foliated in texture, and composed of variable proportions of mica and quartz. It gradually passes in one direction into gneiss and in another into quartz-schist. *Argillaceous mica-schist*, according to Cotta, may be regarded as "an imperfect mica-schist, or as a somewhat crystallized clay-slate."

Michael Angelo: See MICHELANGELO.

Michaëlis, KAROLINA: See under VASCONCELLOS, JOAQUIM ANTONIO FONSECA, de.

Michae'lis, JOHANN DAVID: theologian: b. at Halle, Germany, Feb. 27, 1717; studied theology, Oriental languages, and biblical archæology under his father, who was professor at the university; traveled in Holland and England, and was appointed professor in 1745 at the University of Göttingen, where he died Aug. 22, 1791. His works, the results of immense learning and great acuteness, are very numerous, and contributed much to a fuller understanding of Holy Writ, especially the Old Testament. His theological standpoint may be indicated as a transition from the old orthodoxy to the subsequent rationalism, and on his age he exercised a considerable influence. His principal works are *Introduction to the New Testament* (2 vols., Göttingen, 1750), translated into English by Bishop Marsh (6 vols., London, 1823), and *Commentaries on the Laws of Moses* (6 vols., Frankfort, 1770–75), translated into English by Alexander Smith (1810, 4 vols.). Of great importance is also his *Supplementa ad lex. hebr.* (1786, 2 vols.), which contains excellent contributions to the knowledge not only of the language, but also of the antiquities and history, of the Old Testament. See his *Autobiography*, ed. by J. M. Hassencamp (Rinteln, 1793), and *Correspondence* (3 vols., Leipzig, 1794–96).

Revised by S. M. JACKSON.

Michaelmas: the festival of St. Michael the Archangel, celebrated on Sept. 29.

Michael Palæologus: See BYZANTINE EMPIRE.

Michalce, mikh'ăăl-ets, MARTIN: poet; b. at Litoměřice (Leitmeritz), Bohemia, in 1484; was educated in schools of the Bohemian Brethren; was ordained pastor at Brandejs n. O. in 1531, officiated as superintendent of various communities of the Brethren in Bohemia and Moravia; became a member of the supreme council, and was elected bishop in 1537. D. in 1547. He was a talented and eloquent speaker, and he wrote a number of polemical tracts and numerous *songs*, thirty-one of which are contained in the Brethren's hymn-book.

J. J. KRÁL.

Michaud, mĕĕ'shō', JOSEPH FRANÇOIS: journalist and historian; b. at Albens, Savoy, June 19, 1767; went to Paris in 1791; wrote in the *Gazette Universelle*, *Postillon de la Guerre*, and *Courrier Républicain*, three royalist papers, and showed himself a stanch defender of the monarchy; founded in 1794 the *Quotidienne*; was condemned to death Oct. 27, 1795, for his anti-Revolutionary opinions, but succeeded in getting the verdict annulled; was banished to Cayenne by the Directory, but escaped and hid himself among the Jura Mountains, where he wrote his popular poem, *Le Printemps d'un Proscrit* (Paris, 1804; 2d ed. 1827); returned to Paris under the consular government, but continued to adhere to the cause of the Bourbons; formed, with his brother and Giguet, a publishing firm, and devoted himself principally to historical studies, though he once more, after the Restoration, took up journalism and renewed the *Quotidienne*. His principal historical works are *Histoire des progrès et de la chute de l'empire de Mysore* (2 vols., 1801); *Histoire de Croisades* (3 vols., 1812–22); *Correspondance d'Orient* (7 vols., 1833–35); *Collection de Mémoires pour servir à l'Histoire de France depuis le XIII^e siècle* (32 vols., 1836–39). He also participated in the production of the edition of the *Biographie Universelle*, published from 1811 to 1828. D. at Passy, Sept. 30, 1839.

Revised by B. B. HOLMES.

Michaux, mĕĕ'shō', ANDRÉ: botanist; b. at Satory, near Versailles, France, Mar. 7, 1746; was the son of a rich farmer, and was bred to agriculture; studied botany under the Jussieus; in 1779 sent many British trees to France for culture; botanized in Spain in 1780, and collected seeds for French cultivators; was in Asia 1782–85, whence, after many adventures, he returned with a rich supply of seeds and plants; was 1785–97 the French agent in North America for the collection of useful trees and shrubs for naturalization in France; made near Charleston, S. C., and New York (in Bergen co., N. J.), large nurseries for arboriculture. In 1796 he returned to France, but suffered shipwreck and the loss of all his effects. After waiting in France in poverty and hunger for the arrears of his pay, he started in 1800 upon Baudin's expedition to Australia, but at the Mauritius left the expedition and went to Madagascar, where he died Nov. 13, 1802. His principal works are a *Treatise on the Oaks of North America* (in French, 1801; Germ. trans. 1802), and a *Flora Boreali-Americana* (1803).

Michaux, FRANÇOIS ANDRÉ, M. D.: botanist; son of André Michaux; b. at Versailles, France, in 1770; for a time was his father's assistant in the U. S., and was himself sent in 1802, and again in 1806, to study the botany of the Mississippi valley and collect useful seeds. He published a *Treatise on the Naturalization of American Forest Trees* (1805); a *Journal* of his travels (Paris, 1804; Eng. trans. London, 1805); a work on the Bermudas (1806); *North American Sylva* (in French, 1810–13; in English, the trans. by Hillhouse, 1817–19; completed by Nuttall and others 1842–50). In 1816 Michaux was received into the French Academy of Sciences. D. at Vauréal, France, Oct. 23, 1855.

Michel, mĕĕ'shel', FRANCISQUE: scholar; b. at Lyons, France, Feb. 2, 1809; d. in Paris, May 21, 1887. In 1839 he became Professor of Foreign Literatures in the Faculty of Bordeaux, and retained the position until his death. He was one of the most distinguished students of mediæval literature, especially Old French, in Europe. He edited a large number of important Old French texts, among them: *Tristan, recueil . . . des poèmes relatifs à ses aventures, etc.* (2 vols., 1835–39); *Lais inédits des XII^e et XIII^e siècles* (1836); *Le chanson de Roland* (1837); *Le Roman du St. Graal* (1841); *Girartz de Roseilho* (1856); *Le Roman de la Rose* (2 vols., 1864). He also published a number of works dealing with the mediæval period, among them: *Histoire des races maudites de la France et d'Espagne* (2 vols., 1847); *Histoire des tissus de soie au moyen âge* (2 vols., 1852–54); *Le pays basque, etc.* (1857); *Les Écossais en France et les Français en Écosse* (2 vols., 1862).

A. R. MARSH.

Michel, GEORGES: landscape-painter; b. in Paris, France, in 1763; d. there in 1843. His pictures, long unnoticed, have come into prominence in artistic circles by their being included in exhibitions with the works of Millet, Rousseau, Corot, and their contemporaries, but they have no claim to rank with them in merit. His compositions are almost all of the same general character and are almost monotone in color.

W. A. C.

Michel, JULIUS, M. D.: ophthalmologist; b. at Würzburg, Germany, July 5, 1843; studied medicine in the Universities of Würzburg and Zurich, graduating M. D. at the former in 1866, and serving as Horner's assistant at the latter for several years; established himself in Leipzig in 1872; in 1873 was elected Extraordinary Professor of Ophthalmology in the University of Erlangen, where he remained until 1879, when he accepted the same chair in the University of Würzburg. Among his published works are *Die histologische Structur des Iris-stroma* (Erlangen, 1875); *Die Prüfung des Sehvermögens und der Farbenblindheit beim Eisenbahnpersonal und bei den Truppen* (Munich, 1878); *Lehrbuch der Augenheilkunde* (Wiesbaden, 1884). He was editor of the *Jahresbericht über die Leistungen und Fortschritte im Gebiete der Ophthalmologie* for 1877.

S. T. ARMSTRONG.

Michel, LOUISE: revolutionist; b. at Vroncourt, Haute-Marne, France, in 1839; won distinction by her musical and poetical talents; opened a school in Montmartre, Paris, in 1860; in 1870, during the Commune, fought on the barricades in the uniform of the National Guard; was taken prisoner at Versailles and sentenced to death, but the sentence was commuted to transportation to New Caledonia for life; returned to Paris on the granting of amnesty to political prisoners in 1880. Her continued activity and communistic undertakings led to her imprisonment in 1883 and in 1886. Later she took up her residence in London. She has published *Memoirs* (1886), and a novel, *The Microbes of Society*.

C. H. THURBER.

Michelangelo, or **Michelagnolo**, or **Michelangiolo**, of the family of Buonarrota Simone, generally called MICHELANGELO BUONARROTI: sculptor and painter; b. at Caprese,

in Tuscany, Mar. 6, 1475. He was apprenticed to Ghirlandajo (Domenico Bigordi) in his early youth, and received admittanee when about fifteen years old to the strange, informal academy of fine art which Lorenzo the Magnificent, chief of the Medici, had allowed to form itself in his gardens at San Marco in Florenee. Here he attracted Lorenzo's attention and was aided by him, but the great patron died in 1492. It was probably at about the same time that were executed the two bas-reliefs now in the Buonarroti Museum at Florence, the unfinished and confused eomposition called *The Centaurs* and a *Madonna and Child* with emblematic figures in the baekground. Almost immediately after this he was at work upon a statue of Hereules larger than life, which statue must have been finished before he was twenty, and which was thought worthy, thirty years later, to be a present to King Franeis I. That statue is lost, but a marble statuette of a kneeling angel with a candlestick, in the Church of San Domenico at Bologna, is known to be of this epoch, and the beautiful statue of St. John the Baptist, in the Berlin Museum, is with probability considered a work of Miehelangelo's boyhood. The strong tendency toward pure form as a means of expression, seen in this rapid and almost total abandonment of painting for sculpture, remains a lifelong eharaeteristic. The profound knowledge of the human form, and the almost perfect mastery of its movements and aspects, gained at so early an age, mark him as one of the very greatest technical artists whose works are known.

He had made a hurried visit to Venice and had dwelt some months in Bologna and a year in Florence, eonstantly at work upon sculpture, most of which has disappeared, when Cardinal di San Giorgio called him to Rome, whieh city he first reached in June, 1496. The statue of Bacchus, of the National Museum at Florenee, was sculptured during the following two years, but his other doings at this time are not recorded. The beautiful so-ealled cupid of the South Kensington Museum is generally admitted to be his work, and is thought by many to be of this time; it represents a vigorous youth kneeling on one knee, the left hand held high seems to hold a bow, the right to seize an arrow on the ground; he seems about to shoot downward from a height, and is rather a hunter than a cupid. In 1498 Michelangelo undertook one of the noblest sculptures of his life, the *Pietà*, or group of the Madonna holding the dead Christ upon her knees, which is in St. Peter's chureh at Rome. This is perhaps the only pieee which the artist ever signed; it bears the words Michael Angelus Bonarotus Floren Faciebat, cut in large capitals on the belt whieh passes over the shoulder and aeross the breast of the Virgin. The beautiful *Madonna and Child* in the cathedral at Bruges, in Belgium, almost certainly a work of this artist, is probably a work of the same time.

It should be observed that it was Michelangelo's habit to work the marble himself; contemporary witnesses state that he did even the rough first shaping, at least in some cases. This would be neeessary when he did not have full-size models before him; and it is doubtful if he made such models, or anything more than small sketch-models for study and experiment. It had not then become the custom for sculptors to bring the clay models to absolute completeness that workmen might copy it in the marble, leaving only the final touches for the sculptor. In fact, no accurate process of pointing was in use. Miehelangelo's practice differed from that of his contemporaries only in boldness and unhesitating certainty.

In 1501 the artist returned to Florence, and was at once occupied with the famous *David*, the eolossal statue whieh was finished in 1504, and which had stood for 320 years in the open air at the door of the Palazzo Vecchio, when, about 1875, it was put under cover in the Academy of Fine Arts. This noble work is a study of the forms of adolescenee, and is bold in its recognition of all that is awkward and immature in the youthful body. The action is of the moment of preparation before the sling is whirled and the stone dismissed. A great undertaking of this time was a whole series of apostles for the cathedral of Florence; one only was begun, the *St. Matthew*, whose rough-hewn effigy, half detaehed from the block as if a bas-relief, is in the Florence Academy. The five statuettes of the Pieeolomini altar in the Cathedral of Siena belong to these years, also the model of a bronze *David*, sent to France and set up in the court of the Château of Bury, but now lost, and most probably the two *tondi*, or round bas-reliefs, each of the *Madonna and Child*, one of which is in the National Museum at Florence and the other in the Royal Academy in London. At this time was painted, for Angelo Doni, the one existing movable picture whieh is known to be by Michelangelo, the round *Holy Family* in the Tribune at Florence. It is extremely characteristic of the artist: St. Joseph, an old man, sits behind the Virgin who is seated on the ground, and who takes the child from her husband over her right shoulder without turning round, and with a free and vigorous movement of both arms; the background is occupied with nude figures grouped upon a low stone wall; there is no landscape and no architectural adornments of any kind. An immense painting was undertaken at this time for one wall of the great hall in the Palazzo Veechio; the cartoon only was made, and this was destroyed a few years later; its subject was a number of soldiers surprised while bathing, and hurrying to dress and arm themselves. Most of the year 1504 must have gone to this cartoon, and at the close of that year the artist was called to Rome again, and began a task whieh was to harass him for many years and to remain unachieved, the great monument of Pope Julius II. That vigorous and warlike pope had been elected at the close of 1503; at his command Michelangelo sketched a gigantic strueture "eighteen cubits by twelve," three stories high, including forty statues, some of them colossal, besides basreliefs and ornaments. Half of the year 1505 was spent in mere superintendence of quarrying at Carrara; early in 1506 he hurried from Rome to his home in Florence, believing that the pope cared no longer for the tomb, and would not pay his expenses. The pope tried persuasion and threats to bring him back, and even letters to the rulers of Florence, and at last in Nov., 1506, Michelangelo yielded, met the pope in Bologna, and began work upon a eolossal seated bronze statue of Julius, which occupied him for eighteen months, and was destroyed four years later in a revolt. Then began another exhausting struggle with authority and a four-year task, though this one ended in a triumph and in a gigantic work of art, whieh has been preserved as a permanent possession of Europe. Pope Julius insisted upon the painting of the vaults of the chapel whieh had been built by Pope Sixtus IV. in the Vatiean —a plain room 130 feet long, 44 feet wide, and nearly 70 feet high. The walls had already been adorned with large freseoes by Botticelli, Ghirlandajo, Luca Signorelli, and Perugino, most of which still remain, and with portrait-figures of popes, but the vaulted roofs were now to be deeorated. In spite of great unwillingness to leave sculpture for so vast a work of painting, Michelangelo put up his scaffolding and began; at the close of 1509 the scaffolding was struck so that the half-finished work could be seen; at the close of 1512 the roof was shown again, and this time in the state in which it has remained since, not quite complete it is thought, but a marvel of figure-drawing and of composition, perhaps the greatest achievement in painting in Europe. A very simple architectural framework is painted on the smooth vault, and this affords bases for grouped caryatides, pedestals for single seated figures, seats for larger figures of prophets and sibyls, medallions filled with small compositions, and frames in the flat middle of the ceiling for nine pietures of Bible story; fourteen lunettes and the smaller vaults above them are filled in like manner with huge groups, so that there are in all perhaps 300 human figures, draped and undraped, most of them larger than life and many of them gigantic. In this great work Michelangelo had little help from other artists, for it appears that he had little power of bringing around him men who should work in harmony with him. The human figures, with their conventional drapery, and the slightest indieated architeetural setting, form the whole decoration; there is no other ornament. Then, as there is no landscape, no costume, and almost no incident in this giant work of art, so there is no depth and richness and little variety of color. Michelangelo was not in the usual sense a eolorist, but a modeler of plastic form, to which he gave only so much flesh color, such gray, dull yellow, and dusky blue in the drapery, and such negative stone-gray for the architecture, as would suffiee to keep his work from being a monochrome.

For the next ten years there is a singular and confused record of constant diversion of the great sculptor's and painter's thoughts from the work, which he alone could do, to building, which others could have done better. The rule with the great men of the Renaissance had been, "Great in one art, great in all." The assumption was that he who could handle form and color, who had the eye trained to see as artists see, the hand practiced to execute, and the spirit

alert to deal with tangible and visible realities, must needs be good in all ways. If he could model a great statue he could cut a die or build a church; even more, he would be thought fit for employment as engineer, civil or military. Accordingly, among the more complex and specialized arts of the sixteenth century, the same was expected of Michelangelo. Pope Leo X., who had begun to reign in 1513 and who was one of the Medici, was in Florence at the close of 1515 and decided to employ him on the front of San Lorenzo, the church which still stands with its brick wall as bare as if months of the precious life of a great artist had not been wasted in thought for it. A new contract was made with the executors of Pope Julius for his tomb, planned on a much smaller scale, and statues to form part of this were kept in hand; a model was made for the front of San Lorenzo, and once more many months were spent in the marble quarries. Then came a plan for building a library at San Lorenzo, and next a scheme for decorating the new sacristy of the same church, and putting up tombs of powerful members of the Medici family. Only an orderly and peaceful life and perfect system would have enabled the artist to achieve all that was thrust upon him, but his masters seem to have decreed that he should not have those advantages. They struggled with one another and countermanded their own orders, and while all Italy was contending for the artist's services, felt free, each in his turn, to put him to trivial tasks which he could not decline. *The Risen Christ* of the Church of Sta. Maria sopra Minerva in Rome is the one important piece of sculpture known to have been completed during these years—a life-size figure, concerning which the most contrary opinions are held by modern critics. It is peculiar in being wholly nude, the slight drapery of metal being put on at a later time. Like the Christ of *The Last Judgment*, it is a muscular and powerful man, and many critics think it lacking in proper sentiment. The same year that this was set up (1521) Leo died, and Adrian's short reign came in, to be followed in 1523 by that of Clement VII. Clement was another member of the Medici family, and the work of San Lorenzo was to be pushed accordingly.

There is no doubt that four or five tombs were proposed, instead of two only, and that the two Medicean popes, Leo and Clement, were to be honored in this way. The two tombs which were finished are in memory of comparatively unimportant princes of the family. No monuments of art in Europe are better known by photographs and engravings than these, or have been more fully described and criticised. As works of associated sculpture they are of enormous importance, but their architectural value is slight, and the sacristy itself is not a very successful piece of decorative building.

The statues made about this time for the tomb of Julius II. can not now be identified with certainty, except two of bound captives, which are in the Louvre. Other figures, made perhaps for that tomb or perhaps for the front of San Lorenzo, seem to belong to this epoch of the artist's life; such are the four male figures of the Boboli gardens, and the so-called *Victory* and the so-called *Adonis* of the National Museum at Florence. The *Victory* is a most impressive and vigorous group, but unfinished and capable of many different explanations. The year 1527 brought with it a revolution in Florence, and three years of fortifying, administering, and exile for Michelangelo; then came submission to the Medicean tyranny again, the production of the *Apollo*, in the Florence National Museum, and work continued on the sacristy at San Lorenzo, until it and its contents reached nearly the condition in which we see them.

The Medicean monuments were not finished as we see them till 1534; in that year Paul III. was elected pope, and in the following year Michelangelo was made chief architect, painter, and sculptor to the Vatican. This meant a further diminution of the work to be done for Pope Julius's tomb, for which the giant *Moses*, now in the Church of S. Pietro in Vincoli, had been sculptured—enough by itself, as Pope Paul declared, to grace his predecessor's tomb—and the immediate undertaking of the vast fresco of *The Last Judgment* at the northern end of the Sistine chapel. There were four years of pretty steady work upon this great labor, and at Christmas-time, 1541, when the artist was nearly sixty-seven years old, it was shown to the people of Rome. It can hardly be judged now; the painted drapery added by Daniele da Volterra, the fading of colors, the smoke and dust of many years, have stripped the fresco of the tints and the gradations that it was meant to have had. The composition of lines and masses can still be judged, in part, and the absence here as in the roof paintings of any source of interest but the one of the human body in vigorous action, and the combinations of form which this alone can give. The next great work which he undertook has suffered still more, and is now scarcely to be considered the handiwork of Michelangelo—the frescoes of the chapel built by Paul III. in the Vatican, close to the Sistine chapel. These two paintings, the *Crucifixion of St. Peter* and the *Vision of St. Paul*, were in hand from 1542 for seven years. Except for this work, architecture took up most of the old man's thought and strength. The Farnese Palace, a favorite undertaking of Pope Paul III., owes its completion to him; the two structures on the Campidoglio are his, and in his seventy-second year he became architect of St. Peter's church, then not very far advanced. He labored at this great task until his death, but his successors have greatly changed the church from what he meant it to be, and the cupola itself is the principal result of his labors on the church. This indeed is a triumph; no other European dome is so beautiful; and there seems little reason to doubt that its beauty is due to Michelangelo himself. He was peculiarly one who worked alone and without consultation or aid; moreover, the wooden model which was certainly made in the artist's time, and which was followed in its main lines by the builders, has been most thoroughly discussed and the claims of all disputing artists fully weighed. Michelangelo himself saw built only the drum or cylindrical wall below the cupola; but we are safe in giving him the credit for the whole of this lovely conception, which can only be judged rightly from without by those who will pass around the western and northern sides of the great church and look at the whole mass from the rising hillside of the Vatican gardens. Within as well as without the cupola is of unsurpassed beauty. Michelangelo has, however, no high rank as an architect, for the power of conceiving a graceful form, without much capacity to give it organic and constructional life and with little knowledge of details, is not a very rare nor a very exalted gift. His influence on the development of architecture was bad, or was at least not good, not calculated to oppose the evil tendencies of his time in Italy.

As painter and as sculptor his position is very exalted. Great differences of opinion exist, naturally, about his works of art; the lovers of Greek art do not bow to his powerful but often inaccurate modeling and drawing; the lovers of painting in its noblest form, as at Venice, can not find the fullest enjoyment in his frescoes; the admirers of the refinement and transcendental feeling of the true Renaissance can not worship the man whom they rightly regard as the leader and embodiment of the Decadence. In the second half of the nineteenth century there seems to be nowhere a school which is founded upon the study of Michelangelo's work; that remains, in its highest reach, the object of wonder and admiration as of the most wonderful achievement known to us of grave and somber thought expressing itself with almost unsurpassed technical skill, individual in the extreme, true *fine art*, as being the creation of the mind which had previously saturated itself with knowledge of nature, but still causing far more astonishment than love, and more fitted to stimulate than to teach.

Throughout his life, but especially in his later years, Michelangelo wrote sonnets and other poems, most of them of abstract subject, religious, mystical, or philosophical. The text of these had been known before 1863 only in an extremely falsified condition, for the great man's nephew, Michelangelo the Younger, had rearranged and almost recomposed the poems. All old editions of the poems and all translations of them and conclusions drawn from them are therefore worthless, and the student must go to Guasti's edition (Florence, 1863) until a still more critical one shall be published. The letters published by Milanesi (Florence, 1875) are also accessible now as never before; but it appears that the most unreasonable difficulties are thrown in the way of students wishing to consult the original documents in the Casa Buonarroti in Florence, and therefore the student is still at the mercy of two editors.

During his last years Michelangelo remained stanch to his duties as architect of St. Peter's, and resisted numerous temptations to undertake work elsewhere. He kept much of his strength till the end, and was incapacitated for but a short time, dying in Rome, Feb. 18, 1564.

BIBLIOGRAPHY.—The latest book on Michelangelo is John Addington Symonds's *The Life of Michelangelo Buonarroti*

(2 vols., London, 1893). In this documents not before accessible have been used. The book is inadequate in its critical appreciation of fine art, but is valuable and trustworthy, and contains useful illustrations. Charles Heath Wilson, *Life and Works of Michelangelo Buonarroti* (2d ed. London, 1881), is of great importance because of the minute examination made by the author of the frescoes in the Sixtine chapel. There are many other books on this subject, and a sufficient list of the important ones is given in vol. i. of Mr. Symonds's work. RUSSELL STURGIS.

Michelet, mĕesh'lā', JULES: historian; b. in Paris, Aug. 21, 1798, and educated at the Lyceum of Charlemagne, in which he was elected professor in 1821. After the revolution of 1830 he was appointed chief of the historical section of the royal archives, and in 1838 Professor of History and Morals at the Collège de France. In 1851 he lost his position, both at the archives and at the university, as he refused to take the oath of allegiance to Louis Napoleon. D. at Hyères, Feb. 9, 1874. Of his historical writings, the most important are *Histoire de France* (16 vols., 1833–67); *Histoire de la Révolution* (7 vols., 1847–53); *Précis de l'Histoire moderne* (1827); *Histoire Romaine* (2 vols., 1831); of his polemical writings are *Les Jesuits* (1843); *Du Prêtre, de la Femme, de la Famille* (1844); *Le Temple* (1846); *Pologne et Russie, Légende de Kosciusko* (1851); *Principautés danubiennes* (1853); of his miscellaneous writings, *L'Oiseau* (1856); *L'Insecte* (1857); *L'Amour* (1858); *La Femme* (1859); *La Montagne* (1868); *Nos Fils* (1869).—His second wife, ATHANAISE MICHELET, who survived him, assisted him in these latter works.

Michelet, KARL LUDWIG: philosopher; b. in Berlin, Dec. 4, 1801; studied first law and afterward philosophy, and was appointed Professor of Philosophy at the University of Berlin in 1829. The study of Aristotle was enriched by his *Ethik des Aristoteles* (1827) and *Examen critique de l'ouvrage d'Aristote, intitulé Métaphysique* (1836), which was crowned by the French Academy. On German philosophy he wrote *Geschichte der lezten Systeme der Philosophie in Deutschland* (1837); *Schelling und Hegel* (1839); *Entwickelungsgeschichte der neuesten deutschen Philosophie* (1873). His own standpoint—a modern reconstruction of Neo-Platonic Christianity—is principally developed in his *Die Persönlichkeit des Absoluten* (1844); *Der historische Christus* (1847); *Die Zukunft der Menschheit* (1852); *Naturrecht oder Rechtsphilosophie* (2 vols., 1866). D. Dec. 16, 1893. See his autobiography, *Wahrheit aus meinem Leben* (1884).

Michelozzi, mĕe-kā-lōt'sĕe, MICHELOZZO: seulptor and architect; b. toward the end of the fourteenth century in Florence, where he died at the age of sixty years. He worked with Donatello, whom he helped at Naples with the Brancacci monument. He built for Cosmo dei Mediei the palace now known as the Palazzo Riceardi; he followed this patron into exile to Venice, where he built the Library of St. George for the Benedictine monks, and made many designs for private and public works. On his return to Florence with Cosmo he repaired the Palazzo della Signoria, which Arnolfo had designed; he built the Dominican convent of St. Mark, finished in 1452; construeted the Tornabuoni palace, and, by order of Piero dei Mediei, designed a chapel in the Church of the Virgine Annunziata. A statue of *Faith* in the Baptistery in the same city is his work. At Bosco he designed the Capuchin convent; at Mugello the palace of Caffaggiuolo; and at Fiesole the Mozzi palace and the church and convent of St. Jerome. Michelozzi also designed and made a model for a hospital for pilgrims, which Duke Cosmo ordered to be erected at Jerusalem at his expense, and at the order of the duke he constructed an aqueduct for Assisi, and ereeted a beautiful fountain there. At Perugia he restored the convent and designed the ancient eitadel. When Francesco Sforza bestowed a palace in Milan on Cosmo, Michelozzi was sent to enlarge and ornament it with sculpture. The chapel of St. Peter, Martyr, in St. Eustorgio, of Milan, is also his work. W. J. STILLMAN.

Michie, PETER SMITH: officer and educator; b. at Breehin, Scotland, Mar. 24, 1839; his family removed to Cineinnati, O., in 1843; he graduated at the U. S. Military Academy June 11, 1863; was promoted first lieutenant Corps of Engineers Junc 11, 1863, and captain Nov. 23, 1865. He served during the civil war in the operations against Charleston and in the siege of Fort Wagner June, 1863, to Jan., 1864; was chief engineer northern district, department of the South, and of the district of Florida Jan. to Apr., 1864, being engaged in the battle of Olustee. He was assistant engineer Army of the James May to Aug., 1864, and chief engineer Army of the James and departments of Virginia and North Carolina Aug., 1864, to Mar., 1865; was assistant inspector-general Twenty-fifth Army-corps Mar. to July, 1865, being engaged in the action at Drewry's Bluff, assault and capture of Fort Harrison, and in charge of the construction of lines of works, the Dutch Gap Canal, and the engineering operations of the left column of the Army of the Potomac in the pursuit and capture of Gen. Lee at Appomattox Courthouse. He was made brevet captain and major for gallant and meritorious conduct during the Richmond campaign of 1864, lieutenant-colonel for the Appomattox campaign, and brigadier-general of volunteers for meritorious serviees in 1864; was on duty at the Military Academy as assistant professor in the departments of engineering and chemistry 1867–71; appointed member of commission to Europe to collect information on fabrication of iron and steel June to Nov., 1870; Professor of Natural and Experimental Philosophy at the U. S. Military Academy Feb. 14, 1871; was a member of board of overseers of Thayer School of Civil Engineering; was the author of works on analytical mechanies, hydro-mechanies, and wave-motion, and of the *Life of General Upton*. D. Feb. 16, 1901. JAMES MERCUR.

Michigan [from Indian *Mitchi Sawgyegan*, liter., Lake Country]: one of the U. S. of North America (North Central group); the thirteenth State admitted to the Union.

Seal of Michigan.

Location and Area.—It is situated between 41° 42′ and 47° 32′ N. lat. and 82° 24′ and 90° 31′ W. lon., and covers an area of 58,915 sq. miles, of which 1,485 sq. miles are water surface. It consists of two peninsulas, of which the lower, resting on Ohio and Indiana, and bounded on all other sides by the lakes and their connecting waters, extends 300 miles toward the N., with an average breadth of 200 miles; while the upper, resting with its southwest border on Wiseonsin, stretches eastward between the lakes to St. Mary's river, the outlet of Lake Superior, with a length of over 300 miles and an average width of 50 or 60 miles.

Physical Features.—During the glacial epoch the whole of Michigan was buried beneath several thousand feet of ice, which flowed in a southerly direction, and which greatly modified the previous topography. In the lower peninsula, where the rocks, eroded by glacial action, lie deeply buried, the relief of the land, as now seen, is almost wholly the result of the deposition of clay, gravel, sand, and bowlders by glaciers and by the streams flowing beneath the ancient ice sheet or issuing from its margin. The direction of the streams also was determined by inequalities of the surface left when the ancient glaciers retreated. Imperfect drainage has left thousands of lakes filling depressions in the surface, and in thousands of instances shallow lakes have been filled with marl and peat, and now form swamps or have been drained, and furnish rich soils for vegetable gardens. Over considerable areas there are no surface streams, the rainfall being conducted away by percolation. Beneath the general covering of glacial deposits there is a system of stream channels, excavated in hard rock, traces of which may sometimes be recognized at the surface or discovered by wells and borings, but it has no immediate relation to the present surface drainage. In the lower peninsula there are several summits which attain elevations of from 100 to 700 feet above the lakes, but these are seldom abrupt, and are scarcely distinguishable in the generally monotonous topography. Through the central portion of the peninsula, from Saginaw Bay, S. W., there is a broad, low tract of country which would be transformed into a strait, leaving the country to the N. as an island should the waters of Lakes Michigan and Huron be raised 75 feet. A high-water stage of the Great Lakes, which came later


LAKE SUPERIOR
MICHIGAN
WISCONSIN
IOWA
ILLINOIS
Duluth
Superior
Bayfield
Ashland
Hurley
Bessemer
Ironwood
Rhinelander
Wausau
Eau Claire
La Crosse
Madison
Milwaukee
Green Bay
Oshkosh
Fond du Lac
Appleton
Waukesha
Racine
Kenosha
Beloit
Janesville
Dubuque
Rockford
Freeport
Scale of Miles
Longitude West


Long. W. 87G from Greenwich 86H
85I
84J
83K
82 L
SUPERIOR
CANADA
HURON
MICHIGAN
LAKE
ONTARIO
LAKE ERIE
UPPER PENINSULA
LOWER PENINSULA
MARQUETTE
ALGER
LUCE
NEWBERRY
SAULT DE STE MARIE
CHIPPEWA
SCHOOLCRAFT
MACKINAC
DELTA
MANISTIQUE
St Joseph I.
Drummond I.
North Channel
Cockburn I.
Gr. Manitoulin I.
Mackinac I.
Bois Blanc I.
Gr. Beaver I.
CHEBOYGAN
EMMET
HARBOR SPRINGS
CHARLEVOIX
BOYNE
PRESQUE ISLE
ROGERS
GAYLORD
MONTMORENCY
ATLANTA
ALPENA
ANTRIM
OTSEGO
BELLAIRE
LELAND
Lewiston
Thunder B.
Black River
Alcona
GRAND TRAVERSE
KALKASKA
CRAWFORD
OSCEOLA
MIO
HARRISVILLE
BENZIE
FRANKFORT
SUMMIT CITY
ROSCOMMON
OGEMAW
IOSCO
TAWAS CITY
MANISTEE
WEXFORD
MISSAUKEE
LAKE CITY
COMMON
WEST BRANCH
CADILLAC
ABENA
MASON
LUDINGTON
LAKE
OSCEOLA
CLARE
GLADWIN
HARRISON
STANDISH
Au Gres
Au Barques
Grand Stone City
Port Austin
Huron
Port Hope
Harbor Beach
BALDWIN
HERSEY
HURON
BAD AXE
HART
OCEANA
NEWAYGO
BIG RAPIDS
MECOSTA
MT. PLEASANT
ISABELLA
MIDLAND
BAY CITY
CARO
TUSCOLA
SANILAC
SANILAC CENTRE
MONTCALM
GRATIOT
SAGINAW
MUSKEGON
STANTON
GRAND HAVEN
KENT
GRAND RAPIDS
IONIA
CLINTON
SHIAWASSEE
GENESEE
FLINT
LAPEER
ST CLAIR
PORT HURON
OTTAWA
OAKLAND
PONTIAC
MT. CLEMENS
ALLEGAN
BARRY
EATON
INGHAM
LIVINGSTON
HOWELL
LANSING
CHARLOTTE
MASON
South Haven
KALAMAZOO
Battle Cr.
MARSHALL
JACKSON
ANN ARBOR
DETROIT
LAKE ST CLAIR
VAN BUREN
CALHOUN
WASHTENAW
WAYNE
ST JOSEPH
CASS
Three Rivers
COLDWATER
BRANCH
HILLSDALE
ADRIAN
LENAWEE
MONROE
Amherstburg
Pt Pelee
Michigan City
TOLEDO
INDIANA
OHIO
Mackinac Pt.
White Fish Point
Grand Marais
Munising
Escanaba
Menominee
Marinette
Sturgeon Bay
Ship Canal
Green Bay
Manitowoc
Sheboygan
Milwaukee
Racine
Kenosha
Chicago
Gary
Hammond
New Buffalo
Niles
Constantine
Sturgis
Coldwater
Hillsdale
Tecumseh
Adrian
Clinton
Saline
Ypsilanti
Dearborn
Wyandotte
Windsor
Sandwich
Chatham
Grand Rapids
Holland
Saugatuck
Douglas
Benton Harbor
St Joseph
Kalamazoo
Battle Creek
Jackson
Lansing
Flint
Saginaw
Bay City
Midland
Alpena
Cheboygan
Petoskey
Traverse City
Manistee
Ludington
Muskegon
Grand Haven
Port Huron
Sarnia
Detroit
Toledo
Monroe
Erie
Pt Pelee
Long. W. 87G from Greenwich
G from Washington H 9
I 8
J 7
K 6
L

than the glaciers, left beaches at elevations of several hundred feet above the present lake surfaces, and spread fine clays over the submerged borders. These ancient lake ridges may be easily recognized in both the lower and upper peninsulas. On the Lake Michigan shore of the lower peninsula are large tracts of drifting sand forming dunes, which travel inland in the direction of the prevailing winds.

Geology.—The rocks below the superficial deposits of the lower peninsula are sandstones, limestones, and shales, ranging in age from the coal-measures downward to the Upper Silurian. Beneath these, but not coming to the surface, are still older Palæozoic strata. The Trenton limestone underlies the entire peninsula at a depth in the central part of about 2,000 feet. At an early date in the deposition of the strata a central basin was formed by subsidence, which was filled as its bottom was lowered, so that the younger rocks, the coal-measures, occur in a somewhat circular area, about which the older rocks come to the surface as concentric rings. Owing to the existence of a central basin, the brines and salt deposits included in the rocks at the time of their formation have not been flooded out. In the eastern half of the upper peninsula the geological strata are a continuation of those existing in the lower peninsula, the sandstone cliffs along the southern shore of Lake Superior forming the northern part of the basin referred to. The western portion of the upper peninsula, however, presents a marked contrast with the rest of the State. The hills rise to an elevation of from a few hundred to about 1,300 feet above the lake, but their ruggedness has been much softened by glacial erosion. Among the boldest topographic features is Keweenaw Point, which projects into Lake Superior as a long ridge, with an elevation of from 800 to 900 feet, and owes its prominence to numerous dikes and sheets of igneous rocks which have withstood erosion. The characteristic rocks of this region belong to the Algonkian period, which includes the copper and iron bearing rocks, and to the Archæan, including the granites. With these rocks is found a reddish sandstone of the Cambrian period, which has been quarried for building purposes.

Mineral Resources.—According to the U. S. census of 1890, Michigan in 1889 produced 40·34 per cent. of all the iron ore mined in the U. S., Alabama and Pennsylvania coming next with 10·82 and 10·75 per cent. respectively. In 1899 the Michigan mines produced 9,146,157 long tons, valued at $13,707,899, 37·1 per cent. of the total production of the U. S. Minnesota, Alabama, and Pennsylvania ranked next with 33, 10·3, and 9 per cent. respectively. The mines are in three ranges: the Marquette range, of which the most important mines are those of Ishpeming; the Menominee range, of which the principal mine, the Chapin, has a yearly output second only to that of the Norrie; and the Gogebic range, of which the Norrie is the leading mine. Until 1889 Marquette was the most important port for the shipment of iron ore, but in that year the lead passed to Escanaba, and finally in 1897 to Two Harbors, Minn. The shipments from these two ports in 1899 aggregated 7,693,951 long tons, more than one-third of the total shipment of the Lake Superior region. Only a very small part of its iron-ore product is smelted within the State, and that in charcoal-plant furnaces, which in 1899 produced 134,443 long tons of pig-iron. The U. S. produces a third of the world's copper, and of the output of the U. S. Michigan furnishes a third. Its copper mines are all situated on the peninsula jutting out into Lake Superior, and terminating in Keweenaw Point. The total production of copper in the Lake Superior region in 1899 was 147,400,338 lb. Some of the leading mines with the amount of their production were: Tamarack, 18,565,602 lb.; Quincy, 14,301,182 lb.; Oceola, Kearsarge, and Tamarack, Jr., 11,358,049 lb.; Franklin, 1,230,000 lb.; Atlantic, 4,675,882 lb.; and Wolverine, 4,756,646. The annual report of the Calumet and Hecla Mining Company for the fiscal year ending April 30, 1899 shows a product of 49,312 tons of refined copper. The metal is found in the rock as free copper, and is separated by crushing and washing. The brine and salt stored in the rocks underlying the State have been reached by wells. These wells vary in depth from 850 to 2,200 feet, and the salt-bearing rocks lie deepest in the western part of the State. In 1898 the wells of the State yielded 5,263,564 barrels, valued at $1,628,081, out of a total product for the U. S. of 17,612,634 barrels, valued at $6,212,554. Of the gypsum produced in Michigan, which forms about half the yield of the entire country, the larger part comes from Kent County, where, in the neighborhood of Grand Rapids, there are deposits not far below the surface covering an area of 10 or 12 sq. miles. About a third of the gypsum produced in the State is calcined into plaster-of-Paris, while the remainder is sold as land plaster. The quarries at Grindstone City supply the best quality of stone for wet grinding. Sandstone is quarried in considerable quantities for building purposes in the upper peninsula, where the supply is unlimited and of fine quality.

Soil and Productions.—Owing to the commingling of the *débris* of many kinds of rocks, the soils of Michigan are of varied composition, and in large areas very fertile. 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	154,008	172,344	11·9
Total acreage of farms	13,807,240	14,785,636	7·1
Value of farms, including buildings and fences	$499,103,181	$556,190,670	11·4

* Increase.

The manufacture of beet-sugar has been successfully introduced, giving employment to 23,000 persons and producing more than 34,000,000 lb. of sugar in 1900.

The following table shows the acreage, yield, and value of the principal crops in the calendar year 1900:

CROPS.	Acreage.	Yield.	Value.
Corn	1,080,235	38,888,460 bush.	$14,388,730
Wheat	1,219,969	9,271,764 "	6,397,517
Oats	917,971	33,689,536 "	8,759,279
Rye	71,306	1,041,068 "	499,713
Barley	37,858	904,806 "	425,259
Buckwheat	22,160	310,240 "	158,222
Potatoes	171,453	16,630,941 "	4,324,045
Hay	1,339,238	1,727,817 tons	16,218,657
Totals	4,860,190	....	$51,171,422

On Jan. 1, 1899, the farm animals comprised 412,462 horses, value $23,752,433; 2,567 mules, value $166,161; 463,698 milch-cows, value $15,162,925; 338,120 oxen and other cattle, value $9,043,695; 1,389,073 sheep, value $4,972,882; and about 700,000 swine, value $5,000,000: total value, $58,098,096.

The fruit-crop is varied. The apple-crop in particular is large, varying between the extremes of 1,500,000 and 5,000,000 barrels annually. The peach belt of the State lies chiefly under the lee of Lake Michigan. The yearly peach crop is from 500,000 to 1,000,000 bush. Allegan, Kent, and Van Buren Counties are the chief producers. The various kinds of small fruits are largely cultivated.

Lumber.—According to the U. S. census of 1890, Michigan in 1889 produced 19·75 per cent. of all the lumber cut in the U. S., or an amount about equal to the combined product of Wisconsin and Minnesota, the two States which stand nearest to it on the list. When lumbering began in Michigan the State possessed enormous wealth in its pine-forests, which were found N. of a line running nearly W. from Port Huron, and which are estimated to have contained 150,000,000,000 feet of lumber. For the marketing of this lumber there existed the most ample facilities, the logs being floated down the rivers and their tributaries swollen by spring rains, and the lumber being shipped from lake ports. So rapidly has this process been carried on that of the once apparently inexhaustible pine supply of the State, nine-tenths have been already cut. The total production for the year 1899 was 2,338,575,135 feet, and 1,454,578,000 shingles. The abundance of lumber has given an impetus to the manufacture of furniture, nearly $10,000,000 being invested, fully half of the amount in the factories at Grand Rapids.

Fisheries.—The fisheries of Michigan give employment to over 4,000 men, and yield annually about 35,000,000 lb. of fish. Two-thirds of the catch of the State consists of trout and whitefish, of which Lake Michigan yields nearly half, while the rest is furnished in equal proportions by Lake Superior and Lake Huron. To replenish the lakes and streams a board of fish commissioners has established hatcheries at Detroit, Paris, Glenwood, and Sault Ste. Marie, and the Federal Government has established others at Alpena and Northville.

Climate.—The climate is intermediate between that of the relatively moist New England and that of the relatively dry Dakotas. It has also some features peculiar to its position. In the spring the Great Lakes, the waters of which warm up more slowly than the land, serve to hold back the

summer temperatures. Hence spring comes late and with a rush, its actual duration being extremely short, sometimes not more than a fortnight. May Day in Michigan is almost invariably cold and raw. In the autumn, the lakes, whose waters cool slowly, prolong the autumn and give several weeks of cool, stimulating, and beautiful weather, which may extend well into December, and sometimes is prolonged beyond Christmas. Moreover, the extremes of temperature are cut down at both ends, so that the weather is not likely to be either so cold in winter or so hot in summer as it is in adjacent States. The accompanying tables give the average and the extreme temperature for certain selected stations, where observations were taken for the number of years indicated:

STATIONS.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	†
Monthly Average, or Normal Temperature.													
Alpena	17·8°	18·0°	23·2°	37·4°	49·4°	59·8°	65·9°	63·6°	57·2°	45·5°	33·3°	24·7°	18 years.
Detroit	24·8	27·0	32·4	44·6	57·6	67·2	71·8	70·0	63·0	51·4	38·8	30·4	18 "
Grand Haven	24·8	25·4	30·8	43·6	54·1	63·6	68·2	66·5	60·2	49·8	38·1	30·6	19 "
Lansing *	21·5	23·8	30·8	45·3	58·3	67·7	71·6	68·8	60·4	48·3	35·3	25·4	24 "
Marquette	16·1	16·8	23·0	37·8	48·2	58·4	65·2	63·5	57·2	45·4	32·2	23·7	17 "
Highest Temperature recorded.													
Alpena	52	58	66	79	91	97	98	93	93	87	67	56	20 years.
Detroit	66	64	75	82	90	94	101	99	97	85	70	65	22 "
Grand Haven	61	58	71	81	86	90	90	92	88	81	72	61	20 "
Lansing *	63	64	70	83	90	99	101	96	90	81	72	62	9 "
Marquette	56	69	70	87	92	95	100	98	97	87	69	59	19 "
Monthly Normal Precipitation (rain and melted snow).													
Alpena	2·6″	2·2″	2·1″	2·1″	3·4″	3·6″	3·2″	3·7″	4·0″	4·0″	3·0″	2·5″	19 years.
Detroit	2·0	2·3	2·5	2·2	3·3	3·6	3·6	2·9	2·5	2·7	2·6	2·5	22 "
Grand Haven	2·4	2·2	2·4	2·4	3·3	4·0	2·9	2·9	3·6	3·5	3·1	2·5	21 "
Lansing *	1·9	2·1	2·6	2·4	3·0	3·8	3·4	2·8	3·1	2·6	2·2	2·0	24 "
Marquette	1·8	1·7	1·6	2·0	2·6	3·7	3·1	3·1	4·2	3·3	2·5	2·3	21 "

* Principally from observations made at the State Agricultural College of Michigan. † Period of observation.

The number of storms that pass over the State in the course of a year is large. If maps were drawn for a number of years, showing, in black, the path of each storm, the successive maps would become blacker and blacker, and the blackest path would be in the vicinity of Alpena. The following table gives the average number of low-area storms crossing centrally over the State each month during the decade 1883–92, and shows also their distribution among the three indicated divisions:

STATIONS.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Upper peninsula	2·6	1·6	2·0	1·2	1·7	1·7	2·4	2·0	2·0	2·4	2·6	1·7
Upper half lower peninsula	1·6	1·7	1·4	1·2	1·0	0·8	0·9	0·6	0·6	1·1	1·5	1·9
Lower half lower peninsula	1·5	1·5	0·6	0·9	0·8	0·5	0·3	0·4	0·5	1·0	1·4	1·1
Totals	5·7	4·8	4·0	3·3	3·5	3·0	3·6	3·0	3·1	4·5	5·5	4·7

Divisions.—The United States census of 1900 showed eighty-three counties, as follows:

COUNTIES AND COUNTY-TOWNS, WITH POPULATION.

COUNTIES.	* Ref.	Pop. 1890.	Pop. 1900.	COUNTY-TOWNS.	Pop. 1900.	COUNTIES.	* Ref.	Pop. 1890.	Pop. 1900.	COUNTY-TOWNS.	Pop. 1900.
Alcona	4-J	5,409	5,691	Harrisville	403	Lapeer	7-K	29,213	27,641	Lapeer	3,297
Alger	2-G	1,238	5,868	Au Train	484	Leelanaw	4-H	7,944	10,556	Leland	946
Allegan	7-H	38,961	38,812	Allegan	2,667	Lenawee	8-J	48,448	48,406	Adrian	9,654
Alpena	4-J	15,581	18,254	Alpena	11,802	Livingston	7-J	20,858	19,664	Howell	2,518
Antrim	4-I	10,413	16,568	Bellaire	1,157	Luce	2-H	2,455	2,983	Newberry	1,421
Arenac	5-J	5,683	9,821	Standish	829	Mackinac	2-I	7,830	7,703	St. Ignace	2,271
Baraga	2-F	3,036	4,320	L'Anse	620	Macomb	7-K	31,813	33,244	Mt. Clemens	6,576
Barry	7-I	23,783	22,514	Hastings	3,172	Manistee	5-H	24,230	27,856	Manistee	14,260
Bay	5-J	56,412	62,378	Bay City	27,628	Manitou §	3-H	860	.....	.....	.....
Benzie	4-H	5,237	9,685	Benzonia	484	Marquette	2-F	39,521	41,239	Marquette	10,058
Berrien	8-G	41,285	49,165	Berrien Springs	808	Mason	5-H	16,385	18,885	Ludington	7,166
Branch	8-I	26,791	27,811	Coldwater	6,216	Mecosta	6-I	19,697	20,693	Big Rapids	4,686
Calhoun	8-I	43,501	49,315	Marshall	4,370	Menominee	3-F	33,639	27,046	Menominee	12,818
Cass	8-H	20,953	20,876	Cassopolis	1,330	Midland	6-I	10,657	14,439	Midland	2,363
Charlevoix	4-I	9,686	13,956	Charlevoix	2,079	Missaukee	5-I	5,048	9,308	Lake City	816
Cheboygan	3-I	11,986	15,516	Cheboygan	6,489	Monroe	8-K	32,337	32,754	Monroe	5,043
Chippewa	2-I	12,019	21,338	Sault Ste. Marie	10,538	Montcalm	6-I	32,637	32,754	Stanton	1,234
Clare	5-I	7,558	8,360	Harrison	647	Montmorency	4-J	1,487	3,234	Atlanta	.....
Clinton	7-I	26,509	25,136	St. John's	3,288	Muskegon	7-H	40,013	37,036	Muskegon	20,818
Crawford	5-I	2,962	2,943	Grayling	1,716	Newaygo	6-H	20,476	17,673	Newago	1,172
Delta	3-G	15,330	23,881	Escanaba	9,549	Oakland	7-K	41,245	44,792	Pontiac	9,769
Dickinson †	3-F	.....	17,890	Iron Mountain	9,242	Oceana	6-H	15,698	16,644	Hart	1,134
Eaton	7-I	32,094	31,668	Charlotte	4,092	Ogemaw	5-J	5,583	7,765	West Branch	1,412
Emmet	3-I	8,756	15,931	Harbor Springs	1,643	Ontonagon	2-D	3,756	6,197	Ontonagon	1,267
Genesee	7-J	39,430	41,804	Flint	13,103	Osceola	5-H	14,630	17,859	Hersey	327
Gladwin	5-I	4,208	6,564	Gladwin	732	Oscoda	4-J	1,904	1,468	Mio	.....
Gogebic	2-D	13,166	16,738	Bessemer	3,911	Otsego	4-I	4,272	6,175	Gaylord	1,561
Grand Traverse	4-H	13,355	20,479	Traverse City	9,407	Ottawa	7-H	35,358	39,667	Grand Haven	4,743
Gratiot	6-I	28,668	29,889	Ithaca	2,020	Presque Isle	3-J	4,687	8,821	Rogers	544
Hillsdale	8-J	30,660	29,865	Hillsdale	4,151	Roscommon	5-I	2,033	1,787	Roscommon	465
Houghton	1-E	35,389	66,063	Houghton	3,359	Saginaw	6-J	82,273	81,222	Saginaw	42,345
Huron	6-K	28,545	34,162	Bad Axe	1,241	St. Clair	7-K	52,105	55,228	Port Huron	19,158
Ingham	7-J	37,666	39,818	Mason	1,828	St. Joseph	8-H	25,356	23,889	Centerville	645
Ionia	7-I	32,801	34,329	Iona	5,209	Sanilac	6-K	32,589	35,055	Sanilac Center	578
Iosco	5-J	15,224	10,246	Tawas City	1,736	Schoolcraft	2-G	5,818	7,889	Manistique	4,126
Iron	2-E	4,432	8,990	Crystal Falls	3,231	Shiawassee	7-J	30,952	33,866	Corunna	1,510
Isabella	6-I	18,784	22,784	Mt. Pleasant	3,662	Tuscola	6-K	32,508	35,890	Caro	2,006
Isle Royale ‡	....	135	.....	.....	.....	Van Buren	8-H	30,541	33,274	Paw Paw	1,465
Jackson	8-J	45,031	48,222	Jackson	25,180	Washtenaw	8-J	42,210	47,761	Ann Arbor	14,509
Kalamazoo	8-H	39,273	44,310	Kalamazoo	24,404	Wayne	8-K	257,114	348,793	Detroit	285,704
Kalkaska	4-I	5,160	7,133	Kalkaska	1,304	Wexford	5-H	11,278	16,845	Cadillac	5,997
Kent	7-H	109,922	129,714	Grand Rapids	87,565						
Keweenaw	1-F	2,894	3,217	Eagle Harbor	770	Totals	.....	2,093,889	2,420,982		
Lake	5-H	6,505	4,957	Baldwin	343						

* Reference for location of counties, see map of Michigan.
† Formed from parts of Iron, Menominee, and Marquette in 1891.
‡ In Lake Superior. Annexed to Keweenaw County in 1897.
§ Annexed to Charlevoix and Leelanaw Counties in 1896.

Principal Cities and Towns, with Population in 1900.—Detroit, 285,704; Grand Rapids, 87,565; Saginaw, 42,345; Bay City, 27,628; Jackson, 25,180; Kalamazoo, 24,404; Muskegon, 20,818; Port Huron, 19,158; Battle Creek, 18,563; Lansing (capital) 16,485; Ann Arbor, 14,509; Manistee, 14,260; Ishpeming, 13,255; West Bay City, 13,119; Flint, 13,103; Menominee, 12,818; Alpena, 11,802; Sault Ste. Marie, 10,538; Marquette, 10,058; Pontiac, 9,769; Ironwood, 9,705; Adrian, 9,654; Escanaba, 9,549; Traverse City, 9,407; and Iron Mountain, 9,242.

Population and Races.—In 1870, 1,184,059; 1880, 1,636,937; 1890, 2,093,889 (native, 1,550,009; foreign, 543,880; males, 1,091,780; females, 1,002,109; white, 2,072,884; colored, 21,005, of whom 15,223 were of African descent; 120 Chinese, 38 Japanese, and 5,624 civilized Indians); 1900, 2,420,982.

Commerce.—Michigan has a large foreign commerce, chiefly with Canada, the exports including iron ore, copper, salt, building-stone, lumber, grain, fish, meats, fruit, carriages, and railway cars. The U. S. customs districts and ports of entry are Detroit, Grand Rapids, Huron, Michigan City, and Superior, and during the calendar year 1900 the combined imports amounted in value to $5,556,054, and the exports to $32,590,586.

Finance.—In 1899 the State debt, including trust funds, amounted to $6,630,996.39. The financial report for the year ending June 30, 1899, showed balance on June 30, 1898, $1,216,212.61; receipts from June 30, 1898, to June 30, 1899, $4,576,874.98; expenditures during same period, $4,391,031.71; leaving a balance, June 30, 1899, of $1,402,055.88. The assessed valuation in 1900 was $1,105,100,000.

Banking.—On Sept. 5, 1900, there were 83 national banks, with a combined capital of $11,471,532.60, surplus and undivided profits of $4,844,733.41, and individual deposits of $54,065,246.36. There were, June 30, 1900, 194 State banks, capital $12,945,100, surplus and profits $5,390,312, and deposits $102,448,609; and 48 private banks, capital $617,603, surplus and profits $128,378, and deposits $3,442,350.

Means of Communication.—The first railway built in Michigan was the one between Port Lawrence, O. (now Toledo), and Adrian, which was opened for traffic in 1836. In 1837 the Legislature authorized the construction by the State of three railways, traversing the State from E. to W., of which the central had been built from Detroit to Kalamazoo, and the southern from Monroe to Hillsdale, when in 1846 they were sold to private corporations. The two railways reached Chicago in 1852, within a few hours of each other. The progress of railway construction is shown by the following figures, giving the number of miles of track within the State at the end of each decade: 1840, 104; 1850, 380; 1860, 770; 1870, 1,739; 1880, 3,823; 1890, 6,957. On June 30, 1899, the total mileage was reported at 8,097·31.

A coast line of over 1,600 miles affords unequal facilities for water transportation. Of the 2,784 craft engaged in carrying the 53,500,000 tons of freight transported on the Great Lakes in 1889, about 1,000 belonged to Michigan. In 1892, vessels numbering 33,860, with 24,785,000 registered tonnage, passed through Detroit river, and 12,580 vessels, with 10,647,203 registered tonnage, passed through St. Mary's river and canal. The only other canal in the State, 3 miles long and without locks, connects the northern end of Portage Lake with Lake Superior.

Churches.—The census of 1890 gave the following statistics of the religious bodies having each a membership in the State of 5,000 and upward:

DENOMINATIONS.	Organizations.	Churches and halls.	Members.	Value of church property.
Roman Catholic	406	409	222,261	$3,671,350
Methodist Episcopal	1,085	1,042	86,958	3,739,850
Baptist	395	415	34,145	1,858,419
Lutheran, Synodical Conference	137	116	27,472	488,880
Presb. in the U. S. of America	236	246	25,088	2,214,636
Congregational	331	346	24,582	1,533,055
Protestant Episcopal	189	204	18,034	1,645,551
Lutheran, Michigan Synod	62	62	11,041	157,270
German Evan. Synod of N. A.	50	50	10,926	242,450
Lutheran, General Council	70	70	8,710	153,350
Christian Reformed	44	52	7,782	174,100
Evangelical Association	134	136	6,677	188,450
Reformed Church in America	45	53	6,609	262,800
Lutheran, Joint Syn. of Ohio, etc.	21	21	6,217	125,700
Disciples of Christ	73	75	5,788	160,650
United Brethren, Old Constitution	164	164	5,602	119,550
Free-will Baptist	128	127	5,135	277,275
United Brethren in Christ	138	137	5,201	133,250

Schools.—For primary education the townships are divided into school districts, each with a board of three members chosen at the school meeting. In 1899 there were 7,973 school-houses, and 15,564 teachers, and a school enrollment of 498,665 out of a total school population of 713,740, with an average daily attendance of about 350,000. The total revenue for school purposes was $6,660,800; the total expenditure, $5,883,369. The average expenditure per pupil, based on daily attendance, was $16.81. The primary-school fund had its origin in the grant made by Congress of a section in each township for educational purposes. In many of the more populous districts the schools have been graded, the statistics of 1892 showing 572 graded school districts. To encourage grading the law permits two or more contiguous districts to unite to establish a graded school. High schools are but graded schools of a more advanced character, the line between the grammar school and the high school being drawn, as a rule, at the end of the eighth grade. The educational system of the State culminates in the University of Michigan, a State institution managed by an elected board of regents, and having in 1898–99 about 200 professors and instructors and 3,059 students. The Normal School, at Ypsilanti, the Agricultural College, at Lansing, and the Mining-school, at Houghton, complete the list of State educational institutions. There are also a number of colleges in the State supported by religious denominations.

Libraries.—According to a U. S. Government report on public libraries of 1,000 volumes and upward each in 1891, Michigan had 139 libraries which contained 733,377 bound volumes and 80,734 pamphlets. The libraries were classified as follows: General, 47; school, 36; college, 14; college society, 1; law, 2; medical, 1; public institution, 7; State, 1; social, 24; scientific, 2; garrison, 1; not reported, 3.

Post-offices and Periodicals.—In Jan., 1901, there were 2,173 post-offices, of which 305 were presidential (11 first-class, 46 second-class, 148 third-class), and 1,968 fourth-class. There were 1,066 money-order offices, and 60 money-order stations. The newspapers and periodicals comprised 77 daily, 5 tri-weekly, 21 semi-weekly, 604 weekly, 1 bi-weekly, 6 semi-monthly, 89 monthly, 3 bi-monthly, and 5 quarterly publications: total, 790.

Charitable, Reformatory, and Penal Institutions.—The first charitable institution organized in the State was the School for the Deaf, established at Flint in 1851. The school had in 1900 431 pupils and 18 instructors. The blind were also admitted to this school until 1880, when a School for the Blind was established at Lansing. An institution peculiar to Michigan is the State Public School at Coldwater, established in 1874 to afford a temporary home to dependent and ill-treated children who, if between the ages of two and twelve and sound in body and mind, may be sent there by the superintendents of the poor under the order of a judge of probate. In 1891 there were 198 children in the school and 1,352 in homes which had been secured for them, and where they continue to be wards of the State. There is a Soldiers' Home at Grand Rapids. The Legislature of 1893 made provision for a Home for the Feeble-minded and Epileptic. The State has also made generous provision for the insane. In three asylums, located at Kalamazoo (opened in 1859), at Pontiac (opened in 1870), and at Traverse City (opened in 1878), the total number of patients in 1892 was 2,748. A law of 1893 provided for a fourth asylum to be located in the upper peninsula. For such criminals as might become insane the Asylum for Insane Criminals was established at Ionia in 1885, but in 1891, upon provision being made for the transfer to it of the dangerous insane, its name was changed to the Michigan Asylum for Dangerous and Criminal Insane. The State Prison at Jackson was established in 1839. The State House of Correction and Reformatory, established at Ionia in 1877, was designed for younger and less hardened male offenders, but it has no distinctive reformatory features and differs from the State Prison chiefly in the exclusion of life-prisoners. In both institutions the prisoners are employed in various kinds of manual labor in the immediate service either of the State or of contractors. A third prison, corresponding to these, established at Marquette in 1885, is known as the State House of Correction and Branch of the State Prison for the Upper Peninsula. The number of inmates in the three prisons in 1892 was 768. The State Board of Corrections and Charities, consisting of four members appointed by the Governor for eight years, one every second year, and of which the Governor is *ex officio* a member, is intrusted with the duty of

inspecting the charitable, reformatory, and penal institutions of the State, as also county jails and asylums, and of reporting annually to the Governor the results of such inspection, together with such recommendations as it may deem proper. An agent of the board may be appointed by the Governor in every county, charged with the duty of advising the courts in regard to juvenile offenders, of seeking suitable homes for children who have become wards of the State, and of exercising oversight over those who have already been placed in homes.

Political Organization.—The Legislature is composed of two houses, the Senate and the House of Representatives, the former having 32 and the latter 100 members, elected in both cases from single districts. During its term of two years the Legislature, unless specially convened by the Governor, has but a single session, which begins on the first Wednesday in January of the year following the election of its members. To the Governor the constitution intrusts a qualified veto power, the duty of enforcing the laws, including the right as commander-in-chief to make use of the militia for the purpose, the authority to remove for cause a large number of appointed and elected officers, and the pardoning power. In the thirty-three judicial districts into which the State is divided circuit judges are elected for terms of six years, whose duty it is to hold at least two terms of court yearly in each of the counties belonging to their circuit. The Supreme Court consists of five justices elected for terms of ten years, one being elected every second year, and each acting as chief justice during the last two years of his term. The right to vote is given to male citizens of the U. S., including those who have declared their intention to become citizens, who are twenty-one years of age and have resided in the State three months and in the township or ward ten days preceding the election. The right of women to vote and to hold office is limited to school districts. The constitution prescribes that every sixteenth year the question of general revision shall be submitted to the voters.

History.—The early French missionaries and traders, diverted from the more direct route by the hostility of the Iroquois, moved westward by way of the Ottawa and French rivers and Georgian Bay, establishing settlements at Sault Ste. Marie and at St. Ignace, about thirty years before Cadillac's appreciation of the strategic importance of its position made him in 1701 the founder of Detroit. The town was surrendered to the English Nov. 29, 1760, within two months of the fall of Montreal. Two and a half years later it narrowly escaped falling into the hands of Pontiac at the head of a general movement on the part of the Indians to check the encroachment of the whites. In the Revolutionary war Detroit was the base of British operations in the Northwest, and their retention of it for thirteen years after the conclusion of peace resulted from their unwillingness to abandon that region to the U. S. Forming part at first of the Northwest Territory, organized by the ordinance of 1787, and belonging after the division of the latter in 1800 to the Territory of Indiana, Michigan was in 1805 organized as a separate Territory. Its first executive, Governor Hull, surrendered Detroit to the British in Aug., 1812, but the disaster was retrieved in the following year in consequence of Perry's victory at Put-in-Bay. Under the able rule of Lewis Cass, Governor from 1814 to 1831, emigration, hitherto held in check by danger from Indians, bad roads, and erroneous views in regard to the soil, streamed into the Territory. It was under the administration of Stevens T. Mason who, though but nineteen years of age, was appointed territorial secretary upon the resignation of Cass to enter Jackson's cabinet, and who acted as Governor during nearly the whole remaining period of territorial existence, that Michigan organized itself as a State and applied for admission into the Union. Its admission was retarded by its border controversy with Ohio, Michigan claiming that the boundary should be the continuation from the west boundary of Ohio of a line running due E. from the most southerly point of Lake Michigan, and hence reaching Lake Erie S. of Toledo. A proposition made by Congress to admit the State on condition that it should relinquish to Ohio the territory in dispute and accept in its stead a considerable addition of territory on the northwest, being the greater part of what is now known as the upper peninsula, was first rejected, but shortly afterward accepted, and on Jan. 26, 1837, the State was admitted. The constitution of 1835 was revised in 1850, when, among other changes, judges and heads of departments were made elective.

GOVERNORS OF MICHIGAN.

Under French Dominion.

Samuel Champlain	1622–35
M. de Montmagny	1636–47
M. d'Aillebout	1648–50
M. de Lauson	1651–56
M. de Lauson (son)	1656–57
M. d'Aillebout	1657–58
M. d'Argenson	1658–60
Baron de Avangour	1661–63
M. de Mesey	1663–65
M. de Courcelles	1665–72
Count de Frontenac	1672–82
M. de la Barre	1682–85
M. de Nonville	1685–89
Count de Frontenac	1689–98
M. de Callieres	1699–1703
M. de Vaudreuil	1703–25
M. de Beauharnois	1726–47
M. de Galissoniere	1747–49
M. de la Jonquiere	1749–52
M. de Quesne	1752–55
M. de Vaudreuil de Cavagnac	1755–63

Under British Dominion.

James Murray	1763–67
Guy Carleton	1768–77
Frederick Haldimand	1777–85
Henry Hamilton	1785–86
Lord Dorchester	1786–96

Territorial.—N. W. Territory.

Arthur St. Clair	1796–1800

Indiana Territory.

Wm. Henry Harrison	1800–05

Michigan Territory.

William Hull	1805–13
Lewis Cass	1813–31
George B. Porter	1831–34
S. T. Mason, *ex officio*	1834–35

State.

Stevens T. Mason	1835–40
William Woodbridge	1840–41
J. Wright Gordon (acting)	1841–42
John S. Barry	1843–45
Alpheus Felch	1846–47
Wm. L. Greenly (acting)	1847
Epaphroditus Ransom	1848–49
John S. Barry	1850–51
Robert McClelland	1852–53
Andrew Parsons (acting)	1853–54
Kinsley S. Bingham	1855–58
Moses Wisner	1859–60
Austin Blair	1861–64
Henry H. Crapo	1865–68
Henry P. Baldwin	1869–72
John J. Bagley	1873–77
Charles M. Croswell	1877–81
David H. Jerome	1881–83
Josiah W. Begole	1883–85
R. A. Alger	1885–87
Cyrus G. Luce	1887–91
Edwin B. Winans	1891–93
John T. Rich	1893–97
Hazen S. Pingree	1897–1901
Aaron T. Bliss	1901–

AUTHORITIES.—Cooley, *Michigan: a History of Governments* (Boston, 1885); Campbell, *Outlines of the Political History of Michigan* (Detroit, 1876); Cocker, *Civil Government of Michigan* (14th edition, Detroit, 1892); *Michigan and its Resources*, compiled by authority of the State (4th edition, Lansing, 1893); *Michigan Manual*, published biennially by the Secretary of State; other State publications, including *Public Acts, Joint Documents, and Farm Statistics of Michigan*; *Michigan Semi-Centennial Addresses* (Detroit, 1886); Reports of the eleventh U. S. census, etc.

RICHARD HUDSON.

Michigan City: city; La Porte co., Ind. (for location of county, see map of Indiana, ref. 1–D); on Lake Michigan, and the Lake Erie and W., the Louis., New Alb. and Chi., and the Mich. Cent. railways; 50 miles E. of Chicago. It contains 15 churches, a central and 5 ward public schools, St. Mary's Academy (Roman Catholic), St. John's and St. Luke's parochial schools (Lutheran), the Northern Indiana State Prison, a sanitarium, a U. S. life-saving station, electric street-railway, a beautiful public park on the lake front, a national bank with a capital of $250,000, a State bank with capital of $50,000, and 2 daily and 3 weekly newspapers. The city has an extensive trade in lumber, salt, and iron ore. Its manufactories include foundries, planing-mills, railway-car factory, glass-works, and several chair-factories. Pop. (1880) 7,366; (1890) 10,776; (1900) 14,850. EDITOR OF "NEWS."

Michigan, Lake: a lake of the Laurentian system, communicating with Lake Huron by the Straits of Mackinac. From the maps of the U. S. Lake Survey it has been computed that Lake Michigan, including Green Bay, has an area of 21,729 sq. miles. It is somewhat smaller than Lake Huron, and ranks third in the series of Great Lakes. Its mean surface elevation is 582 feet above the sea, and is the same as the level of Lake Huron. Its maximum depth is 870 feet; the bottom of the basin is therefore some 300 feet below sea-level. Its shores are low, unpicturesque, and without embayments except at the N., where Green Bay indents the western and Grand Traverse Bay the eastern shore. About its southern and eastern borders there are immense accumulations of sand which has been thrown ashore by the waves and currents, and drifted inland by the wind. In this way heavy forests have sometimes been buried, as may be seen at Sleeping Bear bluffs and other localities.

The level of the lake undergoes many changes, due to variations in the direction and force of the wind, seasonal and secular variations in rainfall and evaporation, fluctuations in atmospheric pressure, etc. The average differences of level as shown by twenty years' observation do not exceed 1·3 feet, but protracted gales blowing steadily in one direction may cause a rise or fall of several times this amount. A tide in the lake was detected from observations made by the U. S. Lake Survey at Chicago, having an amplitude of 1½ inches for neap and about 3 inches for spring tide. The

lake has an important influence on the climate of its shores, as its waters are warmer than the air in winter and cooler in summer. The effect of this amelioration of climate is shown by the abundance and rich flavor of the fruits of Michigan. Like its sister lakes, Lake Michigan abounds in fish, and is an important commercial highway. See also St. Lawrence River. Israel C. Russell.

Michigan University: an institution of learning at Ann Arbor, Mich. Congress, in the year 1826, set apart two townships in the Territory of Michigan for the future foundation of a university, which was accordingly established by the first Legislature of the new State Mar. 18, 1837, though not opened until Sept. 20, 1841. It is supported by the State, and open to students of both sexes on the payment of a small matriculation fee and of an annual charge of from $20 to $35. James B. Angell, LL. D., has been its president since 1871. To the original academic institution a medical department was added in 1850, a law department in 1859, and subsequently a school of pharmacy, a homœopathic medical college, and a dental college. The department of literature, science, and the arts embraces nine regular courses of four years and a graduate course. In that department courses in civil, mining, mechanical, and electrical engineering are given. The total number of instructors in 1899–1900 in the various departments was 158; the number of students was 3,700. The libraries contain about 145,000 volumes. A fine observatory was erected by citizens of Detroit in 1854. The grounds of the university embrace 55 acres, and the buildings were erected at a cost of $700,000. The university fund, derived from the sale of lands, annually yields about $38,500. A sixth-of-a-mill tax levied by the State for the university yielded (1899) about $240,000. The Legislature at each session for many years has made generous appropriations for the university. The annual expenditure averages about $325,000. The government is in the hands of eight regents, elected by the popular vote of the State.

J. B. Angell.

Michipicoten, mish-i-pi-kō'ten (great mushroom, according to Lacombe): name of a river, harbor, bay, and island in or emptying into northeastern Lake Superior, and forming parts of Ontario. The river is the outlet of many lakes, and descends through them by a series of rapids and cascades into the Bay of Michipicoten. It has clear and abundant water, except in summer; abounds in trout, sturgeon, and other fish, and forms with Moose river a boat route from Lake Superior to Hudson Bay, over at least thirty-nine portages. It requires sixteen days to reach Moose Factory, at the mouth of Moose river. At the mouth of Michipicoten river was the Michipicoten House of the Hudson Bay Company—one of its largest fortified posts, established at an early date, and long the busiest place on Lake Superior. Fifty miles S. W. is the island of Michipicoten, 25 miles long E. and W. by 10 broad, rocky, inhabited, cut up by fiords on the south side, culminating in an elevation of about 800 feet above the level of the lake. It has inexhaustible supplies of native copper. M. W. Harrington.

Michmash, mik'mash: a town of Palestine; in the tribe of Benjamin; 9 Roman miles N. of Jerusalem. It was a point of great strategical importance, and played a conspicuous part in several of the wars of the Israelites (1 Sam. xiii., xiv.; Isa. x. 28). It became the seat of government under Judas Maccabæus (1 Macc. ix. 73). It is now a small village, called Mukhmash. S. M. J.

Michoacan, mĕĕ-shō-ăă-kaan' (often written *Mechoacan*): a southwestern state of Mexico; bounded N. W. by Colima and Jalisco, N. by Guanajuato and Querétaro, E. by Mexico, S. by Guerrero, and S. W. by the Pacific. Area, 22,874 sq. miles. Pop. (1895) 889,795. Capital, Morelia. Somewhat N. of the middle the state is traversed from E. to W. by forest-covered monntains, which, farther W., in Jalisco, join the Sierra Madre. None of them is snow-capped, and the highest point in the range and in the state appears to be Tancitaro (about 11,500 feet). N. of these extend the plains and rolling country of the plateau about Morelia, generally open lands, dotted with lakes; of these, the largest are the Lago de Chapala (*q. v.*), on the border of Jalisco, and the Lago de Patzcuaro. S. of the mountains the country is extremely varied, long ridges descending toward the coast and separating fertile valleys of the *tierra templada* and *tierra caliente*. In the southeast, and S. of the principal mountain range, there is an arid basin, covered with lava and cinders, and containing the isolated recent volcano of Jorullo (*q. v.*). The climate, except in some parts of the coast land, is healthful, and in the interior is like that of a perpetual spring. The state is abundantly watered, the two largest streams being the Mescala and Lerma, respectively on the southern and northern frontiers. The soil is so fertile that this has been called the "garden of Mexico." The principal crops are maize on the plateau, coffee in the middle valleys, and sugar-cane and cotton (for home consumption only) in the hot lands. Cattle-raising is an important industry in the high lands. This is not one of the great mining states, but gold, silver, and copper to the amount of about $2,000,000 annually (Mexican money) are extracted, and a number of other minerals are reported. Manufactures, as yet in their infancy, consist mainly of woolen and cotton cloths and small hand-works.

Herbert H. Smith.

Michon, mĕĕ'shōṅ', Jean Hippolyte: preacher and author; b. at La Roche Fressange, Corrèze, France, Nov. 21, 1806; was educated in the College of Angoulême; studied theology in the Seminary of St. Sulpice, in Paris; was ordained a priest in 1830; preached with great success in Bordeaux, Angoulême, Périgueux, Paris, and other places; accompanied de Saulcy twice to the East, in 1850 and in 1863; was made an honorary canon of Bordeaux and Angoulême. D. at Montauzier, Charente, May 8, 1881. His numerous works belong to apologetics or archæology, or to that new science he has designated as "graphology." The first group comprises *La femme et la famille dans le catholicisme* (1845); *Apologie chrétienne au XIX^e siècle* (1863); *Vie de Jésus* (2 vols., 1865); the second, *Statistique monumentale de la Charente* (1844–48); *Monographie du château de la Rochefoucault* (1848); *Solution nouvelle de la question des lieux saints* (1852); *Voyage religieux en Orient* (2 vols., 1854); the third, *Système de graphologie* (1874); and the semi-monthly review *Graphologie*. See Varinard, *Jean-Hippolyte Michon, sa vie et ses œuvres* (Paris, 1883).

Mickiewicz, mits-kyev'ich, Adam Bernard: poet; b. at Novogródek, Lithuania, Dec. 24, 1798; studied at Minsk and Wilno; was appointed teacher of Latin and Polish at the gymnasium of Kovno, and published in 1822–23, at Wilno, two volumes of poems, *Poezye* (containing ballads, hymns, and the epic *Gražyna* and the *Dziady*), which at once gave him rank among the greatest poets of Poland, and decided the contest between the old classical and the new romantic school. A journey to the Crimea (1825) gave rise to a series of sonnets, *Sonety krymskie* (Moscow, 1826). For participation in Zan's conspiracy he was banished to the interior of Russia, and here he wrote the great patriotic epic *Konrad Wallenrod* (St. Petersburg, 1828). Having received permission to make a tour of Europe, he went to Germany and Italy, and finally settled in Paris (1832). There he published *Księgy narodu polskiego* (Books of the Polish Nation, Paris, 1832), in which he describes the mission of Poland in a biblical style. His greatest work, however, is the modern epic *Pan Tadeusz* (Paris, 1834), in which the poet, like a modern Homer, faithfully portrays Lithuanian life in 1812. In 1840 he was appointed Professor of the Slavonic Languages and Literature at the Collège de France, and his brilliant lectures attracted much attention; but afterward he became concerned in various fanatical religious and political plans designed by Towiański, and his lectures were suspended. In 1849 he edited *La Tribune du Peuple* (a daily). In 1852 Napoleon III. made him librarian at the arsenal in Paris. In 1855 he was sent by the emperor on a secret mission to Constantinople. D. in that city Nov. 28, same year. He was buried at Montmorency, Paris. Mickiewicz is justly considered the greatest of all Slavonic poets.

Revised by J. J. Král.

Micmacs: See Algonquian Indians.

Microbacteria: See Fermentation.

Microbes: minute living beings, instrumental in the production of fermentation and decay, and of many contagious diseases affecting man and the lower animals. See Bacteria and Bacteriology.

Micrococcus: the general name applied to minute spherical bacteria, many of which produce diseases in plants and animals. The name is also applied to a particular genus of the spherical bacteria. See Bacteria and Fermentation.

Micrococci.

Mi'crocosm [Gr. μικρόκοσμος, little world]: a name applied by the astrological philosophers of the Middle Ages to man, who was conceived of as the epitome or miniature representation of the universe, which was

named by them *Macrocosm*, or the great world. This theory, a very ancient one, was believed to explain the supposed influence of the stars upon the events in the history of the human race and of individual men.

Microfarad: See FARAD.

Microm'eter [Gr. *μικρός*, small + *μέτρον*, measure]: an apparatus for measuring small distances. The term is usually limited to a contrivance placed in the field of view of a telescope or microscope. Gascoigne in 1640 first suggested the idea of measuring distances in the field of view of a telescope by separating mechanically the edges of two brass plates placed in the focus of the eyepiece. Auzout and Picard in 1666 described a micrometer in which silver wires take the place of the brass edges. Felix Fontana in 1775 substituted spiders' web for the silver wires, which seems to be, in connection with the previous suggestions of Bradley, the incipient idea of the modern position micrometer. A fixed micrometer is mentioned by Cassini, and Cavallo used a strip of mother-of-pearl ruled to $\frac{1}{200}$th of an inch. Roemer hints at the heliometer with two object-glasses in 1675, and Bouger first calls it by that name in 1748; but it remained for Dolland in 1753 to construct a heliometer with a divided object-glass.

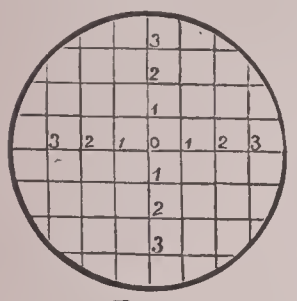

FIG. 1.

The simplest form of micrometer is the reticulated micrometer shown in Fig. 1, which consists of a network of lines whose distances apart are known. The apparent size of an object in the field of view then becomes known by noting how many divisions of the micrometer are occupied by its image. Scales ruled on glass, such as shown in Fig. 2, are sometimes substituted for the reticule. These lines are rendered visible at night by artificial light. For the observation of very faint objects, Prof. Rood suggests (*American Journal of Arts and Sciences*, 3d series, vol. vi., p. 44) an inexpensive scale micrometer made as follows: A dead black surface is formed on a thin plate of silver. Lines are ruled through the blackened surface, ending at the edge of the plate. The plate is then put in the focus of the eyepiece, so as to obscure less than half the field of view. The lines are illuminated by the light of a distant lamp or diffused light, which reaches them through an opening cut in the telescope tube between the observer's eye and the ruling on the silver plate. The ring micrometer is a circular metallic ring fixed in the focus of the telescope such as shown in Fig. 3.

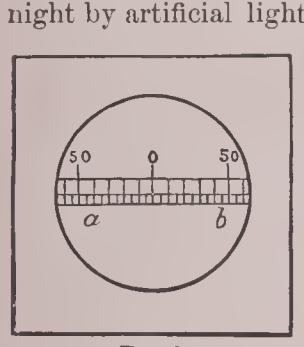

FIG. 2.

FIG. 3.

The Filar Micrometer.—This is the micrometer now most commonly used in astronomical instruments. It is called filar because its essential feature is a system of fine spider lines, having the appearance of threads. In a rectangular frame, *a a a a*, slide two rectangular forks, *b b b* and *c c c*, which can be moved by the screws *f f* by turning the graduated heads *g g*, which are graduated usually into 100 equal parts; at *a* and *a* are two pointers. If the head is turned so that 100 divisions will pass the point *a*, obviously we move one of the forks

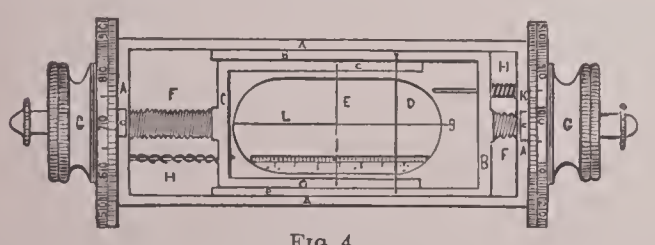

FIG. 4.

a distance equal to the distance between the threads of the screw *f*. The forks carry two spider-lines, *e* and *d*. The distance apart of any two points in the field of view may be determined by making the line *e* bisect one of them, and the line *d* the other, and at the same time having the line joining them parallel to *l*. For every entire revolution of the screw *f* the line *e* or *d* passes over a single tooth of the comb *c*. By noting the number of teeth included between the lines *e* and *d*, and also noting the readings of the pointers *a* and *a*, the exact distance between the two points becomes known, expressed in terms of the distance between the threads of the micrometer screw *f f*, which has usually about 100 threads to the inch. One division on the head of the micrometer screw would in this case correspond to $\frac{1}{10000}$th of an inch. When the filar micrometer is attached to a graduated circle, so that it can be rotated around the axis of a telescope, as shown in Fig. 5, it is called a position micrometer. The spider-lines are illuminated by lamplight at night.

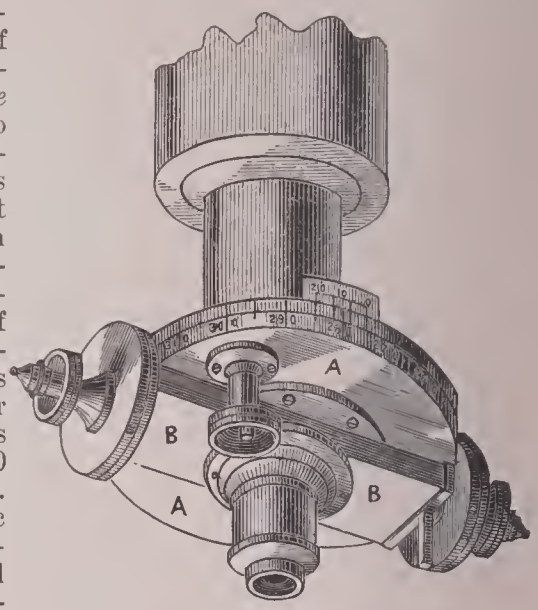

FIG. 5.

The Double-image Micrometer.—In this form the images of two objects are made to coincide in the field of view, either by the motion of the two halves of a divided object-glass of a telescope, in a line parallel to the line of section, or by the separating of the two halves of a simple eye-lens. The motion in either case is effected by proper micrometer-screws, and the displacement of the lenses necessary to effect a coincidence gives the data necessary to determine the angular distance between two objects. The first form of instrument is called the heliometer, and is superior to the position micrometer in that much larger distances can be measured. The second form is known as the double-image eyepiece micrometer. Either the reticulated or the filar micrometer may be used with the microscope, but one of the best microscope micrometers is that known as Jackson's micrometer, and shown in Fig. 6 and 7, where *a* is a frame containing a glass plate on which a scale of fine lines is ruled. This scale can be moved by a screw *s*, so that when placed in the focus of the eyepiece *b c* any desired line of the scale may be made to bisect any point in the field of view. The distance between two points may easily be determined in terms of the scale divisions.

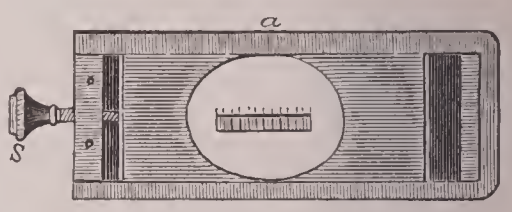

FIG. 6.

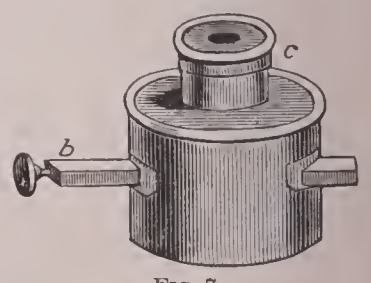

FIG. 7.

See for discussion of errors of micrometers Chauvenet's *Manual of Practical Astronomy*. For a very complete description of various forms of micrometers see *The Encyclopædia Britannica*, article *Micrometer*, by David Gill. For index of literature on micrometer, and descriptions of, see Dr. Philipp Carl on *Die Principien der astronomische Instrumentkunde* (Leipzig, 1863).

Revised by S. NEWCOMB.

Microne'sia [Gr. *μικρός*, small + *νῆσος*, island]: one of the three grand geographic, or more properly ethnographic, divisions of Oceanica, comprising the Marianne, Caroline, Marshall, and Gilbert groups, and those lying to the N. and N. E. of the Mariannes, with a combined area of about 1,300 sq. miles, and an estimated population of 91,000, or seventy per square mile. The Micronesians are closely allied to the Polynesians, but quite distinct from the Melanesians. There

is apparently some negrito mixture, and also considerable Malayan intermingling, but there are also traces of a race of still clearer complexion. M. W. Harrington.

Microphone: a device for increasing the amplitude of the minute sound-waves received by the telephone and thus to intensify the effect in the telephonic receiver. The name is generally applied to apparatus in which the change in the electrical resistance of graphitic carbon with varying pressure is utilized. Numerous forms of the microphone have been described, of which the carbon button invented by Edison has come into general commercial use in telephonic transmission. This button consists of a layer of pulverized carbon between two metallic disks. To one of these, which is free to move, is attached the stylus of the telephone transmitter, the motions of which vary the pressure upon the powdered carbon. This carbon button is placed in circuit with a battery and with the primary coil of an inductorium. To the secondary circuit of this induction coil is connected the line and the receiving telephone. This simple device has greatly increased the practicability of telephonic transmission to a distance. E. L. Nichols.

Micropyle: See Entomology.

Mi'croscope [Gr. *μικρός*, small + *σκοπεῖν*, look at, view]: Those objects which are too minute to be seen by the unaided vision are brought into view by the instrument called *microscope*. The period at which the microscope first became generally known was about the year 1590, Zacharias Jansens and his son having made the instrument at that time. Fontana (1618) and Stellati (1685) also made use of the microscope, and the latter published a description of the anatomy of the bee, including its minute structure. With the simple microscope (a single lens) Swammerdam, Leeuwenhoeck, and others made many discoveries; in fact, it would seem that the simple lens served to establish the immense value which this instrument was destined to render, and has rendered, almost every department of science. The form of single microscope used by Dr. Nathaniel Lieberkuhn (1740) consisted of a small lens placed in the center of a polished concave speculum of silver, thus allowing a brilliant light to be reflected upon the surface of the object. (Fig. 1.) Leeuwenhoeck's discoveries were made with a single lens mounted between two plates, each plate pierced with a hole. The objects were fastened to needles or plates of talc, which could be brought into position by means of screws. As each instrument was arranged for only two or three objects. Leeuwenhoeck had a large number of such simple microscopes. From the time of Zacharias Jansens (1590) to the period when uncorrected instruments were being abandoned, many forms of microscopes were constructed by men of science and by opticians in England, France, Germany, and Italy. Prominent among those to whom the development of the microscope is due are Adams, Baker, Hill, Delabarre, and Wollaston. The great difficulty which beset these early microscopists was the *spherical and chromatic aberrations* of the lenses, by which the image formed was distorted in figure and surrounded by a colored fringe. Wollaston and Fraunhofer directed their attention to the improvement of these defects, which resulted in the celebrated Wollaston doublet called by its inventor "periscopic microscope," and the combination by Fraunhofer of two glasses in juxtaposition, forming a single achromatic object-glass (1816). Euler as early as 1776 discovered the achromatic objective. The value of clear definition had now become so established that the greatest scientists of the day were engaged upon the subject of achromatism, both theoretically and practically. In 1829 Mr. Jackson Lister effected one of the greatest improvements in the construction of the object-glass, using a plano-concave lens of flint glass and a double convex of crown. These two lenses were cemented together by Canada balsam.

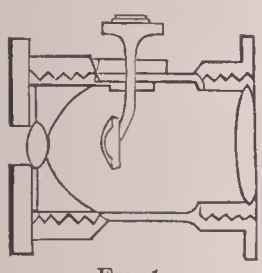

Fig. 1.

By a *simple* microscope is understood a single lens or set of lenses, by means of which the object is viewed directly. The ordinary hand-magnifier or pocket-lens is an example. Here one, two, or three lenses may be employed. A more convenient form consists in having the simple microscope mounted upon a stand provided with an arm made to move up and down by means of a rack and pinion or other device. The steadiness attained by this addition enables much useful work to be accomplished, such as dissecting animal and vegetable tissues, studying in a rough way fragments of rock, plants, etc. Hand-magnifiers, to be serviceable, must range in focal length between 2 inches and half an inch. High powers on this plan are generally known as the Coddington lens, Stanhope lens, and Wollaston doublet. It seems that the Coddington lens was really invented by Sir David Brewster, its present name having been given to it by Mr. Carey, who constructed one for Mr. Coddington, and supposed that he was the originator. This Coddington lens consists of a sphere of glass with a groove cut all around it and filled with dark, opaque material; the definition is good, and the instrument is used in collecting specimens for study with the larger microscopes, or where a rapid view is desired of many objects. Under the head of *compound* microscopes may be included those furnished with an object-glass and an eyepiece, or ocular, which further amplifies the image formed by the object-glass. A stand furnished with stage or object-carrier, quick and slow motions for focusing, with many accessories, constitutes the complicated though easily managed modern instrument.

In order fully to comprehend the optical arrangements of the microscope it seems best to consider very briefly some of the laws of optics which are immediately connected with it, and, as lenses are the chief parts to be looked into, to begin with their study. "A lens is a piece of glass or other transparent substance having its two surfaces so formed that the rays of light in passing through it have their direction changed, and are made to converge or diverge from their original parallelism, or to become parallel after converging or diverging." When a ray of light passes in an oblique direction from one transparent medium to another of a different density, the direction of the ray is changed both on entering and leaving; this influence is the result of the well-known law of refraction, that a ray of light passing from a rare into a dense medium is refracted toward the perpendicular, and *vice versa*. (Fig. 2.) The ray *k e* falling perpendicularly on the piece of glass at *e* is continued in a straight line to *h*. Now, if the same ray should take the course *a e*—that is, obliquely—instead of passing in a straight line *a e m b*, it will be turned out of its course, or refracted, to *d*, which is nearer the perpendicular *a' k h*. *a e* is the incident ray, and the angle *a e k* the angle of incidence with the perpendicular *k h*. From *e* to *d* is the refracted ray, and the angle *d e g* is the angle of refraction to the perpendicular. After the change in the course of the ray has taken place in the glass, we find that when the ray is allowed to pass out from the glass, as at *d c*, another bending takes place, by means of which the course is made parallel with the incident ray *a e*, only its course is shifted a little to one side. With any radius, as *d e*, describe a circle from the center *e*; then the angle of incidence *a e k* is measured by the arc *a a'*, and the arc *g' d* measures the angle of refraction *g e d*. The line *a k* equals the sine of the angle of incidence, and *d g* equals the sine of the angle of refraction. The sine of the angle of incidence (in a given transparent medium) has always the same ratio to the sine of the angle of refraction with all degrees of obliquity of the incident ray.

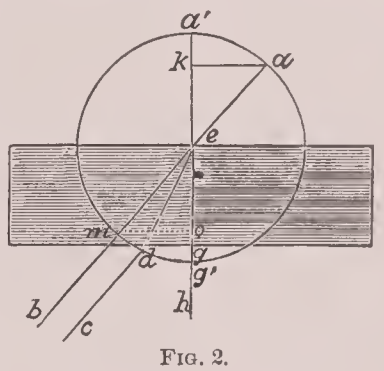

Fig. 2.

Lenses are of various forms, and change the course of light passing through them according to their special figure. In Fig. 3 are represented the different shapes of lenses. *a* is simple, parallel glass, *b* a meniscus or concavo-convex lens, *c* a double concave, *d* a plano-concave, *e* a double convex, and *f* a plano-convex. In the optical construction of the microscope, convex and concave lenses are chiefly employed, the convex being the most important form, as the concave is used more for the purpose of correcting the errors which exist in simple convex glasses. The course of parallel rays when they pass through a convex lens is changed, and brought to a point called a focus, *the principal focus*, and the distance from the center of the lens to this point is the focal length. Diverging rays are rendered parallel in their

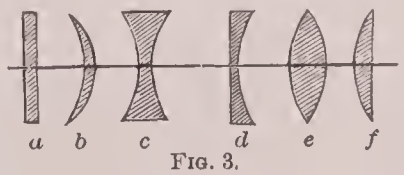

Fig. 3.

passage through a convex lens, and the focal distance for a double convex will be one-half that of a plano-convex having the same curved surface. The focal length depends upon the curvature of the lens and its index of refraction, so that a lens of crown glass will have a longer focus than one of flint with the same curvature. The principal focus, in general terms, may be considered as the distance of its radius for a double convex lens (that is, in its center of curvature), and at twice the distance of its radius for a plano-convex, parallel rays being understood as passing through in both cases. A concave lens refracts light in exactly the opposite manner from convex; hence parallel rays are caused to diverge, etc. By means of a convex lens a great number of rays proceeding from some point of an object are united in one point; each ray carries with it the image of the point from which it proceeded; therefore, all the rays united form an image of the object, and the image is brighter in proportion to the number of rays united. "If an object be placed at twice the distance of the principal focus, the image, being formed at an equal distance on either side of the lens, will be of the same dimensions with the object." (Fig. 4.) As the object approaches the lens, the image increases both in size and distance from the lens; and as the object is withdrawn from the lens, the image is smaller and closer to the glass. The smaller the image the more brilliantly it is illuminated; and, on the other hand, the light decreases as the image increases in size. Images formed by simple lenses are usually imperfect in two respects; they are distorted, and they are surrounded by a colored fringe. These defects are due to the spherical form in which the lenses are ground, as practically such curves as the ellipse and hyperbola can not be accurately made. The rays of light, then, in passing through a convex lens, are not *all* brought to the same focus, but those on the periphery come to a point first—i. e. nearest to the lens—and then those rays passing through closer to the center, afterward or farther from the lens. (Fig. 5.) This phenomenon to which the distortion of the image is due is called spherical aberration. A concave lens has precisely the same defects, but of an opposite character; hence, as will be seen further on, by combining the convex and concave a compound lens is obtained in which figure-distortion is greatly reduced. Chromatic aberration is due to the fact that the light, which consists of rays of different degrees of refrangibility, in its passage through the lens has the more refrangible rays brought to a focus first, and those of less degree at a greater distance from the lens. (Fig. 6.) Chromatic aberration can be corrected by the combination of two media of opposite form and of different refracting and dispersing power. By thus neutralizing the dispersion the refraction is not entirely overcome, but it is modified. With a lens of crown glass, double convex, index of refraction 1·519, dispersive power 0·036, focal length 4⅓ inches, cemented to a concave lens of flint, index of refraction 1·589, dispersive power 0·0393, focal length 7⅔ inches, the combined focal length 10 inches, an image free from color will be produced, which

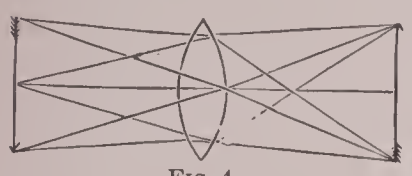

Fig. 4.

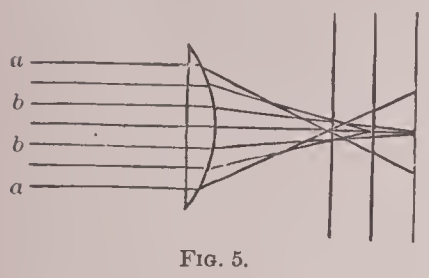

Fig. 5.

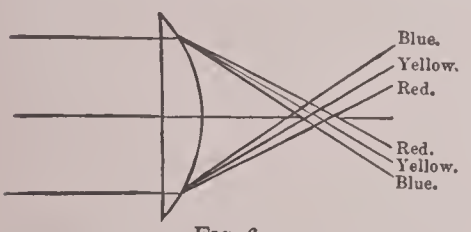

Fig. 6.

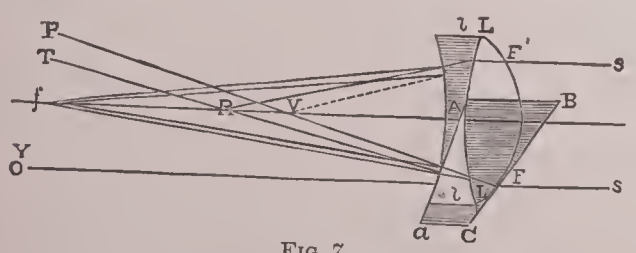

Fig. 7.

can be better understood from Fig. 7. L L is a double convex of crown glass, and *l l* is a concave of flint glass. The ray S falling on the lens L L at F is refracted just as it would be were it to fall on a prism A B C whose faces touch the lens at points of entrance and emergence of the ray. The ray S F goes on to form the spectrum P T, with F V, the violet ray, crossing the axis *f* V, and going to the upper end of the spectrum, and the red ray going to the lower end of the spectrum T. The flint-glass lens, however, *l l*, or the prism A *a* C, instead of allowing the rays to take the course indicated above, unites the rays F V, F R at *f*, refracting the ray S F without color from S F Y to F *f*. The ray S′ F′ is refracted in the same manner to *f*.

The Magnifying Power of a Lens.—In order that an object may be seen, it must be at such a distance as to form an image of some appreciable size upon the retina; and it must furthermore be sufficiently illuminated to produce an impression. The apparent size of an object depends upon the angle which it subtends to the eye, or the angle formed by two lines drawn from the extremities of the object to the center of the eye. (Fig. 8.) The lines from A and R form twice the angle at the center of the eye that O and W do; therefore the object O W seems one-half the size of A R. The angles formed as just described are called the visual angles. The eye can receive rays of a certain character only to produce distinct vision, and the rays must be parallel or slightly divergent, so that the crystalline lens may form an image of the object upon the retina. The distance or limit of distinct vision ranges from 6 to 10 inches; and when an object is brought closer to the eye, although it appears larger, it becomes more and more indistinct as the distance decreases, due to the fact that the rays which enter the eye are becoming more and more divergent. When a convex lens is interposed between a near object and the eye, it reduces the divergence of the rays forming the pencils issuing from it, and in this manner enables the rays to enter the eye so that an image may be formed upon the retina. (Fig. 9.) The more important laws of optics relating to the microscope will be considered as the various parts of the instrument are described.

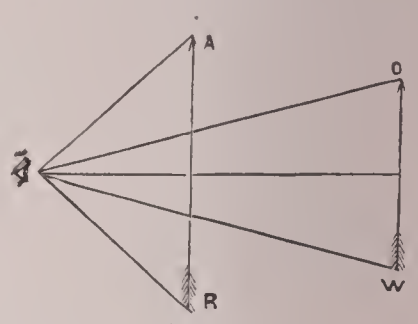

Fig. 8.

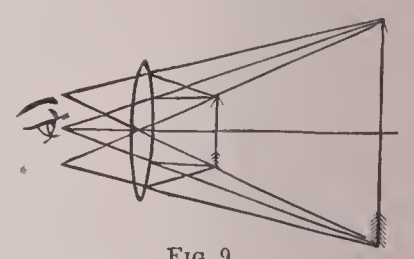

Fig. 9.

In the simple microscope, as has been seen, several lenses may be used, but they all act as a single glass; now, in the compound microscope, there are two parts, the object-glass, which may be a single lens, and the eyepiece or ocular, and this can also be a single lens. (Fig. 10.) The object-glass C D forms an enlarged and inverted image A′ B′ of the object A B, and the eye-glass L M receives the diverging rays from this image, as if from an object, and brings them to the eye at E. so that the object appears greatly magnified, on the same principle as the simple instrument. The magnifying power can be varied by changing the power of the objective, of the eyepiece, and by altering the distance between object and object-glass, eye-glass and object-glass. By approaching the object to the objective, and moving the ocular to a greater distance from the object-glass, the image is increased in size; and, conversely, by increasing the distance from object to object-glass, and lessening that between the latter and eye-glass, the image is reduced in size. In order that a greater portion of the object may come within range of the eyepiece, and so be made visible, a third lens (F F, Fig. 11) is placed between the objective and the eye-glass. As the third lens limits the circle of light or field of view which is seen in looking into a microscope, it is

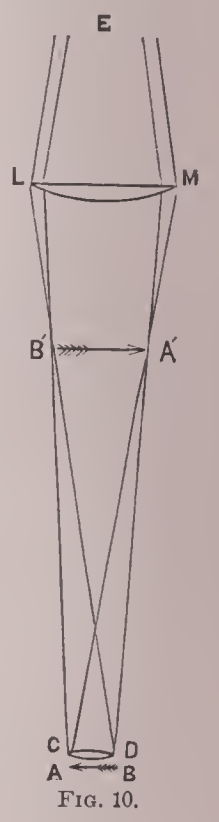

Fig. 10.

called the *field-glass*. The eye-glass and field-glass together are considered as one, and termed eyepiece or ocular. The Huyghenian is the most usual form of eyepiece, and consists of two plano-convex lenses (Fig. 12, E E and F F) with their plane surfaces toward the eye. The lenses "are placed at a distance equal to half the sum of their focal length, or, to speak with more precision, at half the sum of the focal length of the eye-glass and of the distance from the field-glass at which an image of the object-glass would be formed by it. A stop or diaphragm B B must be placed between the two lenses in the visual focus of the eye-glass, which is, of course, the position wherein the image of the object will be formed by the rays brought into convergence by their passage through the field-glass. Huyghens devised this arrangement merely to diminish the spherical aberration, but it was subsequently shown by Boscovich that the chromatic dispersion was also in great part corrected by it."

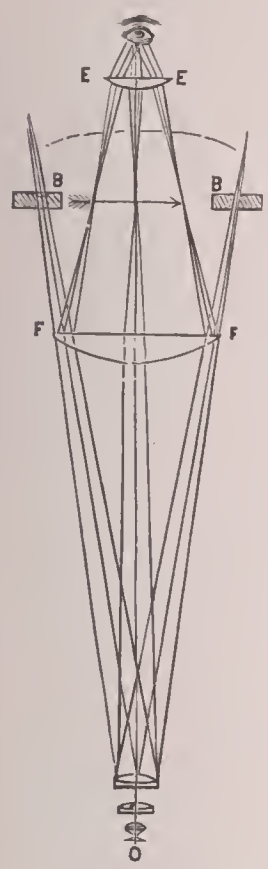

FIG. 11.

The *object-glass*—which, as has been stated, may be a single lens—is of the utmost importance; it is this part of the instrument that requires the greatest amount of care and skill in construction, and therefore requires special attention. The distortions known as spherical and chromatic aberration are the obstacles to be overcome in the construction of the object-glass. Now, it has been shown that, by combining a double convex lens of crown glass with a plano-concave of flint, the spherical and chromatic errors may be remedied—not in a single combination of flint and crown glass, but by means of two or more so-called achromatic lenses. To Joseph Jackson Lister is due the discovery by means of which the errors in the object-glass may be almost if not entirely overcome. Lister's result, which was communicated to the Royal Society in 1830, may be stated as follows: Plano-convex achromatic lenses, of the form shown in Fig. 13, are most easily constructed. When the convex and concave lenses have their inner surfaces of the same curvature cemented together, much less light is lost by reflection than if the lenses are not cemented. Every such plano-convex combination has some point *f*, not far from its principal focus, from which radiant light falling upon the lens will be transmitted free from spherical aberration; the point *f* is called the *aplanatic focus*. The incident ray *f d* makes, with the perpendicular *i d*, an angle considerably less than the emergent ray *e g* makes with the perpendicular at the point of emergence. The angle of emergence is nearly three times as great as the angle of incidence, and the rays emerge from the lens nearly parallel, or converging to a focus at a moderate distance from the lens. If the radial point is now made to approach the lens so that the ray *f d e g* becomes more divergent from the axis as the angles of incidence and emergence become more nearly equal to each other, the spherical aberration becomes negative or over-corrected; but if the radiant point *f* continues to approach the glass, the angle of incidence increases, and the angle of emergence diminishes and becomes less than the angle of incidence, and the negative spherical aberration produced by the outer curves of the compound lens becomes again equal to the opposing positive aberrations produced by the inner curves which are cemented together. When the radiant has reached this point *f'* (at which the angle of incidence does not exceed that of emergence so much as it had at first come short of it), the rays again pass the glass free from spherical aberration. The point *f'* is called the shorter aplanatic focus. For all points between the two aplanatic foci *f* and *f'* the spherical aberration is over-corrected, or negative; and for all radiant points more distant than the longer aplanatic focus *f*, or less distant than the shorter aplanatic focus *f'*, the spherical aberration is under-corrected, or positive. These aplanatic foci have another singular property. If a radiant point in an oblique or secondary axis is situated at the distance of the longer aplanatic focus, the image situated in the corresponding conjugate focus will not be sharply defined, but will have a coma extending outward, distorting the image. If the shorter aplanatic focus is used, the image of a point in the secondary axis will have a coma extending toward the center of the field. These peculiarities of the coma, produced by oblique pencils, are found to be inseparable attendants on the two aplanatic foci. These principles furnish the means of entirely correcting both chromatic and spherical aberration, and of destroying the coma of oblique pencils, and also of transmitting a large angular pencil of light free from every species of error. Two plano-convex achromatic lenses (A M, Fig. 14) are so arranged that the light radiating from the shorter aplanatic focus of the anterior combination is received by the second lens in the direction of *f''*, its longer aplanatic focus. If the two compound lenses are fixed in this position, the radiant point may be moved backward or forward within moderate limits, and the opposite errors of the two compound lenses will balance each other. Achromatic lenses of other forms have similar properties. It is found in practice that larger pencils free from errors can be transmitted by employing three compound lenses, the middle and posterior combinations being so united as to act as a single lens, together balancing the aberrations of the more powerful anterior combinations. (Fig. 15.)

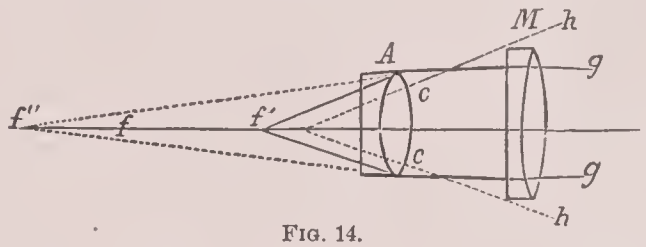

FIG. 14.

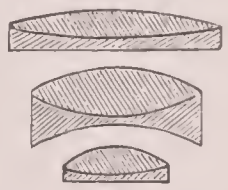
FIG. 15.

In many objectives it is required that there should be what is termed a large "angle of aperture," by means of which the definition is much improved. "The angle of aperture is that angle which the most extreme rays that are capable of being transmitted through the object-glass make at the point of focus." A much larger quantity of light passes through a lens of high angular aperture. The lenses constructed upon the principles given are termed *dry lenses*—i. e. a layer of air is between the objective and the front of the combination; for higher powers, however, the *immersion system* is now generally used, which is simply the intervention of a drop of water between the object and the lens, and consequently the rays of light from the object pass through water instead of air. The interposition of the water seems to prevent reflection of certain rays which would otherwise be lost; and therefore with the immersion system a greater amount of light can pass into the glass. Immersion lenses, as a rule, can not be used dry, although objectives have been made by Tolles, Wales, and other opticians that work both as wet or dry. Some makers construct two fronts, one for *dry* and the other for *wet* focusing, the middle and posterior combinations remaining the same in both instances.

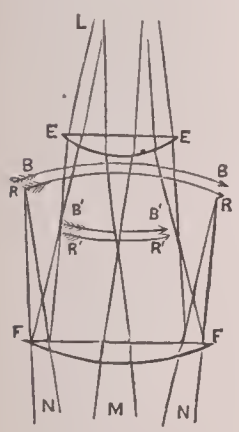

FIG. 12.

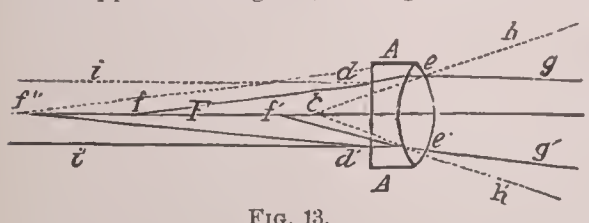

FIG. 13.

The great perfection obtained by opticians has rendered imperfect the performance of certain higher powers when different thicknesses of glass are used for covering the object. The discovery was made by A. Ross that a very marked difference exists in the precision of the image according as the object is viewed with or without the thin cover.* A correction for this has been effected by Ross by giving to the

* Microscopical objects are examined upon plates of glass 1 inch by 3 inches, and covered with a disk or square of thin glass; this cover is for the purpose both of protecting the object and of preventing the formation of moisture or deleterious vapors from reaching the exposed portion of the objective.

front pair of the objective an excess of positive aberration, by under-correcting it, and by giving an excess of negative aberration to the middle and posterior combinations. When the lenses are adjusted for an uncovered object, by bringing the anterior combination closer to the middle and posterior, a certain amount of positive aberration can be produced which will neutralize the negative aberration caused by the covering glass. A *screw-collar* is added, therefore, to those lenses which require the change in the position of the front lens, and in this manner the different thicknesses of glass covers are easily disposed of.

Objectives are named according to their magnifying power. Unfortunately, there is no uniform system upon which the lenses are constructed. In Great Britain and the U. S. lenses are called 1-inch, ½-inch, ¼-inch, etc. On this principle it is supposed that 10 inches is considered the standard for distinct vision, and therefore the 1-inch object-glass would produce an image at 10 inches distance enlarged 10 diameters,* the ½-inch (at the same distance) 20 diameters, the ¼-inch 40 diameters, etc. Lenses made in France and Germany are named according to an arbitrary system adopted by the maker himself; and Hartnach, of Paris, simply gives a series of numbers, 1, 2, 3, 4, etc., to designate the various powers. The eyepieces of American and English manufacture receive the letters of the alphabet to distinguish them; the A eyepiece magnifiying 5 diameters; B, 10; C, 15, etc. Hence the 1-inch objective with A eyepiece gives a power of 50 diameters; ½-inch, 100 diameters. Continental eyepieces are named 1, 2, 3, in just the same manner as are the objectives. Low-power objective glasses are those of longer focus than the ½-inch; medium, $\frac{1}{10}$ths, ¼th, and ⅓th; high, from ⅛th to $\frac{1}{15}$th, which is about the highest.

Reference has been made, in a general way, to the *stand*, which carries the eyepiece and object-glass, together with the object. In nearly all modern stands *coarse* or rapid adjustment is effected by milled heads, which move the tube by means of rack and pinion, while the *fine* adjustment is made by a delicate screw (also provided with milled head), which acts upon a lever, and this lever moves the nose carrying the objective. The stage or object-carrier likewise is frequently given freedom of motion both laterally in the direction of the optical axis of the instrument, while at the same time it can be made to rotate concentrically. Below the stage is what is termed the sub-stage, into which can be fitted the achromatic condenser, polariscope, and various other accessories. The sub-stage is provided with centering screws, rotation, and vertical motion. The various accessories of so much value to the microscope can be best studied in the larger works devoted to the special subject.

Revised by E. L. Nichols.

Microscopy: the use of the microscope and the preparation of objects to be examined by it. (See Microscope.) The use of the microscope in medicine is confined to the examination of solids and fluids of the body. It is of the utmost importance in distinguishing the changes which are produced in the body in various diseases, and the diagnosis of diseases by such changes. Perhaps the greatest use of the microscope which has been made in recent years is in the recognition during life of the pathogenic bacteria, and in this way diagnosing disease. Thus in the case of consumption the earliest proof of the presence of the disease may be obtained by the examination of the expectoration and the detection in this of the tubercle bacilli. Of scarcely less importance is its use in the examination of the urine and other secretions of the body. It has also an important part to play in medical jurisprudence, especially in the examination of stains for the presence of blood. In the examination of fluids they are either placed in their natural state under the microscope, or they are treated before examination in various ways with the view of rendering certain substances in the fluids more easily recognizable. Frequently in the examination of fluids, particularly urine, it is better to allow it to stand for some time until the solid substances contained in it have settled, and then to examine the sediment. The examination is rendered still easier by the use of the centrifugal machine which separates the solid matter. In the examination of the tissues of the body they may either be torn apart with needles and the cells examined, or they may be divided into very thin sections, and these sections examined. The sections are prepared on an instrument called the microtome. A certain degree of consistency must be given them in order to render it possible to divide them into these thin sections. This may be done either by freezing the tissue and then cutting it, or by subjecting the tissue to the action of alcohol or other hardening fluids. The sections so prepared may either be examined without further change, but better results are usually obtained by treating the sections with suitable coloring fluids, which have the effect of rendering certain of the constituents more easily visible.

W. T. Councilman.

* As the image is enlarged equally in all directions, ten diameters would represent a space occupied by the image 100 times greater than the original object. The simple form of writing magnifying power is, × 10, which means magnified ten diameters. When very high magnifying power is used, the expression in diameters is more convenient than superficial measurement.

Microzyma: See Fermentation.

Micyllus (Molsheym), Jacob: classical scholar; b. in Strassburg, Alsace, Apr. 6, 1503; studied under Melanchthon; was appointed director of the Latin school of Frankfort in 1524. After a stay of eight years, he was compelled to resign owing to an anti-humanistic propaganda of certain Lutheran Reformers, and accepted a professorship of Greek at Heidelberg in 1533, but meeting the same opposition here, he again returned to Frankfort in 1537, where the classicists had finally triumphed. Ten years later he was recalled to Heidelberg. With the powerful aid of the Margraves Frederick II. and Otto Heinrich, he and Melanchthon reorganized the university on a firm humanistic basis, elevating it to a high position among the learned institutions of Europe. D. Jan. 28, 1558. As an author, Micyllus is deservedly celebrated for his elegant Latin poems, published after his death by his son, under the title *Silvae* (1564). Of his philological works, which now possess only an historical value, may be mentioned his editions of *Ovid*; the so-called fables of *Hyginus*, his master-piece; *Vita Euripidis, de tragœdia et eius partibus*; a Latin translation of *Lucian* (1538); translations of *Germania*, *Histories and Annals of Tacitus*, one of the earliest translations of a classic author into German; a commentary to Boccaccio, *De genealogia Deorum*. See I. Classen, *J. M., als Schulmann, Dichter und Gelehrte* (Frankfort, 1859).

Alfred Gudeman.

Mi'das (in Gr. Μίδας): in Greek mythology, son of Gordius and King of Phrygia. He was the leader of the Phrygians from Europe to Asia Minor. His name alternated with that of Gordius (*q. v.*) in the Phrygian royal family. There were three Midases and four Gordiuses, and both names continued to live in *Gordium* and *Midiæum*. One of the Midases entertained hospitably the drunken Silenus. He thus promoted the worship of Dionysus, and became the center of a number of popular myths. Thus Dionysus gave him the power of transforming everything he touched into gold, but the gift proved a terrible curse. The man would have starved to death had not the god helped him a second time. By bathing in the river Pactolus the auriferous power was transferred from the body of Midas to the waters of the river, and they became henceforth productive of gold. He was merely the type of the immensely wealthy king in the times before Crœsus. Another time he was chosen umpire in a musical contest between Apollo and Pan. He gave the prize to the latter, and the angry god punished him by changing his ears into those of an ass. Midas concealed the deformity under a Phrygian cap, but one of his slaves, a barber, happened to discover the secret. Unable to keep it to himself, and yet not venturing to tell it to anybody, the slave dug a hole in the soil, and whispered the secret into the hole, which he filled with earth, but the reeds which grew upon the spot always sang when the wind blew among them, "Midas has ass's ears." The original Midas was a Silenus or Satyr, and the ass's ears were but the ears of the Satyr, and afterward became familiar in the Attic drama and in art. (See Marsyas.) For an excellent discussion of this whole subject, see Perrot and Chipiez, *History of Art in Phrygia*, etc. (London, 1892, pp. 1–231), where the literature will be found cited.

Revised by J. R. S. Sterrett.

Mid'delburg: capital of the province of Zealand, Netherlands; situated on the island of Walcheren; 4½ miles by rail N. E. of Flushing (see map of Holland and Belgium, ref. 8–C). It is a handsome town, and has many public squares and interesting buildings, among which the town-hall is the most remarkable, built by Charles the Bold in 1468, and ornamented with twenty-five colossal statues of Counts and Countesses of Flanders. The commerce of Middelburg has greatly declined, but it has some manufactures of cotton, and an active inland trade. The town is mentioned in the middle of the twelfth century, and received its charter in 1225. The brilliant point in its history is the

defeat of the Spaniards in 1574, after a siege of two years. The wars between France and Great Britain in the beginning of the nineteenth century nearly ruined the town. Pop. (1888) 16,455.

Middelburg, Paul: mathematician: b. at Middelburg, island of Walcheren, Netherlands, in 1445; studied at the University of Louvain; took holy orders, and was appointed chaplain at the Church of St. Bartholomew in his native city; but, preaching a little too zealously against ignorance, drunkenness, gluttony, and other habits of that day, he was expelled from the city, and returned to Louvain, where he lectured with great success on mathematics. Chosen by the grand council of Venice to the chair of Mathematics in Padua, he afterward became physician to the Duke of Urbino, on whose recommendation he was appointed Bishop of Fossombrone in 1494 by Pope Alexander VI. With Julius II. and Leo X. he stood in great favor, and presided over the fifth Lateran Council (1512–18). D. in Rome, Dec. 15, 1534. He was one of the first to urge the necessity of reforming the calendar, showing in his learned work *Paulina, de recta Paschæ Celebratione, et de die Passionis Domini nostri Jesu-Christi* (fol., 1513), that the great Easter festival was not celebrated on the day determined by the Council of Nice, but sometimes a whole month earlier or later. Some of his many other writings treat the same subject, such as the *Epistola ad Universitatem Lovaniensem: De Paschate recte observando* (1487), which occasioned a long controversy, during which he published *Epistola apologetica magistri Pauli de Middelburgo, alumni universitatis Lovaniensis*, in answer to a criticism by Pierre de Rivo, Professor of Theology at Louvain.

Middle Ages: the term generally used to designate that great historical period lying between the ancient and modern epochs of the world's civilization, and separating them from each other as young manhood separates youth from mature manhood.

1. *Chronology.*—Concerning the exact date of the beginning and end of the mediæval period differences of opinion exist, some authors regarding the triumph of the Franks over the remnants of the Roman power in Gaul at the battle of Soissons (486 A. D.), others the overthrow of the West Roman empire in 476 A. D., and still others the accession of Charlemagne in 768 A. D., or the dissolution of the Frankish empire in 843 A. D., as the opening events. Some consider the discovery of America, others the discovery of printing, most the German Reformation, and a few the Westphalian Peace (1648), as marking the close. Those historians who consider ancient history to comprehend the world's history down to the dissolution of the Roman state begin the Middle Ages with the overthrow of the Roman power by the Germans and the settlement of the Vandals, Goths, Anglo-Saxons, Franks, and Burgundians upon Romanic soil in the last half of the fifth century; while those who regard Teutonic history in its more specific light, and consider each nationality as having its own childhood, youth, manhood, and old age, are inclined to look upon the life of the Teutonic peoples down to the dissolution of the Frankish European empire (see Franks) as the period of their wardship, and hence to set the beginning of the following period of young manhood or middle age between the years 814 and 843 A. D.; while, as regards the boundary of the epoch on the other side, very nearly all are agreed that the great events of the fifteenth and sixteenth centuries—viz., the discovery of printing, the discovery of America, the employment of gunpowder, the development of the absolute monarchy in the state, and the Reformation in the Church—designate the point where the spirit of civilization was throwing off its mediæval and taking on its modern form.

2. *Events.*—The cardinal events of the Middle Ages were—

(*a*) The reaction of the spirit of nationality against the artificial union of the Frankish European empire, producing the treaty at Verdun in 843 A. D. between the different sovereigns of the Carlovingian house, whereby the empire was divided into three independent kingdoms, corresponding in their territorial extent very nearly to the geographical basis of three distinct types of nationality, which had been for three and a half centuries developing themselves, and which may be termed from that time forward Italian, German, and French.

(*b*) The reaction of individuality against the authority of law imposed from without, which may be termed a great *series* of events rather than an event, realizing themselves all through the mediæval period, and splitting Europe up into a multiplicity of petty sovereignties, standing closed and hostile over against each other, blockading trade and intercourse, and producing unceasing intestine strife.

(*c*) The great invasion of the Scandinavian Vikings (836–912 A. D.), striking the deathblow to the tottering Carlovingian powers, already threatened by the Saracens in the S. and the Magyars in the E., compelling the members of this dynasty, in their impotence to defend their lands and peoples, to give way to stronger arms and cleverer genius, occasioning thus the elevation of the Capetians to the throne of France, changing Germany into an elective monarchy, and delivering emperorless Italy over to three-quarters of a century of most fearful intestine struggles.

(*d*) The settlement of the Northmen upon the territory of Northern France, founding there the dukedom of Normandy, accepting the culture of the Romanized Franks both in state and Church, setting the great North into connection with the Continent, and opening it up to the influences of Christianity and the civilization of the Romanic world; and then from this continental basis making conquest both of England (1066 A. D.) and Southern Italy (1029–85 A. D.), and founding independent kingdoms upon Anglo-Saxon and Italian soil.

(*e*) The crusades, eight in number, reaching chronologically from the year 1096 to 1270 A. D. In this great European movement, in which the chivalrous type of Christianity, beginning with the consecration of King Clovis's sword to the service of the Church, culminates, the peoples of Europe, especially those of Romanic nationality, impelled chiefly by the power of religious fanaticism, threw themselves back upon Asia with the nominal purpose of freeing the Holy Sepulcher from the desecrations of the Turks. In 1099 A. D. Jerusalem was captured and a European kingdom erected in Palestine, which existed with changeable fortune for nearly two centuries. In 1291 A. D. the last remnants of European sovereignty in Syria were extinguished, but the influence which the movement and its results exercised upon the course of European civilization was all-guiding and permanent. Six millions of men perished in these undertakings. Among these the nobility as a class suffered far the most severely, both in loss of life and property. From some districts this class was almost entirely obliterated. Moreover, the establishment of a political connection with Asia had led to the establishment of an intercourse and trade which enriched the burgher class as much as the wars had impoverished the nobility. The effect of this change in the conditions of property upon the political constitution of Europe was most marked. The political power passed over more and more to the cities and the burgher class, and the old feudal constitution began to be undermined. The results as regards the Church were of a double nature. Its temporalities had been immensely increased, in that it fell heir, for the most part, to the property of those who perished in these great religious adventures, having been made the guardian of the same during the absence of the owners; and its moral power entered upon the period of its decline, not only because the increased wealth of the Church led to luxurious living on the part of the clergy, but because also that power of religious fanaticism and unreflecting devotion upon which the Church of that age so much rested had been broken of its intensity and exhausted. The crusades were, after all, powerful elements in opening the way for the absolute monarchies and the Reformation.

(*f*) Lastly, the re-establishment of the Carlovingian imperium by Otho the Great (962 A. D.), under the name of Holy Roman Empire of the German Nation, thus bringing, both for weal and for woe, the German and the Roman into direct contact with each other, and paving the way for that great conflict between pope and emperor for the supremacy over European Christendom which, of all the movements of the Middle Ages, was the most continuous, important, and heavy with results. (See Franks.) The clergy had ever regarded the Carlovingian imperium as their own creation. In it European Christendom had found its point of unity. No wonder, then, that they sustained it to the last, and when it fell, felt themselves compelled to look for a new center and a new head. What more natural than that all eyes should be turned toward the Bishop of Rome? From the moment of the dissolution of the Carlovingian imperium the watchword had been the establishment of the "papal monarchy," and the withdrawal of the Church, with its property and its *personnel*, from under the jurisdiction

of the secular powers to unite it under the sovereignty of the pope, both as regards temporal and spiritual matters. In this way it would make good that which had been lost in the dissolution of the imperium—viz., the principle of unity in European Christendom. During the century and a quarter between the treaty of Verdun (843 A. D.) and the re-establishment of the empire by Otho (962 A. D.) this had been the reigning idea in the Church; and the chief reason why it did not then come to realization was the lack of a mighty personality upon the papal throne, by the power of whose genius that which lay in the consciousness and desire of the Church might be made an objective reality. This power was attained when Hildebrand became first the manager and maker of popes, and then pope himself under the title of Gregory VII. The creation of the college of cardinals with the sole power of electing the pope, and the laws against marriage and simony, were the chief means made use of in the establishment of the European papal monarchy. These measures, or something with the same nominal purpose, were indeed, to a certain extent, justified by the needs of the time. The conflict between the emperors and the nobility of Rome over the papal appointment had been productive of such confusion and bloodshed as to become an offence to all Christendom, while the unchastity and venality of the clergy had risen to a fearful height. These measures, though nominally taken for the purpose of correcting abuses (a fact which justified them fully in the eyes of the unthinking masses), were attended by far more wide-reaching results, and were used for the execution of a far more wide-reaching plan in the mind of Gregory and his assistants. He had conceived the relationship of the Church to the state to be that of the soul to the body, and meant to realize in the world of fact the forms of his idea. By the constitution of the college of cardinals he would withdraw the papal office from under the influence both of the secular princes and the laity, and place it under the immediate control of the narrow ecclesiastical aristocracy of the Roman diocese. It was not meet that the body should choose the organ through which the soul realized its will. By the forbiddance of priestly marriage he would cut the bond of blood and interest which connected the servants of the Church with society at large, and make the clergy the complete and willing executors of the papal will; and by the laws against simony he would withdraw the bishops and abbots from their feudal relationship to the secular princes in whose territories their bishoprics and cloisters lay, and bring the property for which they owed feudal service to the state under the complete and independent ownership of the Church. It was one of the most daring attempts to unsettle and transform the relationships of property which the world has ever known. Borne by the power of such personalities as Gregory VII., Alexander III., Innocent III., and Boniface VIII., the cause of the papacy and the universal Church monarchy was for two and a half centuries, from the beginning of the eleventh to the middle of the fourteenth, powerfully and successfully pushed forward upon the road of universal European sovereignty. By the help of the great German dukes, who were ever striving for more independence of the imperial power, the triumph over the mightiest secular lord of Christendom, the Roman German emperor, was secured, while England, Scotland, Poland, Hungary, Aragon, and the Two Sicilies became little more than fiefs of the papal throne. It was Philip the Fair of France (1285–1314 A. D.) who first opposed with success this growing and threatening power. Through force and intrigue the papal seat was removed by him from Rome to Avignon (1307 A. D.), and became thenceforth a luxurious court devoted to pleasure and the interests of French politics. From this time forth the moral influence of the papacy and of the Church declined from year to year; and the scientific discoveries and revival of learning in the fifteenth century, and the Reformation in the sixteenth, lifted society above that stage of its civilization where the Church can absorb the state.

3. *Spirit and Genius of the Middle Ages.*—From the above-mentioned facts it is not difficult to generalize a conception of the spirit and genius which brought them forth. Defiant self-reliance upon rude physical force in regard to the attainment of all things temporal, and superstitious subjection to a sacerdotal order in regard to things unseen, unknown, and represented as eternal; narrow selfishness in regard to the duties and functions lying near and in the common course, connected with the most chivalrous devotion to the mystical, the undefined, and the distant; the direst immorality and disobedience to law and order, coupled with the most exaggerated and enthusiastic religiosity; bold adventuresomeness without defined purpose; fancy and imagination without reflection; faith without reason; devotion without humanity—these are some of the contradictions which characterize the mediæval spirit. Those great cathedral piles testify not only to the power of the imagination and devotion of the age, but also to the undervaluation of the human sufferings and sacrifices through which they were founded and builded.

4. *Institutions of the Middle Ages.*—This spirit and genius incorporated itself in the two all-comprehending institutions, the feudal state and the hierarchical Church. The spirit of the age was far too objective to conceive of the authority of law as based upon the common consciousness of the governed. The individual felt no internal behest to observe the rights of his neighbor any further than he had by contract or promise agreed to do so. Personal contract, varying in the details of its terms with time, place, and circumstances, occupied thus the proper ground of universal political law. Under such an order the common man could only protect himself by contracting for his protection by some great man, whose land and people furnished him the means of protection. The cost of such protection to the common man was the surrender of his own land to the ownership of the lord, retaining only the possession of the same as a fief, and rendering certain tributes or services to the lord for such possession and protection. The vassals of the same lord were connected with each other not directly, but only through their feudal relation to a common lord, and different lords only through their feudal relation to a common superior or by *contract* with each other, and so on until the sovereign lord of the land was reached—the apex of the feudal pyramid; only the pyramid was inverted, with the greatest weakness where the greatest strength ought to be. These actual relationships were legalized through the ratification obtained mediately or immediately from the kingship and the imperium, in which latter office the sum and substance of all authority was theoretically held to exist as the immediate gift of God to one man through his vicegerent upon earth—the pope. The practical result of such a system was anarchy in the state. In regard to the Church, the same externality of idea manifests itself in the conceptions of authority and grace. The sum and substance of all authority and grace were conceived as proceeding from Christ to the chief of his apostles, to whom the pope was successor; by the latter dealt out again upon the bishops in their consecration, and then by these in turn upon the priests and laity. The power to bind and to loose, to damn and to save, became thus, according to this conception, the property of a close corporation, which by the power of excommunication from the company of the saved upon earth, with all its attendant consequences upon the social and political status of the individual, and of the threats of eternal punishment hereafter, held the souls of men in a state of spiritual subjection of a most degrading nature. The practical result of such a system was spiritual despotism in the Church.

Men have been wont to call the Middle Ages "Dark Ages." On the contrary, they are full of light. In them the great questions of the relationship of individual right to political right, of local government to central government, and of ecclesiastical government to secular government, were raised and drawn into conscious consideration. Had the European empire of Charlemagne been perpetuated, Europe might have become a second China, but would never have been what it is—viz., the source of the civilization of the modern world. The unceasing conflicts of the Middle Ages between private right and public law, local government and central government, state authority and Church authority, were necessary to bring men out from under the monotony of slavish subjection to the artificial, external, Church-state system of the Carlovingian empire, and develop them by the antagonism of thought and will into the power of producing systems more reflected and more free. See FEUDAL SYSTEM.

The reader may further consult—for history of the Middle Ages, Emerton, Hallam, Leo, Kortüm, Rückert, Ranke, Weber; for history of the period of the German emperors, Giesebrecht and Waitz; and for history of the city of Rome in the Middle Ages, Gregorovius. JOHN W. BURGESS.

Middleboro: town; Plymouth co., Mass. (for location of county, see map of Massachusetts, ref. 4-J); on both sides

of the Namasket river, and on the N. Y., N. H. and Hart. Railroad; 10 miles E. of Taunton, 34 miles S. by E. of Boston. It is one of the oldest towns in the county; derives excellent power for manufacturing from the river, which has three falls, comprises several villages, and has several churches and public schools, an academy, gas and electric light plants, a free public library (founded 1874) containing 6,000 volumes, a national bank with capital of $50,000, a savings-bank with deposits of over $750,000, and two weekly newspapers. For many years the town has been noted for its manufactures, which include shoes, woolen goods, lumber, varnish, marble, shovels, and needles. Pop. (1880) 5,237; (1890) 6,065; (1900) 6,885.

Middlebury: village; capital of Addison co., Vt. (for location of county, see map of Vermont, ref. 5–A); on Otter creek, and the Cent. Vt. Railroad; 33 miles N. N. W. of Rutland, 35 miles S. of Burlington. It is in an agricultural region, and has excellent water-power, six productive marble quarries, and several large lime-kilns. It is the seat of Middlebury College, and contains three libraries (Ladies', Sheldon Art Museum and Library, and Middlebury College) with nearly 25,000 volumes, a national bank with capital of $200,000, a weekly newspaper and a monthly college publication, and flour-mills, pulp-mills, and iron-furnace. Pop. (1890) 1,762; (1900) 1,897. Editor of "Register."

Middlebury College: an institution of learning at Middlebury, Vt., established in 1800. It is coeducational and purely collegiate, its curriculum being partially elective and leading up to the degrees of A. B. and B. S. The (eighth) president, Ezra Brainerd, LL. D., was inaugurated in 1886. The faculty numbers eleven, the departments of instruction being mental and moral science, natural history, physics and chemistry, mathematics, Greek, Latin, English, modern languages, history, and political science. The main buildings are the chapel, with lecture-rooms and laboratories, Starr Hall, the main dormitory, Painter Hall, containing the library and the gymnasium, Battell Hall, for young women. Of these buildings, the first three are of stone and are surrounded by a beautiful park of 30 acres.

C. B. Wright.

Middle C: in music, the note standing a fifth above the F or bass clef and a fifth below the G or treble clef. Its place is therefore on the added-line between the bass and treble clefs. It takes its name from this circumstance, and also from its midway position on the general scale. The C clef, whether placed on the third, fourth, or any other line, is always representative of the note or sound called "middle C," and the lines and spaces above and below are named accordingly.

Middle English: See English Language.

Middleport: village; Niagara co., N. Y. (for location of county, see map of New York, ref. 4–C); on the Erie Canal, and the N. Y. C. and Hud. Riv. Railroad; midway between Buffalo and Rochester. It is in a fruit-growing region, ships large quantities of general produce, has a ship-yard and dry-dock, and contains saw and planing mills, paper-mill, grist-mill, foundries, furniture-factory, large fruit canning and evaporating works, and a creamery. Pop. (1880) 771; (1890) 1,217; (1900) 1,431. Editor of "Herald."

Middleport: village; Meigs co., O. (for location of county, see map of Ohio, ref. 7–G); on the Ohio river, and the Col., Hock. Val. and Tol. and the Ohio Cent. railways; 2 miles S. of Pomeroy, the county-seat. It is in an agricultural and coal-mining region, and has important manufactures, large river commerce, a national bank with capital of $50,000, and two weekly newspapers. Pop. (1880) 3,032; (1890) 3,211; (1900) 2,799.

Middlesborough: municipal, parliamentary, and county borough; in the county of York, England; at the mouth of the Tees; 50 miles N. of York (see map of England, ref. 5–I). It has very important iron and steel works and considerable exports of coal, besides ship-yards, chemical-works, salt and soda works, wire, nail, and tube works, marine engineering works, sawmills, and manufactures of ropes and sailcloth. The public buildings include a town-hall, a market-house, and a royal exchange. The docks, opened in 1842 and extended in 1875, have 1,700 feet of quays, and can accommodate vessels of 3,000 tons burden. Middlesborough was founded in 1830, and in 1831 it had a population of 154; in 1841, of 5,463. In 1850 iron ore was discovered in Eston Hills, and in 1881 the population of the municipal borough had increased to 55,288. In 1901 it was 91,300.

Middlesex: a county of England; bounded S. by the Thames, and E. and W. by its two affluents, the Colne and the Lea. Area, 283 sq. miles. A great part of the county consists of grazing lands and market-gardens, which supply London with milk, hay, and vegetables. Pop. (1901) 792,-225.

Middleton: town of Annapolis co., Nova Scotia; 102 miles W. N. W. of Halifax (see map of Quebec, ref. 2–B). It is a station on the Windsor and Annapolis Railway, and northwestern terminus of the Nova Scotia Central Railway, near the historic Annapolis river. There are rich iron and copper mines in the vicinity, and near it are the attractive Nictaux Falls. Pop. (with environs) 2,000. M. W. H.

Middleton, Conyers, D. D.: theologian and classical scholar; b. at Richmond, Yorkshire, England, Dec. 27, 1683; graduated at Cambridge 1702, and became a fellow of Trinity College 1706. He was for years engaged in an acrimonious quarrel with Richard Bentley (see Monk's *Life of Bentley*); wrote *A Letter from Rome showing an Exact Conformity between Popery and Paganism* (1729); became principal librarian of Cambridge (1722); was Woodwardian Professor of Mineralogy 1731–34. His best-known works are an uncritical and highly eulogistic *Life of Cicero* (1741); *Introductory Discourse* (1747); and the *Free Inquiry* (1748), violent attacks on ecclesiastical miracles. D. at Hildersham, July 28, 1750. Cf. Leslie Stephen, *English Thought in the Eighteenth Century*. Revised by A. Gudeman.

Middleton, Thomas: dramatist; b. probably in London about 1570; studied law at Gray's Inn; became a dramatic author; assisted Rowley, Massinger, Fletcher, and Ben Jonson in the composition of some of their plays, and produced several dramas, among which are *A Mad World, my Masters*, *Women beware Women*, *A Trick to Catch the Old One*, *The Changeling*, and *The Spanish Gipsy*. In 1623 he wrote a very clever satirical comedy (*A Game of Chess*) on Prince Charles's unsuccessful wooing of the Spanish infanta. The performance of the play was stopped by royal order, but the action against the author was afterward dropped. His plays were edited by Rev. Alexander Dyce (5 vols., 1840) and by Bullen (8 vols., London, 1886). D. July, 1627.

Revised by H. A. Beers.

Middleton, Thomas Fanshaw, D. D.: bishop and Bible scholar; b. at Kedleston, England, Jan. 26, 1769; was educated at Christ's Hospital and at Pembroke Hall, Cambridge; took orders in the Church of England 1729; became archdeacon of Huntingdon 1812, and was consecrated May 8, 1814, at Lambeth, first Bishop of Calcutta, in which city he arrived Nov., 1814; died there of fever July 8, 1822. He was an elegant scholar, and as a writer is remembered for his *Doctrine of the Greek Article, applied to the Criticism and Illustration of the New Testament* (London, 1808; 5th ed. 1858). A volume of his sermons, charges, and tracts was published in 1824. See his *Life*, by Rev. C. W. Le Bas (2 vols., London, 1831). Revised by S. M. Jackson.

Middletown: city (settled in 1650, incorporated in 1784); formerly a port of entry, and one of the county-seats of Middlesex co., Conn. (for location of county, see map of Connecticut, ref. 9–H); on the Connecticut river opposite Portland, with which it is connected by an iron railway bridge, and on the N. Y., N. H. and Hart. Railroad; 15 miles S. of Hartford, 24 miles N. E. of New Haven. The city is pleasantly situated, is laid out with broad, tree-shaded streets, and has daily steamboat communication with New York and Hartford, the river being navigable here for vessels drawing 10 feet of water. Valuable freestone and feldspar and the rare columbite are found in the vicinity, silver and lead were formerly mined, and gold has been found. The city is the seat of Wesleyan University (Methodist Episcopal, opened 1831), of the Berkeley Divinity School (Protestant Episcopal, opened 1847), the Connecticut Hospital for the Insane, and the Connecticut Industrial School for Girls; contains 5 libraries (the University, Divinity School, Insane Hospital, Industrial School, and the Russell) with about 75,000 volumes, 4 national banks with combined capital of $1,069,300, a State bank with capital of $600,000, and 2 savings-banks with surplus of $500,000, and 2 daily and 2 other periodicals. Pop. (1880) 6,826; (1890) 9,013; (1900) 9,589.

Editor of "Penny Press."

Middletown: town; Newcastle co., Del. (for location of county, see map of Delaware, ref. 3–M); on the Phila., Wil. and Balt. Railroad; 25 miles S. by W. of Wilmington, the county-seat, 52 miles S. W. of Philadelphia. It is in the

great peach-growing region of Maryland and Delaware, and has carriage, harness, and agricultural-implement factories, fruit curing and canning works, 2 national banks with combined capital of $160,000, and 2 weekly newspapers. Pop. (1880) 1,280; (1890) 1,454; (1900) 1,567.

Middletown: city (incorporated in 1888); Orange co., N. Y. (for location of county, see map of New York, ref. 7–J); on the Wallkill river, and the Erie, the N. Y., Ont. and W., and the N. Y., Sus. and West. railways; 24 miles W. S. W. of Newburg, 66 miles N. N. W. of New York. It is in an agricultural and dairy region, is the seat of the New York Homœopathic Hospital for the Insane, and has 12 churches, graded high school, 12 other public schools, 2 libraries (Leonora S. Bolles Memorial and Public School), 2 national banks with combined capital of $260,000, a savings-bank, and a monthly, 3 daily, and 5 weekly periodicals. There are silk and handkerchief mills, woolen-hat factories, and saw and file works. Pop. (1880) 8,494; (1890) 11,977; (1900) 14,522. EDITOR OF "PRESS."

Middletown: city; Butler co., O. (for location of county, see map of Ohio, ref. 6–C); on the Miami river, and the Cin., Ham. and Day., the Cleve., Cin., Chi. and St. L., the Cin. and Day., and the Middle. and Day. railways; 32 miles N. of Cincinnati. It has the Holly system of water-works, gas and electric lights, 2 national banks with combined capital of $550,000, an incorporated bank with capital of $50,000, and 2 daily and 2 weekly newspapers. There are 7 paper-mills, 2 tobacco-factories, 2 paper-bag factories, foundry, planing-mill, and flour-mills. Pop. (1880) 4,538; (1890) 7,681; (1900) 9,215. EDITOR OF "JOURNAL."

Middletown: borough (founded in 1756, incorporated in 1828); Dauphin co., Pa. (for location of county, see map of Pennsylvania, ref. 5–G); at the junction of Swatara creek with the Susquehanna river, and on the Penn. and the Phila. and Reading railways; 9 miles S. E. of Harrisburg. It is in an agricultural region, has good water-power from Swatara creek, and had the first furnace in America for the manufacture of blister steel, erected about 1793. It has water, gas, electric-light, and electric street-railway plants, brownstone and limestone quarries, tube and iron works, iron-furnaces, railway-car shops, furniture-factory, tannery, and large lumber interests, the Frey Orphan School, a national bank with capital of $85,000, a State bank with capital of $50,000, and a daily and two weekly newspapers. Pop. (1890) 5,080; (1900) 5,608. EDITOR OF "JOURNAL."

Midge [M. Eng. *migge* < O. Eng. *mycge*: O. H. Germ. *mucca* > Mod. Germ. *mücke*, moth; cf. Gr. *μυῖα*]: a name applied in England to several dipterous insects resembling gnats and mosquitoes in their habit of feeding upon the blood of men and animals. Some are of the family *Chironomidæ*, which has representatives in North America. In the U. S. the name is especially given to the wheat midge, *Cecidomyia tritici*, a most destructive insect, which lays its eggs in the blossoming ears of wheat. Deep plowing destroys many of them by burying their cocoons in the earth, and late-sown spring wheat generally blossoms so late as to escape their ravages. For gall midges, see GALL INSECTS.

Midhat Pasha: statesman; born of humble parents in 1822 in Constantinople, where he was educated. He early entered the civil service of the Ottoman Government and gave proofs of executive ability. He visited England and France in 1819. The following year he was made a pasha. He was at various times governor of Uskup, Bulgaria, and Salonica. In each province he constructed roads, built bridges, favored industry, and with a firm hand put down lawlessness and crime. The reactionary party always looked upon him with disfavor; hence his appointment as grand vizier in Mar., 1873, was considered a significant event, as was his speedy removal from that office. He was the real chief among the conspirators who deposed Abd-ul Aziz (May 30, 1876) and Murad V. (Aug. 31, 1876). Made grand vizier (Dec. 23, 1876) by the new sultan, Abd-ul Hamid II., he was an object of suspicion as instrumental in the overthrow of two sultans, and held office only till Feb., 1877, when he was dismissed and banished. He spent some time in Paris, where he published *La Turquie, son passé et son avenir* (1878). Soon after he was made governor of Smyrna, and then of Syria. In 1881 he and several other pashas were accused of murdering Sultan Abd-ul Aziz. At the trial he was convicted and condemned to death, but on the representations of Great Britain this sentence was commuted to imprisonment for life. D. May, 1884, in Arabia. E. A. GROSVENOR.

Midianites: an ancient Arabian race, the descendants of Midian, the fourth of the six sons of Abraham by Keturah (Gen. xxv. 2). They were idolaters. They appear to have dwelt mainly to the S. of Moab. The Sinaitic peninsula was a part of their territory, and the Tawarah Arabs, now dwelling there, are supposed to be their descendants. Moses dwelt in the land of Midian and married a daughter of a priest of Midian (Ex. ii.). Midianites joined Moabites in desiring Balaam to curse Israel (Num. xxii.). They oppressed Israel and were signally defeated by Gideon (Judg. vii.–viii.). Revised by S. M. JACKSON.

Midland: city; capital of Midland co., Mich. (for location of county, see map of Michigan, ref. 6–I); at the junction of the Tittabawassee and Chippewa rivers, and on the Flint and Pere Marq. Railroad; 18 miles W. of Bay City. It contains 7 churches, 4 public schools, and 2 weekly newspapers, and manufactories of lumber, shingles, hoops, pails and tubs, salt, and bromine. Pop. (1880) 1,529; (1890) 2,277; (1900) 2,363. PUBLISHER OF "REPUBLICAN."

Midlothian: See EDINBURGHSHIRE.

Midnapur: district and city of the Bardwan division, Bengal, British India. It is the southernmost of the districts of Bardwan, and extends from the Hugli estuary on the E. to Chota Nagpur on the W. Area, 5,082 sq. miles. Pop. about 2,500,000. The central and southeast portions are a densely populated plain, while the northern plain is dry, and the northwest contains the Mehals jungle, an undulating, picturesque country, alive with wild beasts and serpents, and almost uninhabited. The cultivated portions are but little above sea-level, and suffer much from floods from the rivers and cyclonic inundations from the coast. The city is 62 miles S. of Bardwan, and about the same distance W. of Calcutta, on the Kusi river and terminus of the High Level Canal (see map of N. India, ref. 8–I). It is very subject to fevers and endemic cholera. It is a center for work carried on by missionaries from the U. S. Bronze and copper utensils are manufactured in large numbers, and the sale of these, as well as the commerce in indigo and silk for the district, is centered in a great bazaar in this city. Pop. 35,000. MARK W. HARRINGTON.

Mid'rash [from Heb. *midhrāsh*, commentary, explanation]: a general name for the study and amplification of the Bible as current in the Jewish schools during the times of the Mishnāh and Talmud. As the Bible was regarded as the source of all ritual and ethical laws and practice, and of all religious and philosophical ideas, it became necessary to deduce new ordinances, new principles, and new doctrines from its wording. This the Midrash did by comparing parallel passages, by making use of allegorical explanations, and by casuistical deductions from real or fancied peculiarities of expression. The oldest Midrash busied itself not only with Haggadah (see TALMUD), but also with Halachah. Halachah, which was not derived from the biblical word, was called Mishnāh. The oldest Midrashic works belong to the period of the Tannaim, the teachers who lived from 100 B. C. to about 200 A. D., though the redaction which we now possess was made later. These are the *Mechilta* to Exodus, the *Sifrā* to Leviticus, and the *Sifrē* to Numbers and Deuteronomy. The Midrash thus became also a sort of running commentary on the Bible. In course of time this use of the Midrash gradually usurped the place of the older and more general use. It came to denote almost exclusively the Haggadah. As such it was based largely upon the religious and ethical discourses delivered in school and synagogue, and follows the biblical pericopes. Though certain rules (*Middōth*) were laid down which were to govern this exposition, still the greatest latitude was allowed. The Midrash was not intended to be an exposition of the Bible in our sense of the word. It sought to find in the Bible an indication, however slight, for the principles or ideas it wished to express. The lives of the patriarchs and of other great men in Hebrew history, eschatalogical and mythological ideas, the Divine Being, and philosophical problems of all sorts, formed the subject-matter of the later Midrashim. They are full of anecdotes, bright and witty sayings, and a truly Eastern wealth of imagery. It is impossible to tell how early such Midrash collections were made. The word Midrash occurs in the Bible (2 Chron. xiii. 22, 24, 27). The book of Chronicles itself, when compared with the books of Samuel and Kings, is a sort of historical Midrash. The same method of exegesis is to be found in the New Testament (Matt. xxii. 31; Gal. iii. 16; iv. 22; Rom. x. 6–8), in the Hellenistic Jewish literature, in the Apocrypha, the TARGUMIM (*q. v.*), and

the pseudepigraphic writings of the time. Both Talmuds are full of it. A whole branch of Jewish literature has for its object the collection and arrangement of the later Midrash. See JEWISH LITERATURE.

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RICHARD GOTTHEIL.

Midriff: See DIAPHRAGM.

Midway: town; Woodford co., Ky. (for location of county, see map of Kentucky, ref. 3–H); on the Louis. and Nash., and the Queen and Cresc. railways; 14 miles W. of Lexington. It is in the blue-grass region, is noted for its breeding-farms for thoroughbred horses and shorthorn cattle, ships large quantities of grain and tobacco, and has the Kentucky Female Orphan School, two State banks with combined capital of $115,000, and a weekly newspaper. Pop. (1880) 950; (1890) 1,185; (1900) 1,045.

Midwifery: See OBSTETRICS.

Mierevelt, mee'rā-velt, MICHAEL JANSON: painter; b. at Delft, Holland, May 1, 1567; studied painting under A. Montfort at Blockland, and became one of the most celebrated portrait-painters of his time. Albert, Archduke of Austria, established him at his court, allowing him complete liberty to practice his own religion, Mierevelt being a Mennonite. He left Delft only to paint the Counts of Nassau, whose portraits are excellent examples of his skill. It is said by Sandvart that no less than 10,000 portraits were produced by Mierevelt. D. July 27, 1641. W. J. S.

Mieris, FRANZ: painter; b. at Delft, Holland, in 1635. He studied under Gerard Dow, and became famous at an early age. The Austrian archduke invited Mieris to establish himself at Vienna, offering him a pension besides his own price for all his pictures, but a love of independence prompted the artist to refuse this offer. The Grand Duke of Tuscany having generously paid him for several works, Mieris presented him with his own portrait, now in the Uffizi at Florence. The Louvre possesses nine of his highly finished works. D. in Rome in 1690. W. J. S.

Mifflin, THOMAS: soldier; b. in Philadelphia in 1744 of Quaker stock; was educated at Philadelphia College; became a merchant, and in 1772–73 was in the Legislature; was sent to the Continental Congress in 1774; joined the Revolutionary army, thus severing his connection with the Society of Friends; was made quartermaster-general; rose to be brigadier-general in 1776, and major-general in 1777, serving with great honor; was replaced by Gen. Nathaniel Greene in the quartermaster's department in 1778; in consequence of charges of mismanagement resigned his commission, which Congress refused to accept; was sent to Congress in 1782, becoming its president in 1783; was speaker of the State Legislature in 1785; was in the convention of 1787 which formed the U. S. Constitution; was president of the Pennsylvania executive council 1788–90; president of the State convention of 1790; Governor 1791–1800. D. at Lancaster, Pa., Jan. 20, 1800.

Mifflinburg: borough (founded in 1792); Union co., Pa. (for location of county, see map of Pennsylvania, ref. 4–F); on Buffalo creek, and the Penn. Railroad; 9 miles W. by S. of Lewisburg, the county-seat. It is in an agricultural, limestone, and iron ore region, and has steam flour and planing mills, furniture, carriage, sleigh, and buggy factories, 2 oil-factories, and 2 weekly newspapers. Pop. (1880) 1,168; (1890) 1,417; (1900) 1,436.

EDITOR OF "TIMES."

Migdol [= Heb. watch-tower]: a locality mentioned (Ex. xiv. 2, etc.) as near the place where the Israelites crossed the Red Sea. The word indicates the necessity of guarding a ford where a shallowing of the waters due to natural causes rendered the land liable to incursions by predatory bands from the East. The existence of a Migdol (Magdolum) on the Roman itinerary N. of the middle of the Isthmus of Suez gave nearly all of its probability to the now exploded theory of the Exodus route proposed by Brugsch Bey. See MENZALEH.

CHARLES R. GILLETT.

Mignard, meĕn'yaar', NICHOLAS: painter; b. at Troyes, France, in 1603; d. in Paris in 1668. He studied painting under Boucher, but afterward was much influenced by the works of Primaticcio. On his way to Rome, where he spent two years, he stopped at Avignon to paint a ceiling, and fell in love with a young girl, whom he married subsequently. On his return he established himself at Avignon, thus acquiring the designation of Mignard of Avignon, to distinguish him from his brother, Mignard "the Roman." He was patronized by Cardinal Mazarin, and through him received an order to paint a portrait of the king, after which he painted the portraits of all the members of the court, including the Princess of Elbœuf as St. Cecilia. He also painted two pictures for the Chartreuse of Grenoble, and was appointed professor of the Academy of Painting. Louis XIV. intrusted him with the decoration of his ground-floor apartment at the Tuileries, and was so much pleased that he commissioned him to paint another room, but Mignard soon died through overwork. W. J. STILLMAN.

Mignard, PETER: painter; b. in 1610; brother of Nicholas Mignard. His father desired him to become a doctor, but at the age of fifteen Peter painted the portraits of his medical professor's family in one picture, thus showing his artistic proclivities. After studying under Boucher, and later under Vouet, he was attracted to Rome, where he lived with Dufresnoy, who had been his fellow pupil, and who continued to direct his studies. He visited Venice and many other Italian cities, and on his return to Rome received an order to paint the pope, Alexander VII. He spent twenty-two years in Rome, then was recalled to Paris by Louis XIV. Mazarin introduced him to the royal family, and the cupola of the Val-de-Grâce was assigned to him to decorate. Subsequently he did decorative work in St. Eustache, in the small gallery at Versailles, and elsewhere. He was elected president of the corporation of St. Luke, which he helped to revive. Louis XIV. held him in great favor, ennobled him, and on the death of Lebrun made him court painter and director of the royal manufactories. He became member, professor, rector, director, and chancellor of the Royal Academy of Painting and Sculpture, all in one day. His paintings at the Val-de-Grâce and at St.-Cloud are his most remarkable works. The Louvre contains seven of his pictures. He was also an engraver. D. in Paris in 1695.

W. J. STILLMAN.

Migne, meeñ, JACQUES PAUL: publisher; b. at St.-Flour, Cantal, France, Oct. 25, 1800; studied theology at Orleans; was ordained priest in 1824, and appointed curate at Puiseaux; went in 1833 to Paris and founded the Ultramontanist journal *L'Univers*, which he sold in 1836 and founded at Petit Montrouge, near Paris, the Imprimerie Catholique, which soon became one of the most remarkable industrial establishments in France. From this office issued *Collection des Orateurs Sacrés* (100 vols., 1846–68); *Patrologiæ Cursus Completus* (390 vols.); *Encyclopédie Théologique* (171 vols.). In the establishment were also manufactured organs, statuary, pictures, and all kinds of church utensils. D. in Paris, Oct. 25, 1875. Revised by S. M. JACKSON.

Mignet, meĕn'yā', FRANÇOIS AUGUSTE MARIE: historical writer; b. at Aix, Provence, France, May 8, 1796; was educated at Avignon; studied law at the Academy of Aix at the same time with Thiers; removed to Paris in 1822; produced a dissertation on feudalism and the institutions of St. Louis; then followed *Histoire de la Révolution Française* (1824); 13th ed. 1880); *Histoire de Marie Stuart* (1851; 6th ed. 1884); *Vie de Franklin*; *Antonio Perez et Philippe II.* (1845; 5th ed. 1881); *Charles Quint, son abdication, son séjour et sa mort au monastère de Yuste* (1854; 10th ed. 1882); *Éloges Historiques* (1864; 5th ed. 1884), and other works; was in 1830–48 director of the archives of the foreign ministry; member of the Institute and of the Academy, and commander of the Legion of Honor, etc. D. in Paris, Mar. 24, 1884. See Trefort, *Mignet und seine werke* (Budapest, 1885).

Mignonnette, min-yŭn-et' [= Fr., dimin. of *mignon*, darling]: popular name of an herb, sometimes half shrubby; a native of North Africa; universally cultivated for its delicious fragrance. Its botanical name is *Reseda odorata*,

and it belongs to the order *Resedaceæ*. WELD (*q. v.*) also is a species of *Reseda*.

Migraine, Megrim, or **Hemicrania** [*migraine* is derived through Fr. and Late Lat. from Lat. *hemicrania*, Gr. *ἡμικρανία*; *ἡμι-*, half + *κρανίον*, skull]: paroxysmal headache, usually one-sided, with nausea, and disorders of vision. The disease is often hereditary, and usually begins in youth. It is most frequent in women and the neurotic. It is noteworthy that many celebrated men have suffered from it. Often no cause can be found, but it is quite frequently dependent upon eye-strain, disorders of the uterus and ovaries, adenoid growths in the pharynx, and diseased conditions of the nose. The attacks are precipitated by certain foods, by emotional excitement, and sometimes apparently without cause. The attacks may occur at regular intervals, so that the patient can foretell the very hour of onset, though more often the recurrence is irregular. The duration varies from some hours to several days. In the simplest form there is one-sided headache with nausea, followed by vomiting and relief. In some patients remarkable visual phenomena precede an attack. There may be simple blurring of vision, subjective flashes of light, or bright zigzag lines (fortification spectra). More rarely there are distinct illusions of animals, as dogs and cats, or even distinct landscapes. Transient hemianopia may occur. Disorders referable to the other special senses are rare. There is sometimes numbness and tingling of the arm, face, and tongue. Rarely transient muscular weakness in the arm is present. There may be loss of speech during the attack. The pain usually begins in a small spot on the forehead, or temple, and spreads thence over one side of the head. It may finally involve the whole head and neck. The face on the affected side may be pale and later flushed. The disease is not dangerous. It often ceases of itself at middle life. Treatment depends on removal of the cause and personal hygiene. W. PEPPER and C. W. BURR.

Miguel, Dom MARIA EVARISTO: prince; b. in Lisbon, Oct. 26, 1802; the third son of John VI., King of Portugal, by the Spanish princess Carlotta Joachima; went in 1807 to Brazil with his parents, fleeing from the French armies. Here he grew up entirely neglected. When he returned to Europe in 1821 he could neither read nor write. At ten years of age he was a drunkard; at fifteen his debaucheries and atrocities amazed the people. He was, nevertheless, his mother's favorite, and seems to have returned this love, while he hated his father and brother, and considered them as strangers. Soon after the return of the royal family to Portugal he began to form conspiracies against his father; open revolt followed. The plan was to depose the king, and, if necessary, to kill him; but he fled on board a British man-of-war, and by his escape Dom Miguel's plan was foiled. The prince was banished from Portugal May 12, 1824. On May 10, 1826, John VI. died, and, in order to prevent a civil war, the eldest son, Dom Pedro, Emperor of Brazil, resigned the Portuguese throne in favor of his daughter, Maria da Gloria, and offered her hand to Dom Miguel. He assented, made oath on the constitution, and entered on his regency during the minority of Maria; but he soon broke his oath, subverted the constitution by the aid of the clerical party, dissolved the constitutional Cortes, assumed absolute power, filled all the dungeons of the country with the liberals, and ruled Portugal for several years by terror, while he gave himself up to the wildest dissipation. In 1832 Dom Pedro arrived at Oporto with a Brazilian fleet. In 1833 he conquered Lisbon, and on May 26, 1834, Dom Miguel was brought to Genoa by a Portuguese man-of-war, having agreed never to re-enter Portugal. As soon as he arrived at Genoa, however, he protested against the agreement, but the only result of the protest was that he lost his pension from Portugal, and all his property was confiscated. He afterward married a German princess. D. at Brombach, Baden, Nov. 15, 1866.

Mikado, mĕĕ-kaa'dō [Jap. *mi*, exalted + *kado*, gate. Cf. title *Sublime Porte* applied to the Sultan of Turkey]: the title usually applied by foreigners to the hereditary ruler of Japan. It is, however, rarely heard in Japan itself, having passed away with the abolition of the feudal system. Mikado denoted first the imperial court, and then, by a common Oriental figure, it passed over to the person of the emperor. The Japanese prefer to use the title of *Tenshi* (i. e. Son of heaven), or *Kotei*, the Japanese equivalent of Chinese Hwang-ti or Imperial Ruler, as more in harmony with the modern system of government. Mikado has therefore become a merely historical or literary term, associated with the odes of the *Man-yoshu* and with courtly romances like the *Genji Monogatari*. J. M. DIXON.

Mikhaïlov, A.: See SHELLER, A. K.

Mikhaïlov, mĕĕ-kaa'ĕĕ-lof, MIKHAIL LARIONOVICH: Russian writer; the son of an official and of a Khirgiz princess; b. in the Ural Mountains in 1826. In 1844 he went to St. Petersburg, but was unable to pass the entrance examinations to the university, though he followed the lectures for a while as an outsider. From time to time he sent poems, mostly translations, to the newspapers, and in 1851 he published his best story, *Adam Adamovich*, which made him a reputation. In the following year he settled down to a regular literary career, writing for different journals, and especially for the *Sovremmenik* (Contemporary), to which he contributed tales, serious articles (among them one on the poets and novelists of the U. S.), and many translations, particularly from Heine. From 1858 to 1861 he traveled in Europe, but on his return was arrested for his connection with certain proclamations, tried, and sent to Siberia. There he died in 1865. His translations from Heine were published in 1858, and his works in 1859 (2 vols., St. Petersburg). A. C. COOLIDGE.

Mikhaïlovskiï-Danilevskiï, ALEKSANDR IVANOVICH: Russian historian; b. in 1790; studied at the University of Göttingen, and after his return to Russia was given a position in the ministry of Finance. In the following years he served in the campaigns against Napoleon, and he was present at the Congress of Vienna. From 1815 to 1818 he traveled in the suite of the Emperor Alexander; was major-general under Diebitsch in the war against the Turks (1829). D. Sept. 21, 1848. He was the author of histories of the war of 1806–12 against the Turks, and the military operations against the French, in which he took part. The latter books have been translated into German. Mikhaïlovskiï's style is excellent, but he is often partial and inaccurate. His complete works appeared in seven volumes (St. Petersburg, 1849–50). A. C. COOLIDGE.

Miklosich, mik'lō-zich, FRANZ, von, Ph.D.: founder of Slavic philology; b. at Luttenberg, in Steiermark, Nov. 20, 1813; in 1848 was elected member of the Reichstag; from 1850 to 1886 was Professor of Slavic Philology at Vienna; in 1862 was made life-member of the Reichsrath. His chief works are *Vergleichende Grammatik der slavischen Sprachen* (4 vols., 1852–74); *Lexicon Palæoslovenico-Græco-Latinum* (1862–65); *Ueber die Mundarten und die Wanderungen der Zigeuner Europas* (1872–77); *Etymologisches Wörterbuch der slavischen Sprachen* (1886). D. in Vienna, Mar. 7, 1891. BENJ. IDE WHEELER.

Miklucho-Maclay, NICHOLAS, von: traveler and naturalist; b. in the Ukraine in 1846. In 1865 he went to Germany, where he pursued his studies at Heidelberg, Jena, and Leipzig, and met Dr. Haeckel, with whom in 1867 he visited the Canary islands and Morocco. In 1869 he visited the Red Sea and Asia Minor. He had already decided to devote himself to an investigation of New Guinea, and in 1870 he started for that almost unknown land. From that time until not long before his death he was almost constantly traveling, his longest stay in any place being two years or more at Sydney, Australia. He was in New Guinea 1871–72, 1874, 1877, 1879–80, 1881, and 1883. He also traveled through the Malay Peninsula in 1874–75, the Caroline and Admiralty islands in 1876, and East Melanesia in 1879. His publications were very numerous, but are scattered. The most of them appeared under the auspices of the Imperial Geographical Society of St. Petersburg, or in the Dutch *Nat. Tijdschrift* of Batavia. These writings related to geography, anthropology, linguistics, and zoölogy. His name did not readily lend itself to expression in western languages, and he himself varied in the German form for it. He sometimes signed himself N. von Maclay. The name is sometimes written Miklukho-Maclay and Miklucha-Maklai. D. Apr. 15, 1888. MARK W. HARRINGTON.

Mikovec, mik'ō-vets, FERDINAND BŘETISLAV: dramatist and archæologist; b. at Sloup (Pirkstein), Bohemia, Dec. 24, 1826; was educated at Česká Lípa and Prague; made a special study of Bohemian history and archæology, and contributed numerous essays to Bohemian and German magazines. In 1848 he was politically active in the Bohemian and Servian commotions, returned to Prague in 1849, but went to Leipzig where in 1850 he published a German translation of the letters of John Huss, the Bohemian martyr and

Reformer. In 1851 he established at Prague a magazine devoted exclusively to belles-lettres, the *Lumír*, then the only one of its kind in Bohemia. He wrote two successful tragedies, *Záhuba rodu Přemyslovského* (The Extinction of the Premyslides, Prague, 1851) and *Dimitri Ivanovič* (Prague, 1856), and left two other dramas in MS. In 1858 he became editor of the *Starožitnosti a památky země české* (Bohemian Antiquities). D. at Prague, Sept. 22, 1862.

J. J. Král.

Mil'an (Ital. *Milano*): large town of Northern Italy; in lat. 45° 28′ N., lon. 9° 11′ E., lying in the center of the great fertile plain of the Po, between the Alps and the Apennines, the Adriatic and the Ligurian Seas (see map of Italy, ref. 3–C). The Olona, a small stream, washes its southern wall, and the town is connected by navigable canals with the Adda, and, through the Ticino, with the Po. Railways centering in an imposing station unite Milan with all the large towns of Italy. The circumference of the city, following the walls, which nearly inclose it, is about 8 miles; it has fourteen gates, the most striking being the Porta Sempione on the N. W., at the entrance of the great Simplon road, whose construction is here commemorated by a magnificent triumphal arch begun in 1807. In the center of the city is the Piazza del Duomo, which has been greatly enlarged, and from which tramways and omnibus lines extend in all directions. The streets of Milan generally are broad and clean; the palaces, though sometimes of immense size, lack the mediæval grandeur of those of Florence.

Churches.—Milan is the seat of an archbishopric, and is celebrated for its fine churches. Of the 240 existing in the middle of the eighteenth century, Maria Theresa and Joseph II. suppressed 117; others have been abandoned since, so that the present number is about 80. The Cathedral of Milan, an Italian Gothic structure, is one of the most splendid temples in the world, being exceeded in size only by St. Peter's and the Cathedral of Seville. It was begun in 1366 (Heinrich Arler, of Gmunden, being the architect, according to some—Matteo da Campione, according to others), and was in great part completed by 1500. Under Napoleon the work was actively resumed in 1805, and further decorations and repairs are constantly going on. The interior of this cathedral is 477 feet in length, 186 feet in breadth; height of nave 158 feet, of dome 214 feet, of tower 360 feet. The nave is supported by fifty-two columns, the four sustaining the dome being 10 feet and the others 8¼ feet in diameter, canopied niches with statues taking the place of capitals; the pavement is of mosaic; the vaulting, painted to imitate carved stone, has been injured by dampness, and is unworthy the rest of this wonderful edifice. The roof is a forest of Gothic turrets, 98 in number, decorated with exquisite carvings; the exterior of the cathedral is adorned with 2,000 statues, the interior with 700. Passing over other very noteworthy churches, that of St. Ambrose, founded in 387 by the illustrious archbishop himself, is of the greatest interest to the architect, the antiquarian, and especially to the lover of early Christian art. Near Santa Maria della Grazie, in which are very interesting frescoes, etc., is the convent containing that ruined masterpiece of art, Leonardo da Vinci's *Last Supper*.

Art-galleries, Libraries, etc.—The Brera Gallery alone contains more than 400 oil-paintings, many of great excellence, besides admirable frescoes, etc. In the same building is an archæological museum and the National Library, founded by Maria Theresa in 1764, and enlarged by private donations, libraries from suppressed monasteries, etc., until it now counts 250,000 volumes. The famous Ambrosian Library, founded by Cardinal Borromeo, has also risen to 160,000 volumes, besides about 10,000 manuscripts, some of the greatest rarity. The adjoining Gallery of Art contains, among its countless treasures, invaluable original drawings and manuscripts by da Vinci. In addition to public collections, Milan has 26 private picture-galleries of more or less interest. There are 15 museums of natural history, 14 of medals and antiquarian objects generally.

Public Institutions.—The charitable and educational institutions are on a most liberal scale, and admirably managed. The schools, academies, musical conservatories, etc., have a high reputation. The theater La Scala is the second largest in Italy and one of the largest in Europe. The public gardens and the Bastione di Porta Venezia furnish charming promenades, and the drive through the Corso and around the walls is most agreeable. Among the noted edifices in the city should be mentioned the Victor Emmanuel Gallery, or arcade. It represents a Latin cross, 960 feet long, 48 broad, and 85 in height, with a cupola 165 feet high. The roof consists of two glass vaults, one 6 feet above the other. This gallery is entered from the Piazza della Scala through a superb Corinthian arch of granite, extends to the Piazza del Duomo, and contains about 100 brilliant shops. The municipality has spent large sums of money, besides the cost of the ground, on the new cemetery outside the Porta Garibaldi.

Commerce and Industry.—The geographical position of Milan secures it an immense inland trade, chiefly in grain, rice, cheese, silk, and cotton; it also exports much country produce. It is the chief financial and banking center of Italy, and has very important manufactures of silks, velvets, woolens, gloves, machinery, art-furniture, and porcelain.

History.—At the time of its conquest by the Romans (220 B. C.) Milan was the largest town of Cisalpine Gaul. Cicero and Marcus Brutus were afterward among its governors, and in the third century it almost rivaled Rome. It was Christianized very early—tradition says by St. Barnabas—and was made illustrious in the fourth century by the good and great St. Ambrose. It suffered severely from the barbarians in 452, and in 558 was destroyed by a nephew of Vitiges, who, according to Procopius, slew 300,000 of its inhabitants. After many vicissitudes Milan in the eleventh century became once more independent and had a population of 300,000. Its moral and intellectual prosperity rose with its material wealth. The celebrated Archbishop Aribert offered every encouragement for the education of the young, and from her schools of philosophy, medicine, etc., Milan sent forth her professors to Burgundy, to France, and to Germany. After this followed a series of disastrous wars, ending with the destruction of the city by Frederick Barbarossa in 1162. It was, however, rebuilt with marvelous rapidity, and in 1176 the Milanese, aided by the neighboring towns, defeated Frederick at Legnano. In 1227 they were once more crushed by Frederick II. In 1259 an attempt was made by the terrible Ezzelino to get possession of the city, which failed, and from that time till 1447 it was governed by the ducal house of the Visconti. The so-called Golden Ambrosian republic, of three years' duration, was followed in 1450 by the dukedom of the Sforza, which lasted till 1500. From that time Milan continued for the most part under a foreign yoke, French, Spanish, or German, until 1796, when the French entered Milan and Napoleon made it the capital of the Cisalpine republic. In 1814 the Austrians took possession of the city and promised a liberal government, but pursued an entirely opposite policy. Insurrections broke out (1815, 1821, 1833), each followed by arrests, imprisonments, executions; and a state of chronic conspiracy existed until the "Glorious Five Days' Revolution," which began on Mar. 18, 1848, and terminated in the expulsion of the Austrians. After four months the enemy returned victorious. A new but disastrous insurrection was attempted in 1853. On June 8, 1859, Milan welcomed the Franco-Italian army within her gates, and Victor Emmanuel as the sovereign of her choice. The city is at present highly prosperous. Pop. of commune (1892, estimated) 426.500.

Milan: town; capital of Sullivan co., Mo. (for location of county, see map of Missouri, ref. 1–F); on the Chi., Burl. and Q. and the Quincy, Om. and Kan. City railways; 250 miles N. W. of St. Louis. It is in the center of the blue-grass region; raises fruit, grapes, and berries in abundance; has large farming and stock-growing interests; and has deposits of coal, fire-clay, mineral paint, and good building-stone in the vicinity. Farming, coal-mining, and manufacturing are the principal industries. Pop. (1880) 1,117; (1890) 1,234; (1900) 1,757. Editor of "Republican."

Milan: city; Gibson co., Tenn. (for location of county, see map of Tennessee, ref. 6–B); on the Louisv. and Nashv. and the Ill. Cent. railways; 93 miles N. E. of Memphis. It has six churches, a college, a high school, a weekly newspaper, and steam cotton-gins, saw and flour mills, barrel-factory, and fruit-canning works. Pop. (1880) 1,600; (1890) 1,546; (1900) 1,682. Editor of "Exchange."

Milan I., Obrenovitch: King of Servia; b. Aug. 22, 1854; son of Milosch Yephremovitch; was a student in the Lycée Louis-le-Grand, when, on the assassination of his cousin, Prince Michael III., he succeeded (July 2, 1868) as Prince Milan IV., and (Aug. 22, 1872) on reaching the age of eighteen he personally assumed the reins of government. He declared war against his suzerain, the sultan, in 1876,

but his army under the Russian general Tchernaïeff was always ignominiously beaten and only the intervention of Russia imposed peace and saved Servia from serious loss of territory. Participating shortly after in the Russo-Turkish war, the independence of Servia was recognized by the Treaty of Berlin (July 13, 1878). Servia declared itself a kingdom (Mar. 6, 1882), and Milan took the title of Milan I. On the union of Eastern Roumelia and Bulgaria (Oct., 1885), Milan invaded Bulgaria, but was speedily expelled, and his army disastrously defeated at the battle of Slivnitza, fought on Servian soil. Only the intervention of Austria stopped the progress of the Bulgarians. Milan abdicated (Mar. 6, 1889), proclaiming his son Alexander king under a regency till the attainment of his majority. Some time after he renounced the rights of his rank and nationality, taking the title of Count Takovo. Milan married (Oct. 17, 1875) Natalie, the daughter of the immensely wealthy Russian Col. Keschko; was divorced illegally Oct. 24, 1888, and reconciled to his wife Mar. 7, 1893. E. A. Grosvenor.

Milanés y Fuentes, mĕĕ-laă-nās'ee-foo-ān'tās, José Jacinto: poet; b. at Matanzas, Cuba, Aug. 16, 1814. His family was poor, and in early life he was a clerk at Matanzas and later a blacksmith's assistant at Havana; mainly by self-instruction he obtained a fair education, and about 1833 some of his verses were published, attracting an immediate and wide attention. In 1838 he published a tragedy, *El Conde Alarcos*, which is confessedly one of the best dramatic works of Cuban authorship. Soon after, through the influence of Delmonte, he obtained a position as secretary of a railway company, which placed him in comparatively easy circumstances. A mental disease which attacked him in 1842 was not alleviated by a journey in the U. S. and Europe in 1848–49; he sank into helpless melancholia and died at Matanzas, Nov. 14, 1863. After Heredía, Milanés is the most popular of the Cuban poets. A collected edition of his works was published at Havana, 1846, and a more complete one in New York, 1865. Herbert H. Smith.

Milá y Fontanals, mĕĕ-laa'ee-fōn-taa-naals', Manuel: scholar; b. at Villafranca del Panades, near Barcelona, Spain, May 4, 1818; d. in Barcelona, July 16, 1884. After studying law (licentiate, 1841), he gave himself entirely to the history of literature—especially that of Catalonia and Spain—and in 1845 was made Professor of Literature in Barcelona. For many years he was the most eminent representative in the Spanish Peninsula of the scientific study of the Romance languages and literatures. Among his works may be mentioned *Romancerillo catalán* (1843; 2d ed. 1882); *De los trovadores en España* (1861); *De algunas representaciones catalanes* (1864); *De la poesía heróico-popular castellana* (1873); *Principios de literatúra general* (1874); *Estudios de lengua catalana* (1875); *Notas sobre la influencia de la literatúra italiana en la catalana* (1877); *Poètes lyriques catalans* (Montpellier, 1878). He wrote many learned articles also for the *Romania* and other journals. A new edition of his works, edited by M. Menéndez y Pelayo, is in course of publication in Barcelona (vol. i., 1888; vol. ii., 1889).

A. R. Marsh.

Milaz'zo: seaport-town; in the province of Messina, Sicily; on the Gulf of Milazzo; about 27 miles W. of the city of Messina (see map of Italy, ref. 9–G). This town stands partly on the shore and partly on a high promontory. The harbor is sufficiently large and deep to receive ships of war. The exports consist chiefly of oil, wine, salt fish, linseed, dried fruits, etc. Milazzo (anc. *Mile*) was founded by the Zanclei more than 700 years before our era, and has shared the general vicissitudes of the island. It has been the theater of many battles, the last in 1860, when Garibaldi, July 20, obtained a brilliant victory over the Neapolitan troops, followed by the surrender of the fortress of Milazzo and the city of Messina. Pop. (1881) 7,971.

Milburn, William Henry, D. D.: lecturer and preacher; b. in Philadelphia, Pa., Sept. 26, 1823; removed in childhood to Jacksonville, Ill.; studied at Illinois College, notwithstanding a partial loss of sight; became a Methodist itinerant preacher at the age of twenty, chiefly in the Southern States; was settled for a time at Montgomery, and afterward at Mobile, Ala.; became a popular and eloquent lecturer and was six times chaplain to Congress, and in 1893 was chosen as chaplain to the U. S. Senate; went to Great Britain in 1859, and lectured with success in the principal cities. On his return he was ordained in the Protestant Episcopal Church, but returned in 1872 to Methodism. He is widely known as "the blind preacher," and has published *Rifle, Axe, and Saddle-Bags* (1857); *Ten Years of Preacher Life* (1859); and *Pioneers and People of the Mississippi Valley* (1860). Revised by A. Osborn.

Mildews [*mildew* is from O. Eng. *meledēaw* : O. H. Germ. *militou*, probably meaning, originally, honeydew; Germ. *mehlthau* has then suffered corruption under influence of *mehl*, meal; cf. Goth. *miliþ*, honey : Gr. μέλι : Lat. *mel*]: the general name applied to many microscopic fungi, now pretty well restricted to two families of parasitic plants distingnished as the Downy Mildews (*Peronosporaceæ*) and the Powdery Mildews (*Erysipheæ*).

In Great Britain the rust of wheat and other cereals is called mildew, but this usage does not prevail in the U. S. (See Rusts.) The mildew of cloth exposed to dampness, consisting of reddish, brownish, blackish, yellowish, or even greenish patches, is caused, at least in part, by minute fungi of various kinds (e. g. *Cladosporium herbarum*, *Penicillum glaucum*, *Aspergillus glaucus* and *A. roseus*, *Papulospora sipedonioides*, etc.). The large genus *Botrytis*, of the so-called imperfect fungi, are often known as mildews. They attack dead or languishing plants, e. g., the lettuce mildew, *Botrytis vulgaris*.

The Downy Mildews (*Peronosporaceæ*) consist of branching unseptated threads which grow in and through the tissues of their hosts. Certain branches protrude through the breathing pores of the host (Fig. 1), and produce great numbers of spores (summer spores, or conidia). These spore-bearing branches (conidiophores) occur in such great numbers that they give the surface a downy appearance, whence the popular name, Downy Mildews.

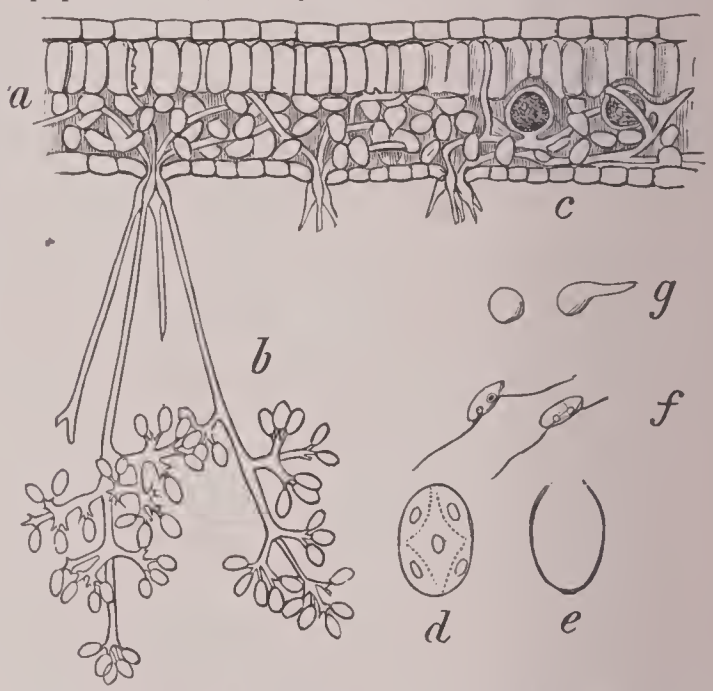

Fig. 1.—Downy mildew of the grape: *a*, diagrammatic section of affected grape-leaf; *b*, branches bearing conidia; *c*, two resting spores; *d*, germinating conidium; *e*, conidium after the escape of zoöspores; *f*, active zoöspores; *g*, zoöspores at rest, and germinating (all magnified).

The summer spores germinate quickly, either by sending out a tube which develops directly into the threads of a new plant (as in lettuce mildew), or by each one breaking up internally into a number of active bodies (zoöspores) which swim about (in dewdrops and films of moisture on leaves) for a time, and then become rounded and covered with a cell-wall, after which each sends out a tube, which develops into a branching thread. This latter method of germination is characteristic of the downy mildew of the grape.

The resting spores are formed within the tissues of the host, by the fertilization of an enlarged globular cell (the oögone), by a slender cell (the antherid), resulting in the formation of a thick-walled cell (Fig. 1, *c*). These resting spores (oöspores) remain for some time in the decaying tissues of the host and then germinate by forming zoöspores, as in the second kind of conidia described above, eventually giving rise to a new generation of the parasite.

About 100 species of Downy Mildews are known. Formerly these were all placed in the single genus *Peronospora*, but five genera are now recognized as follows:

Phytophthora.—Conidiophores at first simple, afterward branched; conidia producing zoöspores; resting spores thin-walled. The most important species is *P. infestans*, the

cause of the potato rot. (See Rot.) Another species is the bean mildew or blight (*P. phaseoli*), which attacks the leaves, stems, and pods of Lima beans.

Sclerospora.—Conidiophores simple; conidia producing zoöspores; resting spores thick-walled. Represented in the U. S. by *S. graminicola*, which attacks the leaves of "foxtail" grasses (*Setaria*).

Plasmopara.—Conidiophores with lateral branches; conidia forming zoöspores; resting spores thin-walled. The downy mildew of the grape (*P. viticola*, Fig. 1) belongs here. It attacks the leaves, young twigs, and berries, and is often harmful.

Bremia.—Conidiophores dichotomously much branched; conidia germinating by an apical tube. The single species is the lettuce mildew (*B. lactucæ*), which attacks garden lettuce and many wild plants related to it.

Peronospora.—Conidiophores dichotomously much branched; conidia germinating by a lateral tube. Radish mildew (*P. parasitica*) attacks the leaves and flowers of radishes (often greatly enlarging and distorting the latter), and many other crucifers. The so-called onion rust is a downy mildew (*P. schleideni*) which attacks and destroys the leaves.

The Powdery Mildews consist of delicate, white, septate threads which grow upon the epidermis of higher plants, here and there sending out a short "sucker" which penetrates the epidermal cells. Many vertical branches are

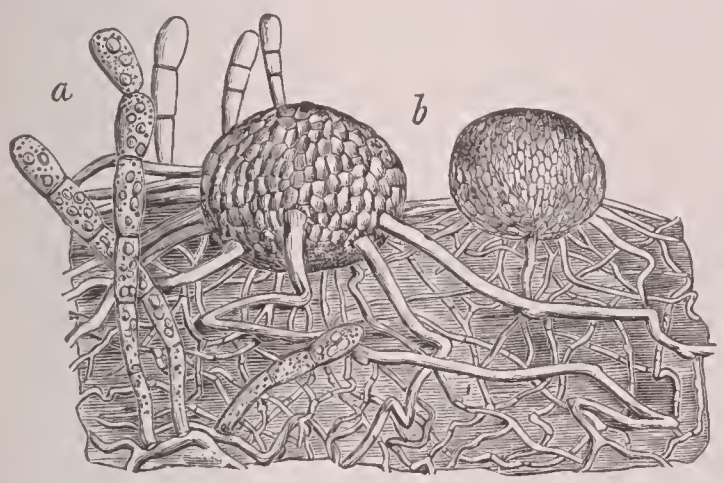

Fig. 2.—Portion of a leaf affected with powdery mildew, showing threads on the epidermis: *a*, conidia; *b*, sporocarps.

produced, which break up into spores, whose great numbers give a white powdery appearance to the surface (Figs. 2 and 3). These spores (summer spores, or conidia), which are

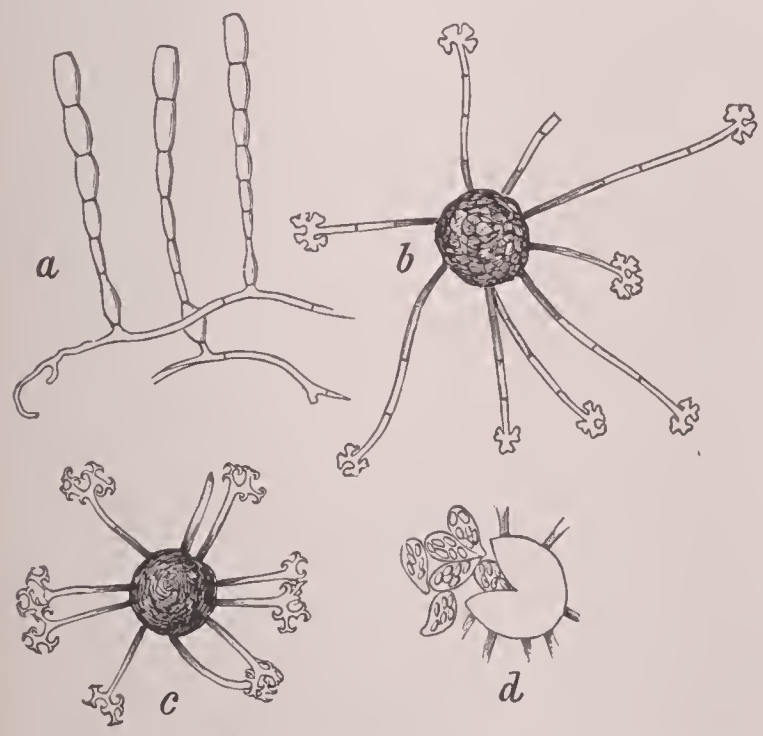

Fig. 3.—*a*, conidia of powdery mildew (*Erysiphe graminis*); *b*, sporocarp of cherry mildew (*Podosphæra oxycanthæ*); *c*, sporocarp of lilac mildew (*Microsphæra alni*); *d*, same ruptured, all magnified about 100 times.

capable of quick germination, soon produce more mildew upon unaffected areas, and thus rapidly spread the parasite. A little later the globular fruits (sporocarps) are produced, within which are the long-lived sac-spores (Fig. 3, *d*), which live through the winter and thus propagate the parasite the next season.

There are somewhat more than 100 species, distributed among half a dozen genera, as follows:

Erysiphe.—Spore-sacs several; appendages simple threads. Abundantly represented by the pea mildew (*E. communis*), often destructive to garden peas, attacking both leaves and pods, and the powdery mildew of composites and verbenas (*E. cichoracearum*), frequently very injurious to cultivated verbenas, sunflowers, asters, etc.

Uncinula.—Spore-sacs several; appendages coiled at the tip. Grape leaves and fruits are often seriously injured by the powdery grape mildew (*U. necator*), which is probably the same parasite as that known in Europe as *Oidium tuckeri*. Maple-leaves are often attacked by a species (*U. aceris*), and willows by another (*U. salicis*).

Microsphæra.—Spore-sacs several; appendages dichotomously branched at the tip. Most commonly represented by the lilac mildew (*M. alni*, Fig. 3, *c*), which covers the leaves in autumn with a dirty white mould-like growth. It attacks also honeysuckles, elms, walnuts, and many other trees and shrubs.

Phyllactinia.—Spore-sacs several; appendages needle-shaped. Represented in the U. S. by but one species (*P. suffulta*), the powdery mildew of magnolias, hawthorns, ashes, elms, birches, alders, hazels, beeches, etc.

Sphærotheca.—Spore-sac single; appendages simple threads. The hop mildew (*S. humulis*) is often destructive in hop-fields. Rose mildew (*S. pannosa*) is frequently troublesome in greenhouses, appearing as a white powdery growth upon the leaves. Another species (*S. mors-uvæ*) is the powdery mildew of the gooseberry.

Podosphæra.—Spore-sac single; appendages dichotomously branched at the tip. The principal species in the U. S. is *P. oxycanthæ* (Fig. 3, *b*), the powdery mildew of cherry, plum, and apple leaves, which is especially harmful to young trees.

Various remedies and preventives have been used for the mildews with more or less success. The fumes of sulphur are effective for the powdery mildews. Spraying with ammoniacal copper carbonate, or some of the copper sulphate solutions (Bordeaux mixture, eau celeste, etc.), has been found effective in both the powdery and the downy mildews.

Charles E. Bessey.

Mile [O. Eng. *mīl*, from Lat. *mi'lia*, *mil'lia*, mile, deriv. of *mil'le* (*pa'suum*), a thousand (paces); cf. Germ. *meile*, Fr. *mille*]: the name for a great number of lineal measures, each remotely derived from the Roman mile. Among the principal miles are the following:

English and U. S. statute mile	= 1·
Roman mile	= ·9193
English nautical or geographical mile	= 1·153
German, four English nautical miles	= 4·611
Scotch mile	= 1·127
Irish mile	= 1·273
German short mile	= 3·897
" long "	= 5·753
Prussian mile	= 4·680
Danish "	= 4·684
Swedish "	= 6·648

The geographical mile is one minute of the earth's equator. Our statute mile was fixed in Queen Elizabeth's time at 5,280 feet, and has not since been changed.

Revised by S. Newcomb.

Milelli, mĕĕ-lel'lĕĕ, Domenico: poet; b. at Catanzaro, in Calabria, Italy, in 1841. Destined for the priesthood, he turned aside to literature, and that of the most pagan kind. In 1864 he wrote an ode to Ugo Foscolo, which was translated into English, and then back into Italian by a writer ignorant of its origin. The list of his poetical works is long: *In giovinezza* (1873); *Gioconda* (1874); *Hiemalia* (1874); *Odi pagane* (1879); *Povertà* (1879); *Discerpta* (1881); *Il rapimento di Elena* (1882); *Canzoniere* (1884); *Verde antico* (classical translations, 1885). He has also published under the pseudonym *Conte di Lara* a book of *Rime* that has been very popular. He is one of the most extreme of the so-called *Veristi*, and many of his utterances have brought upon him the severest denunciations. A. R. M.

Miles, Nelson Appleton: soldier; b. at Wachusettville, Mass., Aug. 8, 1839; entered the volunteer service as cap-

tain in the Twenty-second Massachusetts Volunteers Sept., 1861; was distinguished at Fair Oaks and at Malvern Hill; became adjutant-general of a brigade; was appointed Sept. 30, 1862, colonel Sixty-first New York Volunteers, which he commanded at Fredericksburg; was severely wounded at Chancellorsville; was appointed brigadier-general May 12, 1864; was distinguished in the Richmond campaign of 1864; appointed brevet major-general Aug., 1864; major-general of volunteers Oct., 1865; colonel of Fortieth Infantry U. S. army July 28, 1866; transferred to the Fifth Infantry Mar. 15, 1869, and commissioned brevet brigadier and brevet major-general U. S. army Mar. 2, 1867; brigadier-general U. S. army Dec., 1880; major-general Apr. 5, 1890. He commanded several military departments, and has distinguished himself by his success in suppressing Indian outbreaks. He was in command of the U. S. troops stationed in Chicago during the riots in July, 1894. On Oct. 5, 1895, assumed command of the army. JAMES MERCUR.

Milet de Mureau, mēē'lā'de-mü'rō', LOUIS MARIE ANTOINE DESTOUFF, Baron: soldier and statesman; b. at Toulon, France, June 26, 1756, of a noble family from Lorraine; entered the army in 1771, and was made a captain in 1779. As a member of the States-General he usually voted with the right, but returned soon to active service as commander of the artillery of the army of Italy. In 1792 he was called to Paris to edit the journals of Pérouse, and performed the task with great ability (*Voyage de la Pérouse autour du monde pendant les années 1785–88*, Paris, 1797–98, 4 vols.), though it presented peculiar difficulties, as the revolutionary government wanted the text changed in favor of the Revolution. In 1799 he was for a short time Minister of War, during the empire prefect of the department of Corrèze, and under the Restoration president of the board of administration of the Hôtel des Invalides. Napoleon refused to give him any command, but made him a baron. D. in Paris, May 6, 1825.

Mile'tus (in Gr. Μίλητος): one of the most flourishing cities of Ionia, on the Sinus Latmicus, opposite to the mouth of the Meander. It existed as a town at the time when the Greeks planted their first colonies in Asia Minor; but on the arrival of the Ionians under Neleus all the male citizens of the ancient population (Carians or Leleges) were massacred. Miletus soon became one of the most powerful maritime and commercial places of the Mediterranean. It monopolized the trade of the Euxine; it sent its vessels into the Atlantic; it formed a great number of prosperous colonies, such as Abydos and Lampsacus on the Hellespont, Cyzicus on the Propontis, Sinope and Amisus on the Euxine, and others in Thrace, the Crimea, and on the Borysthenes. It continued to flourish under the Lydian and Persian rule, but after its unsuccessful revolt against Persia in 500 B. C. under HISTIÆUS (*q. v.*), its strength was broken. Darius treated it with great severity. Most of the inhabitants were massacred, and the rest were transported to Ampe, at the mouth of the Tigris. The place was then given up to the Carians; and when the Persians were compelled, 479 B. C., to retire from the coast of Asia Minor, it revived. It gave some signs of life during the Peloponnesian war by throwing off the Athenian yoke; it afterward attempted to resist Alexander the Great, and continued a place of commercial consequence until destroyed by the Turks. Its site is now occupied by Balat or Palattia, described as "a fever-stricken place." See Rayet and Thomas, *Milet et le Golfe Latmique* (Paris, 1877). J. R. S. S.

Miley, JOHN, D. D., LL. D.: minister and educator; b. in Butler co., O., Dec. 25, 1813; educated at Augusta College, Kentucky; entered the Methodist Episcopal ministry in 1838; was pastor 1838–48; professor in Wesleyan Female College, Cincinnati, 1848–50; pastor 1850–73; and Professor of Systematic Theology in Drew Theological Seminary since 1873. He has published *The Atonement in Christ* (1879) and *Systematic Theology* (2 vols., 1892–94). J. F. H.

Milfoil: See YARROW.

Milford: town (originally known as Wepowage, site purchased from the Indians Feb. 12, 1639, settlement independent till 1643, then merged into the colony of New Haven); New Haven co., Conn. (for location of county, see map of Connecticut, ref. 12–F); on Long Island Sound at the mouth of the Wopewaug river, and the N. Y., N. H. and Hart. Railroad; 10 miles S. W. of New Haven. It contains 5 churches, public high school, Elmwood School for boys (opened 1884), lyceum with library (founded 1858), soldiers' monument (dedicated 1888), 2 ancient burying-grounds, and a savings-bank. At the 250th anniversary of its settlement (1889) a memorial bridge across the river at the head of the gorge, built of granite, with a tower, and granite blocks inscribed with the names of early settlers on its copings, was dedicated. The industries of the town comprise the manufacture of shoes, straw hats, fish oil, and bone fertilizers, and the cultivation of oysters. Pop. (1880) 3,347; (1890) 3,811; (1900) 3,783.

Milford: town (founded in 1794); Kent co., Del. (for location of county, see map of Delaware, ref. 5–N); on both sides of the Mispillion river, and on the Phila., Wil. and Balt. Railroad; 96 miles S. of Philadelphia. It is in an agricultural, fruit-growing, and fruit-curing region; is a shipping-point for general produce; contains 6 churches, 2 public schools, a preparatory school, and 2 weekly newspapers, and has considerable ship-building interests. Pop. (1880) 1,240; (1890) 2,565; (1900) 2,500.

EDITOR OF "PENINSULAR NEWS AND ADVERTISER."

Milford: town; Worcester co., Mass. (for location of county, see map of Massachusetts, ref. 3–F); on the Charles river, and the Boston and Albany, the Grafton and Upton, and the N. Y. and N. E. railways; 30 miles S. W. of Boston. It is one of the largest boot and shoe manufacturing centers in the U. S., and has, besides, manufactories of machinery and straw and cotton goods. There are 2 national banks with combined capital of $385,000, a savings-bank, a public library (founded 1858), and 2 daily and 3 weekly newspapers. Pop. (1880) 9,310; (1890) 8,780; (1900) 11,376.

EDITOR OF "JOURNAL."

Milford: village (settled in 1833); Oakland co., Mich. (for location of county, see map of Michigan, ref. 7–K); on the Huron river, and the Flint and Pere Marq. Railroad; 43 miles N. W. of Detroit. It is in an agricultural region; has good water-power and manufactories of foundry products and farming implements, and contains 4 churches, 2 public schools, and a weekly newspaper. Pop. (1880) 1,251; (1890) 1,138; (1900) 1,108. EDITOR OF "TIMES."

Milford: town (incorporated in 1794); Hillsborough co., N. H. (for location of county, see map of New Hampshire, ref. 10–E); on the Boston and Maine Railroad; 50 miles N. W. of Boston. It is in a granite-quarrying and dairying region; contains a high school, public library (founded 1868), a national bank with capital of $100,000, a savings-bank, and a weekly newspaper, and manufactures hosiery, knitting cotton, picture and mirror frames, and furniture. It is a popular summer resort. Pop. (1880) 2,398; (1890) 3,014; (1900) 3,739. EDITOR OF "FARMERS' CABINET."

Milford Haven: a deep inlet of the Atlantic, on the southwest coast of Wales (see map of England, ref. 12–B). It is about 15 miles in length; average width 2 miles; has deep water, and is one of the best ports of the British dominions.

Milhau, mēē'lō', or **Millau**: town; in the department of Aveyron, France; on the Tarn, half a mile below the influx of the Dourbie (see map of France, ref. 8–F). It is beautifully situated, surrounded with picturesque hills covered with vineyards and forests. It has large tanneries and manufactures of gloves, and carries on a considerable trade in leather, wool, and timber. During the religious wars it was one of the chief strongholds of the Calvinists, but its castle was demolished by Louis XIII. Pop. (1896) 18,754.

Miliary Fever: See SWEATING SICKNESS.

Miličević, mil-i-chev'ich, MILAN: author; b. at Ripanj, near Belgrade, Servia, May 7, 1831; studied theology; became a teacher in 1850, obtained a state office in 1852, and was appointed secretary to the Servian Minister of Education in 1861. He has published important geographical and ethnological works: *Knježevina Srbia* (The Principality of Servia, Belgrade, 1876); *Život Srba seljaka* (Servian Peasant Life; in the *Glasnik*, 1867 and 1873); *Selo Zloselica, etc.* (Belgrade, 1880); *The Kingdom of Servia* (Belgrade, 1884); also some stories of Servian life, *Jurmusa i Fatima*, etc., and *Zimnje večeri* (Winter Evenings, Belgrade, 1879). In 1865 he translated Hilferding's *Pišma ob istorii Serbov i Bolgar* (Notes on the History of the Servians and the Bulgarians). J. J. KRÁL.

Milicz of Kremsier: reformer; one of the most influential precursors of Huss; b. at Kremsier, a village near Olmütz, in Moravia, in the beginning of the fourteenth century, probably in 1325. In 1350 he took holy orders; in

1360 he was made canon of the Cathedral of St. Vitus, in Prague, and in the same year he was appointed secretary to the Emperor Charles IV., whom he accompanied to Germany. In 1363 he resigned all his positions, retired to some lonely place in the Bohemian Forest, and then returned to Prague, where he began to preach to the poor people in the streets—not in Latin, but in Bohemian. He caused a great sensation, as a sermon in the native tongue was at that time something altogether unheard of, but he also made a deep impression; and he actually succeeded in cleaning out one of the most obnoxious streets of Prague, the Benatki, and inducing the fallen women who had inhabited it to enter the charitable institution called the Jerusalem, which he had established for their benefit. It soon began, however, to dawn upon him that the root of the evil was in the Church herself—in her corruption, in her vices—and it gradually became clear to him that Antichrist had come, and that radical and sweeping reforms were indispensable. In 1367 he repaired to Rome to confer with the pope; but when he announced, by a placard on the gate of St. Peter's, that he was going to preach on the presence of Antichrist, he was arrested by the Inquisition. He was, however, soon after released and allowed to return to Prague by Urban V., who treated him with great kindness. From 1369 to 1372 he again preached in Prague, but in the latter year dissensions arose between him and his brother-priests in Prague, and they formally accused him of heresy before the pope. He was summoned to Avignon to defend himself, which he did successfully, but he died there, before the verdict was announced, June 29, 1374. His *Libellus de Antichristo* is still extant. Revised by S. M. Jackson.

Military Academies: academies for training men for service as military officers. As they now exist they are of quite modern origin. In modern times many circumstances have combined to make war far more a matter of science and skill, and less a matter of brute force and courage, than formerly. Hence the great necessity for a thorough preparation of officers, upon whose character and ability the results of war, with all its momentous consequences, must very greatly depend. As the peculiar instruction and training required can not be furnished by the ordinary educational institutions, special schools have been judged necessary, and have been carefully organized by the most enlightened nations. Only the principal military schools of some of the great military powers are here noticed.

Great Britain.—1. *The Royal Military Academy* at Woolwich, instituted in 1741, for the purpose of educating candidates for commissions in the artillery and engineers. The education is chiefly technical. Admission is by open competitive examinations, conducted by the civil service commissioners. The candidates pass a preliminary examination in mathematics, French or German, English writing and composition, geometrical drawing, and geography, after which they pass the decisive examination in the following subjects: I. Mathematics (compulsory), mechanics, analytical geometry, conic sections, Latin, French, German (optional). II. Greek, English history, physics, chemistry or physical geography, and geology. III. English composition, free-hand and geometrical drawing. The candidates select only four of the subjects in group I., and one in group II., taking all of group III. Age of admission, sixteen to eighteen years. The course of instruction lasts two years, and embraces mathematics, fortification, artillery, military drawing and reconnoissance, French or German, elementary chemistry and physics, drills, and exercises; certain voluntary subjects being allowed to be taken up at the option of the student. At the end of the first year the courses of the engineers and artillery are conducted separately, the highest choosing the engineers. The cadets pay an annual contribution, which, however, is not the same for all, being greatest for sons of civilians, less for sons of military and naval officers, and least for sons of deceased officers whose families are in pecuniary distress; the queen's cadets pay nothing. At present there are 202 cadets and about thirty professors and instructors, besides the governor and his staff. On graduation the cadets are commissioned lieutenants in the engineers or artillery.

2. *The Royal Military College* at Sandhurst, instituted in 1799, for the purpose of affording a special military education to candidates for commissions in the cavalry and infantry. Admission is as for the Royal Military Academy, and the preliminary entrance examination is quite the same. The decisive entrance examination includes the following subjects: I. Mathematics, Latin, German, French. II. English history, Greek, higher mathematics, physics, chemistry or magnetism and heat, physical geography and geology. III. English composition, free-hand and geometrical drawing. The candidates select three of the subjects in group I., one in group II., taking all of III. Age of admission seventeen to twenty years. The course is one year, and embraces military administration, army organization, minor tactics, fortification, military reconnoissance, drill, riding, and gymnastics. The cadets pay an annual contribution, varying in amount, as in the Royal Military Academy. The number of students is now 300, with about thirty professors and instructors, in addition to the staff of government. On graduation the cadets are commissioned lieutenants in the cavalry or infantry.

3. *The Staff College* at Sandhurst, organized in 1858, is for the instruction of officers in the duties of the staff of an army. Admission is wholly by competitive examination, open to officers of all arms of the service, including artillery and engineers. Candidates must have served five years, have certain certificates from their superiors, and be under thirty-seven years of age. The subjects of the competitive examination are mathematics, military history and geography, French, German (for officers of the Indian staff corps, Russian or Hindustani), and fortification, military drawing, and minor tactics; mathematics, one language, military topography, and minor tactics are obligatory; the remaining subjects are at the option of the candidate. The course lasts two years, and embraces fortification and artillery, topography and reconnoissance, military history and geography, military administration and law, French, German, or Russian (one language only), lectures in applied sciences (voluntary), riding. Much time is devoted to practical outdoor work, including orientation and tactical discussions. The number of students is sixty-four, with fifteen professors and instructors, exclusive of the staff of government. Upon graduation the officers are assigned to staff duty (in some arm other than their own) for four months in the camp at Aldershot, after which they return to their ordinary regimental duties, and are available for assignment to staff duty.

4. Great Britain has also the *Royal Military College of Canada* (Kingston), the *Royal School of Military Engineering* at Chatham, the *Advanced Class of Artillery Officers* at Woolwich, the *School of Gunnery* at Shoeburyness, and the *School of Musketry* at Hythe.

France. 1. *The Polytechnic School at Paris.*—This celebrated school was founded in 1794, but received its organic law in 1799 from La Place, then Minister of the Interior under Napoleon. It is a scientific school, giving a preparatory education for several branches of the public service—viz., the engineers, artillery, and staff, the department of powder and saltpeter, the navy and marine artillery, the naval architects, the hydrographical engineers, the corps of roads and bridges (*ponts et chaussées*), the corps of mines, the telegraph department, the tobacco department, and for other branches requiring an extensive knowledge of mathematics, physics, and chemistry. Admission is wholly by competitive examination. Age of admission, sixteen to twenty-one years, or, if in the army, not over twenty-five years. The candidate must have the degree of bachelor of science or of bachelor of literature, and is examined in French, resolution of triangles, figure and color drawings, algebra and analytical geometry, descriptive geometry, physics and chemistry, and German. The course lasts two years, and embraces analysis, descriptive geometry and stereotomy, mechanics and machines, physics, chemistry, astronomy, geodesy, architecture and public works, topography, military art and fortification, composition and French literature, German, history, figure, landscape, and color drawing. The number of pupils is about 520, with about 40 professors and instructors, exclusive of the staff of government. Pupils pay a certain amount annually, but aid is given by the state to those needing it. On graduation, those who enter the army or navy are commissioned second lieutenants.

2. The *Special Military School* at St.-Cyr (organized in 1808) is intended for the instruction of those destined to become officers of infantry, cavalry, and the marine corps. Age of admission, seventeen to twenty-one, whether in the army or not. Admission is wholly by competitive examination in the following subjects—viz., arithmetic, algebra and plane trigonometry, geometry, descriptive geometry, mechanics, cosmography, physics, history, geography, German, English (voluntary). Candidates must have the degree of

bachelor of science or of literature. The course of study lasts two years, embracing topography, fortification, legislation and administration, artillery, military history and minor tactics, geography, and military exercises. There are about 950 pupils, with 42 professors and instructors, and 26 military officers of instruction in drill, etc., exclusive of the staff of government and administration. On graduation those who pass are commissioned second lieutenants, the rest complete their service in the ranks.

3. The *Superior War School* in Paris, instituted as the *Staff School* in 1808, reorganized in 1875 for the purpose of educating officers in the duties of the general staff. The candidates are lieutenants or captains of the army (exceptionally also of the marine corps or naval artillery), who have served at least five years, without limit as to age. Admission is by competitive examination in the following subjects: Army organization and military history, minor tactics, German, administration, artillery, fortification, geography, topography and riding, including a written solution of a problem in minor tactics, and one in administration, and a topographical map. The course is two years, embracing military history, strategy and tactics, applied tactics, general staff duty, administration, fortification, telegraphy, geodesy, geology, topography, and hygiene. There are now about 163 pupils, with 25 instructors and professors, and 8 visiting lecturers, besides the director and his staff.

4. France has also the *School of Artillery and Engineers* at Fontainebleau, the *Cavalry School* at Saumur, the *Military Orphan School* at La Flèche, the *Medical School* in Paris, the *School of Military Hygiene* at Lyons, the *Gymnastic School* at Joinville-le-Pont, the *School of Musketry* at Châlons, the *Infantry School* at St.-Maixent, the *Artillery and Engineer School* (for non-commissioned officers) and the *Military Administration School* at Versailles.

Prussia. 1. The *Cadet Schools.*—There are seven of these schools—viz., a senior cadet school at Lichterfelde, near Berlin, and six junior cadet schools, preparatory to the senior, situated at Potsdam, Culm, Wahlstatt, Bensberg, Ploen, and Oranienstein. Their purpose is to educate and train youths, particularly for the military service, thus insuring a supply of efficient officers for the army. Admission is by examination, not competitive, but fixed for every particular age. The classes of the junior schools are arranged to correspond to a Real school, with the classes sexta, quinta, quarta, lower tertia, upper tertia, the ages of the pupils ranging from ten to fifteen years; candidates may enter any one of these classes. The full course in the junior schools is five years, and embraces religion, German, Latin, French, English, mathematics, physics, history, geography, natural history, drawing, and writing. On graduation the pupils enter the senior cadet school. The full course at the latter is five years, with the classes lower secunda, upper secunda, lower prima, upper prima, and selecta. The course embraces religion, German, Latin, French, English, mathematics, history, physics, chemistry, drawing, writing; and in the selecta military sciences (ordnance, minor tactics, fortification, topography, drawing, and service duties) and French. Those who complete the upper secunda may pass the ensign examination at once, or enter the selecta (if sufficiently developed physically) or the prima (if not); those who fail enter the army in the ranks. Those who complete the lower prima pass the ensign examination, or enter the selecta or upper prima. Those who complete the upper prima take the graduating examination and enter a war school. The graduates of the selecta may pass the officers' examination without attending a war school. In each junior school there are about 200 pupils, and in the senior school over 800. Cadets in all these schools pay a certain sum, but state aid is given as circumstances require it.

2. The *War Schools.*—These schools are eight in number, situated at Glogau, Potsdam, Neisse, Engers, Cassel, Hanover, Anclam, and Metz, and are designed for the instruction of those intended for officers of all arms. The conditions for entrance are the commission of ensign (officer aspirant), five months' service with troops, and not over 24¼ years of age. The course of instruction lasts nine or ten months, and is subdivided into a theoretical and a practical course; the former (limited to the forenoon) embraces tactics, fortification, science of arms, military surveying and drawing, and military correspondence; the latter (generally in the afternoon throughout the course) embraces drill, gymnastics, swimming, fencing, riding, musketry practice, and service duties. The pupils who pass the graduating (officers') examination are commissioned second lieutenants.

3. The *War Academy* in Berlin. This is designed to furnish an education in the higher branches of military science to officers of the army, to prepare them for general staff duty, and to furnish a supply of well-trained officers for the higher commands. Admission is by competitive examination, open to all officers who have served three years with troops (without limit as to rank or age), and who are characterized on their qualification lists as good duty officers with troops, in sound health, of established character, studious in habit, and free from pecuniary difficulties. The entrance examination includes minor tactics, ordnance, fortification, surveying, history, geography, algebra, geometry, and French. The course lasts three years, and embraces minor tactics, ordnance, fortification, geodesy, general history, general, physical and military geography, mathematics, history of strategy, physics, military history, military administration, surveying, general staff duty, chemistry, military hygiene, military law, history of literature, sieges, French, and Russian. Part of the course is voluntary. Practical instruction in the field is also given, particularly during yearly *rides of instruction* in minor tactics, surveying, general staff duty, etc. There are about 300 pupils. During the vacations, at the end of the first and second years, the officers are detailed on general staff duty in arms other than their own, and on graduation they return to their own regiments, being afterward selected for the general staff as required, lieutenants being promoted to captains out of turn.

4. Prussia has also an *Artillery and Engineer School* at Charlottenberg, near Berlin, a *Military Riding School* at Hanover, a *School of Musketry* at Spandau, a *School of Gunnery* at Tegel, near Berlin, and two *medical schools* in Berlin.

Austria, Russia, Italy, Spain, and other powers have their systems of military schools, of which those of Austria and Russia are noticeable.

The United States. 1. The *Military Academy* at West Point, N. Y. The conception of a military academy in the U. S. dates back to 1776, when a committee was appointed by the Continental Congress to "prepare and bring in a plan of a military academy at the army." No further action appears to have been taken. Washington invited the attention of Congress to the subject in 1793, and in 1796 recommended the institution of a military academy. The result was, finally, the act of Mar. 16, 1802, founding the Military Academy. Between 1802 and 1812 there were in all only six instructors at West Point, of whom only from two to four were present at the same time, and there were only eighty-nine graduates. The uniform of the cadets, nearly the same as now worn, was prescribed by a general order in 1816.

Although owing much to the efforts of its two first superintendents, and especially to Col. Jonathan Williams, the real initiation of the academy, as it has since been, dates from the appointment of Brevet Major (afterward Gen.) Sylvanus Thayer of the Corps of Engineers, who assumed command July 28, 1817. He established the office of commandant of cadets; introduced the division of classes into sections, transfers between the sections, and weekly class reports showing weekly progress, and by a system of daily marks indicating the individual progress of cadets. The check-book controlling the expenses of the cadets, the extensive use of the blackboard, and the essential parts of the regulations now governing the academy are due to him. Ten months of the year were allotted to academic duties, and two months to those of camp. He inculcated by precept and example that spirit of devotion to duty and unquestioning, prompt obedience to lawful authority which still distinguish the graduate of West Point.

In the appointment of cadets it has been admitted as a principle that the sons of those who have lost their lives in the defense of the nation should have preference. The custom of appointing cadets from districts naturally arose in accordance with the tendency to distribute all appointments under the general Government in proportion to representation, and was converted into a law in 1843. The monthly pay of cadets was $28 in 1802, $24 in 1845, $30 in 1857, in 1864 about $50; the pay in 1885 was $540 a year. A board of visitors, to attend the annual examinations and report on the condition of the Academy, provided for in 1816 by regulation from the War Department, was first assembled after Maj. Thayer became superintendent. Discontinued by the act of 1843, it was again authorized by act of Aug. 8, 1846, the members to be selected by the President from half the number of States annually, alternating with the other half;

the number of members was reduced to seven in 1868; and to this number were added in 1870 two Senators and three members of the House of Representatives, to be designated respectively by the President of the Senate and the Speaker of the House. The aggregate amount appropriated from 1864 to 1884 was $6,180,331.07; from 1885 to 1892 (both inclusive), $3,287,700.31; the largest being that for 1890, which was $902,766·69, and included the appropriation for a new gymnasium and a new academic building.

Present Organization.—The general commanding the army has, under the War Department, supervision and charge of the academy. The staff of government and instruction consists of (1) the superintendent,* directing the studies and exercises, and exercising command over all persons belonging to the academy, and commanding the military post. The military staff includes an adjutant, quartermaster, commissary of subsistence, treasurer, surgeon, and assistant surgeon. (2) The commandant of cadets, an officer of the army, who is the instructor of artillery, infantry, and cavalry tactics, and is charged with the discipline and administration, and commands the battalion of cadets. He has eight assistants, likewise army officers. (3) Seven commissioned professors, one professor detailed from the judge-advocates of the army, an instructor of practical military engineering, and an instructor of ordnance and gunnery, taken respectively from the Engineer and Ordnance Corps; these (the superintendent and commandant included) constitute the academic board. There are about forty-three assistant professors and instructors, including those in tactics, and one swordmaster. Except seven professors, all officers and instructors of the academy are officers of the army detailed for the duty, usually for a period of four years. The academic board examines candidates for admission and cadets, recommends text-books, maps, models, etc., draws up programmes of instruction, etc., grants diplomas, etc. For the purpose of discipline and tactical instruction the cadets are organized as a battalion of four companies, each under the supervision of an instructor of tactics, with officers and non-commissioned officers selected from the cadets themselves. Usually cadet officers are selected from the first class,† sergeants from the second class, and corporals from the third class. There are also a cadet adjutant, quartermaster, sergeant-major, and quartermaster-sergeant. The position of cadet officers affects their relation to other cadets only when on duty as officers.

Admission.—Each congressional district and Territory and the District of Columbia are entitled to have one cadet at the academy. The appointments are made by the Secretary of War at the request of the Representative or delegate in Congress from the district or Territory, of which the person appointed must be an actual resident. The President also appoints ten cadets at large. Candidates must be between seventeen and twenty-two years of age, at least 5 feet in height, and free from any infectious or immoral disorder, and from anything which may render them unfit for military service. They must be well versed in reading, writing, and orthography, arithmetic, elements of English grammar, descriptive geography, particularly of America, and history of the U. S. Those admitted are required to sign articles binding themselves to serve the U. S. eight years from date of admission, unless sooner discharged. An oath of allegiance to the U. S. is also required.

The course of study embraces the following subjects: (1) Infantry, artillery, and cavalry tactics and military police and discipline; (2) mathematics, including algebra, geometry, trigonometry, mensuration and surveying, descriptive geometry, analytical geometry, differential and integral calculus; (3, 4, and 5) English, French, and Spanish languages; (6) drawing, comprising topography, with pencil, ink, and colors, etc.; (7) heat, chemistry, electricity, mineralogy, and geology; (8) natural and experimental philosophy, comprising mechanics with applications, acoustics, optics, and astronomy; (9) ordnance and gunnery; (10) history, geography, and ethics; (11) law, including general principles, international law, Constitution of the U. S., etc., Rules and Articles of War, courts martial; (12) practical military engineering, etc.; (13) military and civil engineering and the science of war. By a system of numerical marks the proficiency of a cadet's daily recitations is measured; and these are taken into account in making up the merit rolls in each branch, as well as in the general class standing.

Discipline is very strict—more so than in the army, and probably than in any other similar institution. The aim is to inculcate habits of prompt and cheerful obedience to lawful authority, of neatness, order, and regularity, and of thoughtfulness and attention in the discharge of duty. A scrupulous regard for one's word is also required. The system of punishment for offenses is remarkable for inflexible enforcement rather than for severity. Besides demerit marks, which count in making up the class standing, cadets are further liable to three classes of punishment: (1) privation of recreation, etc., extra duty, reprimands, arrests, or confinement to room or tent or in the light prison, reduction to ranks of officers and non-commissioned officers; (2) confinement in dark prison; (3) suspension, dismission with the privilege of resigning, public dismission. Punishments of the first class are inflicted by the superintendent or with his approval; that of the second class by sentence of a court martial, except in case of mutinous conduct or breach of arrest. Monthly statements of conduct and progress in studies are sent to parents or guardians.

Upon graduating, the class is divided by the academic board into three sections of varying and unequal numbers, according to class rank; the highest, usually very small and sometimes wanting, is recommended for promotion in any corps in the army; the second, for any corps except the engineers; the third, in any corps except the engineers and the artillery. Commissions for the rank of second lieutenant are then usually conferred by the President.

2. The U. S. has also the *Engineer School* at Willets Point, N. Y., the *Artillery School* at Fort Monroe, Va, the *Infantry and Cavalry School* at Fort Leavenworth, Kan., the *Light Artillery and Cavalry School* at Fort Riley, Kan., and the *War College* at Newport, R. I. JOHN P. WISSER.

Military Discipline, Military Engineering, etc.: See DISCIPLINE, ENGINEERING, etc.

Military Insignia: See the Appendix.

Military Law: See MARTIAL LAW and COURT MARTIAL.

Military Orders: See KNIGHT, KNIGHTS TEMPLAR, etc.

Militia [= Lat. military service, soldiery, deriv. of *mī'les, mi'litis*, soldier]: that portion of the military strength of a nation enrolled for discipline and instruction, but local in its organization, and engaged in active service only in cases of emergency. Originally the term was synonymous with the cognate derivative "military," as embracing the whole body of national troops, whether embodied for actual service or relegated to industrial pursuits. It is the organized national reserve in contradistinction to the regular army and the *levée en masse* of a country, and therefore comprehends the "volunteer" organizations of Great Britain and the U. S., the National Guard of France, the Landwehr and Landsturm of Germany, and similar organizations in the other European states.

In Great Britain alone, of the European states, is reliance placed upon voluntary enlistment for maintaining the various militia organizations in time of peace, and for recruiting the regular army both in peace and war. The British militia system originated in the Anglo-Saxon *fyrd*, and in the warlike feature of the ancient *posse comitatus*. The fyrd was overshadowed by the feudal system, was revived in the struggle between the crown and the barons, and was superseded by the "trained bands" created by James I. These were in turn suppressed, and at the Restoration the existing system, in its essential features, was established. Under it the Government appoints lords-lieutenant of counties, empowered to call out, embody, and command the "regular militia" and to appoint its officers. The quota for each county is established by Government, and in the failure of voluntary enlistment a levy by ballot would be made upon all non-exempted inhabitants of the county; but practically these quotas are kept up in time of peace by volunteers. This force assembles at stated periods for military exercise, and can be "embodied" in any national crisis. Most of the regiments were embodied in the Crimean war, and many of them during the Indian mutiny. They may not be sent out of the kingdom unless they volunteer, and then only by provision of Parliament; but this exemption does not apply to a portion, about one-quarter of the whole force, called the "militia reserve." The militia of the United Kingdom in 1893–94 comprised 140,308 men, of whom 123,744 were classed as "effectives." The volunteers, how-

* Up to July 13, 1866, the superintendent was an officer of engineers, of which corps the academy itself formed part. By the act of that date the superintendency was thrown open to all branches of the service. See ENGINEERS, CORPS OF.

† The classes are numbered in inverse order of the years of their service at the academy—that most recently entered being the fourth, etc.

ever, constitute the great national reserve. First organized in 1804, they in 1813 numbered over 400,000 effectives, but diminishing in numbers as danger became less imminent, they were absorbed in the local militia. A revival of military spirit was, however, initiated in 1859, and in 1894 the strength of this force, including the yeomanry cavalry, was 274,549. By furnishing paid adjutants and drill-masters to these corps, granting them certain pecuniary allowances, arming the men, and employing a staff of inspectors under the immediate direction of the War Office, the Government maintains this force in a very creditable condition of efficiency; but, excepting the yeomanry cavalry, it "may not be employed in time of civil disturbance." All of it, however, may be embodied for active service anywhere in Great Britain in case of invasion.

In Switzerland there is, nominally, at least, no standing army, but a corps of educated officers is maintained; every citizen is held to military service, and is taught its exercises in the schools; and the war-strength of the country is divided into a "regular force" of about 80,000, a reserve of about 50,000, and a Landwehr organization.

In the U. S. the militia becomes national only when called into the actual service of the Federal Government. Durthe Revolutionary war, 1775–83, the Federal armies consisted of State troops adopted by Congress, and this system of maintaining a military force prevailed till after the present Union was formed. Although eminently qualified for military service by the experiences of the French and Indian wars, Continental militia, as such, played no prominent part in the Revolutionary struggle. Available only for brief periods, it was deficient in discipline, and therefore uncertain under fire; and it was mainly to the regular troops, or "Continental line," that the revolting colonies were indebted for national independence. The following table, compiled from records of the New Hampshire Historical Society, exhibits the number of troops, Continental and militia, furnished by the thirteeen original States:

STATES.	Continentals or regulars.	Militia.
Massachusetts	67,907	15,155
Connecticut	31,939	7,792
Virginia	26,678	5,620
Pennsylvania	25,678	7,357
New York	17,781	3,304
Maryland	13,912	4,127
New Hampshire	12,497	2,093
New Jersey	10,726	6,055
North Carolina	7,263	(?)
South Carolina	6,417	(?)
Rhode Island	5,908	4,284
Georgia	2,679	(?)
Delaware	2,386	376
Totals	231,971	56,163

Under the Constitution, Congress has power to provide for the organization, equipment, and discipline of the militia, and for its government while in the service of the U. S.; and the States are prohibited from keeping troops in time of peace except under congressional consent; but the appointment of the officers and the authority for training the militia according to the discipline prescribed by Congress is expressly reserved to the respective States. Congressional enactments for maintaining a uniform system of militia throughout the Union require the enrollment in each State of all non-exempted able-bodied male citizens, resident, between the ages of eighteen and forty-five; establish the manner of organization; prescribe as the system for its discipline and field exercises that obtaining for the time being in the regular army; and provide for arms, pay, pensions, etc. Though the necessity of a *well-regulated* militia to the security of a free State is recognized in the Constitution, the arguments of statesmen and the logic of facts have alike failed to secure that attention demanded by the gravity of the subject. Since 1795 there has been no general revision of the system. The militia code is obsolete in many particulars, and in some of the States general enrollments are unknown, and in others the stated musters for exercise are mere burlesques upon military discipline. A judicious system would secure an effective military reserve of over 3,000,000 men; but as a matter of fact the only existing militia worthy of the name is found in the uniformed volunteer organizations maintained in many of the States as "National or State Guards," and these forces do not aggregate an effective force of over 50,000.

The President is commander-in-chief of the militia of the several States when called into the actual service of the U. S., and is empowered to call out these forces, by orders to such officers of the militia as he may choose to address, in event of invasion, actual or imminent, and in cases of insurrection or rebellion against the authority of the U. S. or any one of the States thereof; and he may continue the militia in service for a period not exceeding nine months. While so employed the troops receive the pay, rations, etc., of regular soldiers, are subject to the Rules and Articles of War, and their officers take precedence in rank next after officers of like grade in the regular service or in such volunteer organizations as may also be in the service of the U. S. The efficiency of this system was first tested in the war of 1812–15, in which some of the militia rendered most valuable service, particularly in defense of positions, but much embarrassment was caused to the national Government by pretensions in some of the States—1st, that the State executive could decide whether or not to furnish quotas called for; 2d, that the militia could not be sent out of the U. S., or even beyond its own State; and 3d, that it was exclusively under the command of its own officers, and subject only to the *personal* command of the President. These pretensions arose of course only in localities where the war was unpopular, but they have never been quieted by statute. The troops in the civil war demonstrated that citizens make thorough soldiers, but the lesson of that and all other modern wars has been that civilians are not so transformed by prestidigitation. The armies in the field at the close of the civil war were veteran troops, regulars in all but name; and the time that was required for the drill and discipline of militia and volunteer forces after pressing necessity for their immediate employment had arisen would all have been saved if these men could have been drawn from an efficient military reserve. The war of 1812 repeatedly exhibited the melancholy spectacle of large bodies of U. S. troops marching to the battle-field without understanding a single principle of elementary tactics; and the first draft of national militia (call of Apr. 15, 1861) in the civil war was practically worthless; before they could be fully organized and reasonably disciplined their terms of service began to expire, and their only actual service fittingly terminated in the disaster of the first Bull Run.

From the *Final Report of the Provost-Marshal-General United States Army* it appears that the total number of militia, volunteers, and drafted men received into the service of the U. S. during the civil war was 2,690,401; that there were actually 1,000,516 men in the field when hostilities ceased, of whom about 978,000 were volunteers or conscripts; and that the national enrollment exhibited, at the same time, an available reserve of 2,254,063 men. From the same authority is compiled the following exhibit of militia, called for and accepted as such, during the war:

STATES.	Call of Apr. 15, 1861, for 75,000 militia for three months' service.		Call of Aug. 4, 1862, for 300,000 militia for nine months' service.		Militia for 100 days, mustered into service between Apr. 23 and July 18, 1864.	
	Quota.	Men furnished.	Quota.	Men furnished.	Quota.	Men furnished.
Maine	780	771	9,609	7,620		
New Hampshire	780	779	5,053	1,736	.....	* 167
Vermont	780	782	4,898	4,781		
Massachusetts	1,560	3,736	19,080	16,685	4,000	6,809
Rhode Island	780	3,147	2,712	2,059		
Connecticut	780	2,402	7,145	5,602		
New York	13,280	13,906	59,705	1,781	12,000	5,640
New Jersey	3,123	3,123	10,478	10,787	.....	769
Pennsylvania	12,500	20,175	45,321	32,215	12,000	7,675
Delaware	780	775	1,720	1,799		
Maryland	3,123	.....	8,532	.....	.....	1,297
West Virginia	2,340	900	4,650			
Dist. of Columbia	.....	4,720	890			
Ohio	10,153	12,357	36,858	.....	30,000	36,254
Indiana	4,683	4,686	21,250	337	20,000	7,197
Illinois	4,683	4,820	26,148	.....	20,000	11,328
Michigan	780	781	11,686			
Wisconsin	780	817	11,904	958	5,000	2,134
Minnesota	780	930	2,681			
Iowa	780	968	10,570	.....	10,000	3,901
Missouri	3,123	10,591	17,269			
Kentucky	3,123	.....	14,905			
Kansas	.....	650	1,771	.....	.....	441
Tennessee	1,560					
Arkansas	780					
North Carolina	1,560					
Nebraska Territ'y	.....	.....	.....	1,228		
Totals	73,391	91,816	334,835	87,588	113,000	83,612

* Accepted for three months.

Revised by JAMES MERCUR.

Milk [O. Eng. *meolc*, *meoluc* : O. H. Germ. *miluh* (> Mod. Germ. *milch*) : Icel. *mjölk* : Goth. *miluks*; cf. Lat. *mul'gere* : Gr. ἀμέλγειν : Sanskr. √*marj*, stroke, rub]: the characteristic secretion of the mammary glands which supplies the natural nourishment for the young of all mammals. Under normal conditions it is an opaque, white liquid, often tinged with yellow or blue. It is heavier and more viscous than water, and, when fresh, has a faint, pleasant odor and an agreeable, sweetish taste. When first drawn it is nearly neutral, often giving the amphoteric reaction, i. e. it reacts acid with blue litmus and alkaline with red litmus; usually the acid reaction is most marked. Human milk is nearly always alkaline, and milk from carnivorous animals acid. In a short time milk becomes decidedly acid, owing to the conversion of milk-sugar into lactic acid. Milk when fresh is a mechanical mixture in the form of a thin emulsion of butter-fat and milk serum. All milks, from whatever source, have the same general properties and contain the same proximate principles, the only difference found between milks from different races of animals or from different individuals of the same race being caused by slight variations in the proportion of the several constituents.

Cows' milk, on account of its great importance as human food and because it has been more thoroughly studied than any other, will be considered as typical of all milks. It is white or yellowish white, the yellow tint being imparted by the butter-fat, as closely skimmed milk uniformly has a bluish-white, opalescent appearance. A highly colored milk is characteristic of some breeds of cows, especially the Guernsey, and to a somewhat less extent the Jersey, the intensity of the color varying considerably with individual animals of all breeds. The color is affected by the food and by the period of lactation, it being more marked when cows are in good pasture than when they are fed dry fodder, and higher in the earlier stages of lactation than toward the end. Its specific gravity ranges from about 1·028 to 1·038, according to the amount and character of the solids which it contains; the average is about 1·032.

Microscopic Appearance.—Under the microscope milk appears to be a transparent colorless liquid, in which are suspended an immense number of yellowish translucent globules having a high refractive power and a pearly luster. These globules, which constitute the fatty portion of the milk, vary greatly in size, the diameter ranging from about ·001 mm. for the smallest to about ·01 mm. for the largest; the average diameter is about ·004 mm. The number of globules varies from less than 1,000,000 to over 5,000,000 in a cubic millimeter of milk, from which it is estimated that a single drop of good milk will contain from 150,000,000 to 200,000,000. The number gradually increases, and at the same time the size diminishes, as the period of lactation advances, there being usually two to four times as many at the end of the lactation period as at the beginning. Breed characteristics are also marked, although individual variations are very great within the breeds. So far as the subject has been studied, the globules in Jersey and Guernsey milk have been found the largest and those in Ayrshire and Holstein milk the smallest. On account of the greater facility with which large fat globules separate from the serum, the size of the globules is an important factor in butter-making, especially when any system of gravity creaming is used; the difference, however, practically disappears when the centrifugal cream-separator is used.

It was formerly supposed that the fat globules were inclosed in a thin membrane, which is ruptured by churning, thus permitting the globules to adhere, forming granules of butter; this hypothesis was supported by the fact that ether fails to dissolve fat from fresh milk when the two are shaken together, but dissolves it readily if a little acid or alkali is first added to the milk, the explanation being that the membrane was destroyed by the acid or alkali, thus permitting the solvent to come in contact with the fat. As all of the phenomena indicating a membrane may be duplicated in artificial emulsions where no membrane can exist, and as the globules in milk may be divided by agitation at temperatures above the melting-point of the fat without changing their appearance or properties, it is fair to assume that milk is a simple emulsion and that the globules of fat are free, being prevented from running together or being dissolved by the surface tension of the liquid around them.

Yield of Milk.—The yield of milk depends chiefly upon the individual characteristics and the breed of the animal, and is influenced by age of cow, period of lactation, and food. The average yield of dairy animals throughout the U. S., including all breeds and all conditions of treatment, is between 3,000 and 4,000 lb. per year. The Holsteins lead all other breeds in quantity of milk produced. *The Advanced Registry* contains names of a number of animals that have records of over 20,000 lb. per year, and one cow is reported to have produced 30,318½ lb. in 365 days, an average for the whole year of over 83 lb. per day; her maximum yield was 112 lb. 7 oz. in one day. This cow weighed 1,365 lb.; the average weight of milk would therefore equal her own weight every 16½ days. The Ayrshires are also heavy milkers, but are not so remarkable in this respect as the Holsteins. With proper care the yield of milk increases as the cow grows older, until seven or eight years old, when a maximum is reached. The greatest flow is usually obtained within a few weeks after calving, and then gradually diminishes until the end of lactation. A generous ration rich in albuminoids is conducive to a large milk yield.

Products of Milk.—For cream, butter, cheese, etc., see Butter and Cheese.

Chemical Constituents of Cows' Milk.

In most analyses of milk only two direct determinations are made, viz., the total solids, obtained by evaporating the water and drying the residue at 100° C. to constant weight, and the fat, which is that portion of the total solids that is soluble in anhydrous ether. More complete analyses show that both the fat and the solids not fat are mixtures of several compounds having widely different properties.

Butter-fat is a mixture of several neutral fats or glycerides (glycerol salts or ethers of fatty acids). Nine fatty acids have already been obtained by the saponification of butter-fat, and it is likely that still others will be found when better methods for separating the insoluble acids have been devised. The acids found in butter, in combination with glycerol, are, according to Kirchner, oleic, palmitic, stearic, butyric, caproic, caprylic, capric, myristic, and butic. The first five mentioned are the most important, and are the only ones which will be considered in this place, as only minute quantities of the others are found in butter. The glycerin compounds of these acids are

Olein, $C_3H_5(C_{16}H_{31}O_2)_3$, a constituent of all animal and vegetable fats. When pure, it is nearly colorless and liquid at temperatures above the freezing-point. It yields 95·7 per cent. of oleic acid.

Palmitin, $C_3H_5(C_{16}H_{31}O_2)_3$, occurs in many animal and vegetable fats. It is a white solid, melting at 62·8° C.; it yields 95·28 per cent. of palmitic acid.

Stearin, $C_3H_5(C_{18}H_{35}O_2)_3$, is found in all solid animal fats. It is a white solid, melting at 55° C.; it yields 95·73 per cent. of stearic acid.

Butyrin, $C_3H_5(C_4H_7O_2)_3$, is a heavy oily liquid, having a rancid odor and a disagreeable taste. It yields 97·4 per cent. of butyric acid.

Caproin, $C_3H_5(C_6H_{11}O_2)_3$, is a colorless liquid, with properties similar to butyrin. It yields 90·1 per cent. caproic acid.

Oleic, palmitic, and stearic acids derived from the corresponding glycerides are insoluble in water, and are not volatile; they comprise about 87·5 per cent. of the butter-fat. The proportion of each has not been accurately determined. Butyric and caproic acid are soluble in water and volatile; they comprise about 7 per cent. of the butter-fat.

All of the fats used in the adulteration of butter are composed of olein, stearin, and palmitin, glycerides which yield upon saponification fatty acids which are insoluble and not volatile. The estimation of the soluble and volatile acids is therefore the best means of detecting spurious butters.

The specific gravity of butter-fat at 15° C. is, according to Fleischmann, ·93 when referred to water at 4° C.; its melting-point ranges, according to the amount of liquid and solid glycerides, from 29° C. to 41° C., with an average of about 33° C. The properties of butter-fat, viz., color, specific gravity, melting-point, and amount of volatile acids, are to a considerable extent dependent upon the breed of cow, the character of the ration, and the period of lactation.

The solids not fat in milk consist of protein matter (casein and albumen), milk-sugar, and salts (ash), with minute quantities of other organic compounds (galactin, lactoglobulin, urea, creatin, fibrin, cholesterin, and citric acid). The solution of the solids not fat in water constitutes the milk serum.

The Nitrogenous Portions of Milk.—(1) *Casein*: Under normal conditions casein is the most abundant protein body found in milk, to which it is peculiar, as it has not with

certainty been identified anywhere else. It differs from other albuminoids in containing phosphorus, and in being precipitated by rennet. Its composition, according to Hammarsten, is as follows: Carbon 53, hydrogen 7, nitrogen 15·7, sulphur 0·8, phosphorus 0·85, and oxygen 22·65 per cent. Little is known concerning its molecular structure. Its solutions turn the plane of polarized light to the left. When dry it is a white solid, very slightly soluble in pure water or in solutions of neutral salts—readily soluble in water made slightly alkaline, the solution being neutral or slightly acid, also soluble in water to which carbonate of lime is added, the carbonic acid being liberated. If the solution in lime-water be carefully neutralized with dilute phosphoric acid, neither the casein nor the phosphate of lime, which is present in considerable quantity, appears to be precipitated. This solution has the opalescent appearance of closely skimmed milk; it is therefore probable that the white color of milk is to some extent due to the casein and phosphate of lime which it contains. It is questionable if in these cases, or in milk, the casein is in perfect solution; it seems more probable that it is diffused through the liquid in the form of a thin jelly. It is, however, to all practical purposes, a complete solution, and will be so considered in this article.

Casein solutions are not coagulated by boiling, although the surface becomes covered with a tough skin, which is renewed when removed. It is precipitated unchanged by saturating its solutions with sodium chloride or magnesium sulphate. It is precipitated from neutral solutions by all mineral acids, the precipitate being again dissolved when an excess of acid is added. The coagulation (souring) of milk when it is left undisturbed for a few hours is caused by the formation of lactic acid from the milk-sugar by the growth of the lactic ferment. The most characteristic property of casein, which distinguishes it from all other albuminoids, is that utilized in the manufacture of cheese, viz., its coagulation by rennet. This reaction occurs only in solutions containing salts of lime and at temperatures between 15° C. and 60° C. Casein and alkaline albuminate have many properties in common, but their identity has not been fully established. Normal milk contains about 3 per cent. of casein, the range in individual cases being from about 2 to 4 per cent. We are indebted for most of our knowledge concerning the properties of casein to the researches of Schmidt, Soxhlet, and Hammarsten.

(2) *Albumen* is found in all milk. Its properties are similar to the albumen of eggs and that of the blood serum. It is soluble in water. It is not precipitated from its solution by dilute acids and not by rennet. When warmed to 70°–75° C., it is coagulated. Normal milk contains an average of about 0·6 per cent. of albumen. Colostrum milk, on the other hand, contains a much higher percentage, the amount sometimes reaching 20 per cent.

(3) *Lactoglobulin* was discovered independently in cows' milk by Sebelien and Emmerling at about the same time. Only small quantities of it occur in normal milk, usually not over 1 milligramme per liter, but in colostrum milk several per cent. have been found. It may be separated from whey by carefully adding sodium hydrate to neutral reaction and then saturating with magnesium sulphate. Its solutions are coagulated by heating to 67°–76° C. It is similar to, but not generally considered identical with, the paraglobulin of blood.

(4) *Galactin*, or lactoprotein, belongs to the group of peptones, and occurs even in fresh milk, which on the average contains about 0·1 per cent. It is not precipitated by boiling, nor by acids, but is precipitated by mercuric nitrate, alcohol, tannin, and other reagents, which precipitate peptones.

(5) *Fibrin.*—The presence in milk of a small quantity of a nitrogenous principle having similar properties to blood fibrin was first mentioned by Babcock. The evidence upon which his conclusions are based may be thus summarized: First. The peculiar grouping of the fat globules of milk after it is drawn, which is analogous to the grouping of the blood corpuscles of blood, both of which phenomena are prevented by the addition of substances which interfere with the coagulation of fibrin. Second. The decomposition of hydrogen peroxide by milk, which reaction, although much less marked than with blood fibrin, is of the same nature, in that it is prevented by first heating the milk to boiling. This reaction may be modified by applying tincture of guiacum and hydrogen peroxide to a filter-paper that has been moistened with fresh milk and then dried at ordinary temperatures; the paper will be colored faintly blue wherever any clots of fibrin occur. Clots of fibrin are heavier than the milk serum, and, as they usually contain globules of fat, offer considerable resistance to creaming. The inclosed fat globules are usually sufficient to float the small clots which accumulate in the cream, and cause this to give a stronger reaction for fibrin than the skim milk or even the whole milk from which it is derived. When a centrifugal cream-separator is used, the fibrin clots are mostly collected upon the sides of the bowl, and form a large proportion of the slime found in the separator-bowl after it has been used. This slime often give nearly as strong reaction for fibrin as blood.

In consequence of the resistance which fibrin clots offer to creaming, any condition which prevents their formation should facilitate the separation of cream, and such appears to be the case so long as the means employed does not at the same time tend to separate the casein or other constituents of the milk. For instance, the addition of small quantities of caustic soda or potash to milk gives a very rapid and efficient creaming. The rapid cooling of the milk directly after it is drawn delays the coagulation of the fibrin and facilitates creaming. Close creaming by the deep-setting system is best explained by this fact.

Normal milk appears to contain about one-thousandth as much fibrin as blood, or on the average about ·0003 per cent. This amount, small as it is, on account of its great tendency to coagulate and adhere to the sides of the creaming vessel, may materially affect the practical work in the creamery. When the quantity is much increased, spontaneous coagulation of the milk takes place without the development of acid. The examination of a few milks which coagulated in this way showed in every case that the amount of fibrin was abnormal, at least so far as this is indicated by the decomposition of hydrogen peroxide.

(6) *Creatin and urea*, substances belonging to the amide group, have been separated from milk; but they never occur except in minute quantities, and have no influence upon the quality of the milk.

Milk-sugar, lactose, lactin ($C_{12}H_{22}O_{11} + H_2O$), is a peculiar carbohydrate found in all milks, and in no other animal secretion. According to Bouchardt it also occurs in the ripe fruits of *Achras sapota*. When pure it is a white solid, crystallizing in the rhombic system with one molecule of water, which it gives up slowly at 100° C.; it is easily and completely removed at 130°–140° C.; at 170°–180° C. it loses the element of water, being changed into lactocaramel, a brown amorphous solid. The dry crystals are hard and gritty between the teeth, and have only a slightly sweet taste. It is soluble in 6 parts of cold water and in 2·5 parts of boiling water; it is insoluble in absolute alcohol and in ether. With pure yeast it does not undergo the alcoholic fermentation, but by the action of certain micro-organisms the sugar is so changed that the alcoholic fermentation takes place. Upon this depends the production of *koumiss*. It readily undergoes the lactic fermentation, being changed into lactic acid, and to this is due the ordinary phenomenon of the souring of milk. Milk-sugar is usually manufactured from whey, a waste product obtained in the manufacture of cheese, by evaporation and crystallization. It is used in infant and invalid foods, as well as in pharmaceutical preparations.

Citric Acid.—One of the most interesting discoveries connected with the composition of milk is that it contains a small amount of citric acid. Soxhlet first called attention to the fact that the amount of lime dissolved in milk could only be explained by the presence in milk of an organic acid. Later Henkel, in Soxhlet's laboratory, succeeded in separating citric acid from milk, and showed that it was a normal constituent of all milks. This acid is the same as that in lemons. On the average about 0·1 per cent. of it is contained in milk, so that the milk of a good cow would contain each day more citric acid than a large lemon. This acid is in combination with the ash constituents, otherwise it would render the milk distinctly acid, and probably cause the coagulation of the caseine. The quantity in milk appears to be independent of the nature of the ration.

The Ash—Mineral Constituents.—The mineral constituents of milk are: Potassium oxide, K_2O; sodium oxide, Na_2O; calcium oxide, CaO; magnesium oxide, MgO; ferric oxide, Fe_2O_3; phosphoric pentoxide, P_2O_5; sulphur trioxide, SO_3; and chlorin, Cl.

The metallic oxides are mostly combined with phosphoric acid and Cl, but as these are not sufficient to neutralize the alkalis, the remainder must be united with organic acids.

The SO_3 and a portion of the P_2O_5 in the ash are derived from organic compounds in the milk. The ash amounts to about 0·7 per cent. of the milk.

The total solids in cows' milk vary from 11·64 per cent. to 19·34 per cent., averaging about 13 per cent.

In the graphic table given below are grouped together all of the constituents mentioned, in proportions which represent approximately the average composition of cows' milk. Moreover, as the same constituents enter into all milk, it is typical for milk in general. It is safe to say that milk is uniformly poor. Other breeds have their characteristics more or less pronounced, and there are in all breeds certain families noted either for the quantity or quality of their milk production.

The table in the preceding paragraph gives the averages of analyses of milks from different types of cows. The analyses are taken from Koenig's tables, and represent the average of hundreds of cows in each class mentioned.

The analyses made during the ten years ending 1889 at the milking trials of the British Dairy Farmers' Association

TABLE SHOWING THE COMPOSITION OF MILK.

Milk	100	Butter-fat	3·6	Olein, Palmitin, Stearin, Myrestin, Butin, trace	Glycerides of insoluble and non-volatile acids.	3·3	Fat 3·6	Total solids 12·7
				Butyrin, Capronin, Caprylin, trace, Caprinin, trace	Glycerides of soluble and volatile acids.	0·3		
		Milk serum	96·4	Casein	3·00	Containing nitrogen 3·8	Solids not fat 9·1	
				Albumen	0·60			
				Lactoglobulin, Galactin	0·20			
				Fibrin, trace				
				Milk-sugar		4·5		
				Citric acid		0·1		
				Potassium oxide	0·175	Ash 0·7		
				Sodium oxide	0·070			
				Calcium oxide	0·140			
				Magnesium oxide	0·017			
				Iron oxide	0·001			
				Sulphuric anhydric	0·027			
				Phosphoric anhydric	0·170			
				Chlorin	0·100			
				Water				87·3
								100·0

the individual variations in the composition of cows' milk show wider differences than is found between the average composition of milks from different races of animals.

The Proportion of Milk-constituents.

The average composition of normal cows' milk derived from nearly 800 analyses collected by Koenig from all parts of the world, including milk from all breeds of cows kept under a great variety of conditions, is as follows:

COMPONENT PARTS.	Mean.	Maximum.	Minimum.
Specific gravity	1·0315	1·0370	1·0264
Water	87·17	90·69	80·32
Fat	3·69	6·47	1·67
Casein	3·02	4·23	1·79
Albumen	0·53	1·44	0·25
Sugar	4·88	6·03	2·11
Ash	0·71	1·21	0·35
Total solids	12·83	19·78	9·31
Solids not fat	9·14		

The circumstances which contribute to the wide variations shown will be considered under the following heads:

1. *Individuality and Race.*—In almost every herd of dairy cows will be found some animals which give poor milk, measured by the amount of fat which it contains, and others which give milk much richer than the average; so persistent are these traits under all natural conditions that the individual tendency of the animal is recognized as the most important factor which contributes to the quality of milk produced. These peculiarities may be intensified and, to a certain extent, established by careful breeding through several generations, until they become family or breed characteristics which, within certain limits, may be depended upon. In this way the Channel island cattle

Analyses of Milks from Different Breeds.

PARTS, ETC.	Channel island cattle (Guernsey and Jersey).	Shorthorn.	Dutch cattle, Holstein-Fries., Oldenburg, etc.	Ayrshire.
Water	85·70	87·20	87·85	86·93
Fat	4·65	3·45	3·42	3·58
Casein	3·66	3·21	3·40	3·42
Sugar	5·05	5·45	4·61	5·43
Ash	0·94	0·69	0·72	0·64
Total solids	14·30	12·80	12·15	13·07
Solids not fat	9·65	9·35	8·73	9·49
Number of analyses	47	63	73	41

(Jerseys and Guernseys), noted for the uniformly rich milk which they produce, have been developed. On the other hand, the Holstein cattle bred through many generations toward quantity of milk with little regard to its quality, have come to be the greatest milk-producers, although the

give the following averages for yield and composition of milk from different breeds (*Agr. Gazette*, Nov. 18, 1889):

BREED.	Number of cows.	Yield of milk per day, lb.	Per cent. of solids.	Per cent. of fat.	Per cent. of solids not fat.
Shorthorns	119	43·13	12·87	3·73	9·14
Shorthorns	31	45·80	12·89	3·81	9·08
Jerseys	118	27·87	14·36	4·56	9·80
Jerseys	43	28·41	14·94	5·47	9·47
Guernseys	49	28·30	14·00	4·77	9·23
Guernseys	14	31·15	14·46	5·03	9·43
Dutch	7	43·31	12·11	3·26	8·85
Ayrshires	13	34·26	13·43	4·15	9·28
Devons	2	30·12	14·34	4·90	9·44
Red polled	3	43·10	12·72	3·60	9·12
Welsh	1	46·00	12·74	4·16	8·58
Kerrys	3	23·50	14·22	4·40	9·82
Crosses	26	39·12	12·91	3·69	9·32

The averages for these breeds in 1888 and 1889 show a marked improvement in the general quality of dairy cattle, due to intelligent breeding and selection. The possibilities in this direction are still further shown in the figures below, which are the averages for the prize winners in the same show in 1892 (*London Live Stock Journal*, Oct. 21, 1892):

BREED.	Number of cows.	Yield per day, lb.	Per cent. of solids.	Per cent. of fat.	Per cent. of solids not fat.
Shorthorn	3	59·4	12·90	3·72	9·18
Jersey	3	29·6	15·49	6·18	9·31
Guernsey	2	38·5	14·31	5·41	8·90
Ayrshire	2	40·5	13·64	4·22	9·42
Kerrys and Dexters	3	30·3	13·39	4·40	8·99
Dutch	1	61·8	12·85	3·86	8·99
Polled Aberdeen	1	60·3	13·74	4·99	8·75

The individual variations within each breed are very wide, so that it by no means follows that a cow will give rich milk because she is a Jersey or a Guernsey, or poor milk because she is a Holstein or an Ayrshire. Even in the above trial from selected cows the range in quality is large. Each of the 3 shorthorn cows entered gave practically the same amount of milk, still the per cent. of fat in their milk ranged from 2·91 to 4·30; the 3 Jerseys, with a difference of less than 1½ lb. of milk per day, had a difference in per cent. of fat from 5·20 to 7·84; and the milk from the 3 Kerry cows varied from 3·70 to 5·11 per cent. of fat. The individual variation within the breeds is much greater than is found between these animals, selected as they have been for this trial on account of their superiority either in yield or quality of milk. As a rule, phenomenally rich milk is not given by those cows or breeds that are noted for their large yields. Very few analyses of cows' milk are recorded that have

shown more than 10 per cent. of fat, and in nearly all cases where this has occurred the cows have either been sick or were at the time giving very small quantities of milk. So far as known, there is no case on record of a cow giving as much as 15 lb. of milk per day that contained over 9 per cent. of fat. A number of butter records have been reported that would require from 15 to 25 per cent. of fat in the milk yielded during the trial, provided the butter was of standard quality; but no such record is accompanied by analyses of either the butter produced or of the milk from which it was made.

2. *Period of Lactation.*—The time after calving during which a cow continues to give milk without going dry is known as the period of lactation. Occasionally cows are met with that give milk continuously from one calving to the next, but such cases are not common. Usually cows go dry from four to eight weeks before calving. Cows which have been spayed or that are farrow often give milk for years continuously. An average period of lactation is about 300 days. Cows generally yield the maximum quantity of milk soon after calving, the amount diminishing with more or less regularity from this time until the flow ceases, or becomes too small to be obtained with profit. As this period advances, the composition of the milk gradually changes. As a rule, both the fat and the solids not fat increase slightly, but many cases are found where one or both of these constituents diminish. The following table, compiled from tests given in the *Tenth Annual Report* of the New York agricultural experiment station for 1891, shows the nature of these changes. There were fourteen animals experimented upon, the breeds represented being Holstein, Ayrshire, Jersey, Guernsey, American Holderness, and Devon. The first month represents the time from calving to the first day of the following month, and is of course much affected by the nearness to calving. The table shows the general averages for the breeds for the first ten months of lactation. Under the heading casein is included the total nitrogenous matter of the milk:

MONTH OF LACTATION.	Yield of milk, lb.	Total solids, per cent.	Fat, per cent.	Casein, per cent.	Sugar, per cent.	Ash, per cent.	Solids not fat, per cent.
1.....	245·0	14·09	4·86	3·53	5·00	0·69	9·23
2.....	587·3	13·13	4·13	3·05	5·20	0·72	9·00
3.....	586·7	13·04	4·07	3·23	5·01	0·71	8·97
4.....	547·9	13·36	4·22	3·42	5·06	0·70	9·14
5.....	538·7	13·56	4·23	3·32	5·29	0·70	9·33
6.....	503·3	13·90	4·35	3·61	5·24	0·73	9·55
7.....	510·4	14·08	4·39	3·51	5·42	0·74	9·69
8.....	471·2	14·00	4·39	3·51	5·35	0·74	9·61
9.....	470·4	14·17	4·51	3·80	5·13	0·71	9·66
10.....	418·6	14·41	4·46	3·81	5·39	0·73	9·95

3. *The Milking.*—The first portion of milk drawn at any milking contains much less fat than the last portion, the difference being sometimes as much as 10 per cent.; but otherwise there is very little variation from the beginning to the end of the milking. The following analyses of the first and last half-pints from the same milking illustrate this point:

MILKINGS AND STRIPPINGS.	COMPOSITION OF MILK.			COMPOSITION OF MILK SERUM.	
	Water.	Solids.	Fat.	Water.	Solids.
First milk.....	88·17	11·83	1·32	89·35	10·65
Strippings.....	80·82	19·18	9·63	89·43	10·57
First milk.....	88·73	11·27	1·07	89·69	10·31
Strippings.....	80·37	19·63	10·36	89·66	10·34
Average for first milking.	.....	.....	.....	89·52	10·48
Average for strippings...	.....	.....	.....	89·55	10·45

The interval between milkings also appears to have considerable influence, the milking which follows a short interval usually being richer in fat than that obtained after a long interval. As a rule, three milkings per day not only result in a larger yield of milk than two milkings, but in milk richer in fat.

The manner in which the milking is done has a decided influence upon the per cent. of fat. Some milkers always obtain richer milk than others from the same cow. In a trial at the Wisconsin agricultural experiment station between two milkers with 4 cows, the test continuing for several days, the average per day for each milker was for A, 72·3 lb. milk with 4·20 per cent. of fat; for B, 80 lb. of milk with 4.68 per cent. fat. There was not a single change that was not in favor of B. When a cow was milked fast and slow by the same milker, the fast milking in every case gave the richer milk, the difference in some cases being over 1 per cent. of fat; an average of tests continuing over several days with 6 cows being per day for the fast milking 169 lb. milk with 4·63 per cent. fat; for the slow milking, 165·4 lb. milk with 4·23 per cent. fat. When cows were milked in an unusual manner, the milk obtained was much poorer than the average. A cow which gave milk testing on the average about 5 per cent. of fat, gave, at four successive milkings when milked one teat at a time, milk which tested 2·9, 5·00, 4·06, and 3·78 per cent. of fat. Another cow tested in the same way gave, when milked two teats at a time, milk testing 4 per cent. fat, when milked one teat at a time 2·7 per cent. fat. The greater the departure from the usual method of milking the poorer was the milk obtained. When milking-tubes were used, the milk obtained tested only 2·92 per cent. fat, while hand-milking of the same cows gave milk testing 4·72, the test being with 6 different cows and continued with 3 of them over a period of 7 days. The greatest difference with any cow was 1·93 per cent. fat when milked with tubes and 5·47 per cent. fat when milked by hand. These observations seem to indicate that the elaboration of the milk is more active at the time of milking than at other times, and that it depends to a considerable extent upon the nervous condition of the animal. The best results are always obtained by regularity and kindness.

4. *Food.*—There is a common notion that the kind of food fed has a marked influence upon the per cent. of fat in the milk produced. The results, however, in careful trials, at numerous experiment stations in the U. S. and in Europe, indicate that no rule that will apply to all cows can be stated, as it has been found that some animals respond favorably to one ration and others to another. The only point upon which all agree is that a generous ration made up of such feedstuffs as are relished by the animal is most conducive to good results. Among those feeds which have the reputation of increasing the fat in milk may be mentioned palm-nut meal, cocoanut-meal, sugar-meal, and corn-germs; the first two are not used to any extent as feeds in the U. S., the sugar-meal is a waste product from the manufacture of starch and glucose from corn, and the corn-germs a waste product from the hominy-factories. Foods rich in fat have no tendency toward increasing the fat in milk. The following rations are typical of the best dairy practice in the U. S. The amounts are for cows of 1,000 lb. weight in full milk: (*a*) Pasture with 5 to 8 lb. of a mixture of equal parts of corn-meal and wheat-bran. (*b*) Hay (mixed clover and timothy), 20 lb.; wheat-bran, 6 lb.; oat-straw, 6 lb. (*c*) Corn silage, 40 lb.; clover-hay, 8 lb.; wheat-bran, 6 lb.; corn-meal, 3 lb. (*d*) Clover-hay, 12 lb.; oat straw, 8 lb.; corn-meal, 6 lb.; wheat-bran, 3 lb.; cotton or linseed meal, 2 lb.

Colostrum is the milk secreted for a short time after parturition. It has a yellow color, is much more viscous than normal milk, has a salty taste, a peculiar odor, and generally a slightly acid reaction. Owing to the large amount of solids which it contains, its specific gravity is high, rarely falling below 1·040, and in extreme cases reaching 1·080. Under the microscope there are shown, in addition to the globules of fat, numerous granular bodies of variable shape, ·005–·025 mm. in diameter, containing minute globules of fat. These bodies, which are peculiar to colostrum milk, are known as "colostrum cells"; they have been generally supposed to be cast off epithelium cells from the udder, but more recently are considered to be white blood-corpuscles that have undergone fatty degeneration. These cells rapidly diminish in number from the first milking, and usually disappear within three or four days. The composition of colostrum is very variable, no two samples being alike. Its most marked peculiarity is the high per cent. of albumen, this being from ten to thirty times as large as in normal milk; the casein and ash are also high, while the sugar and fat are usually low. The following analyses by Engline illustrate this fact:

CONSTITUENTS OF COLOSTRUM.	First milking after calving.	Fifth day after calving.
Specific gravity.....	1·071	1·033
Total solids.....	27·70	13·15
Fat.....	3·11	3·94
Casein.....	5·20	2·86
Albumen and globulin	15·50	1·12
Sugar.....	1·85	4·55
Ash.....	2·04	0·68

The average composition of the first milking as given by Koenig is:

Water	74·05 per cent.
Total solids	25·95 "
Casein	4·66 "
Albumen	13·62 "
Fat	3·43 "
Sugar	2·66 "
Ash	1·58 "

Other Milks.—*Human milk* differs from cows' milk chiefly in containing less protein matter and more sugar. It is whiter than cows' milk, and usually has an alkaline reaction when fresh. The curd formed by the addition of rennet or acids is not as firm as that from cows' milk. Its average composition, as derived from over 100 analyses compiled by Koenig, is—water, 87·41 per cent.; casein, 1·03 per cent.; albumen, 1·26 per cent.; fat, 3·78 per cent.; milk-sugar, 6·21 per cent.; ash, 0·31 per cent.

Mares' milk is poor in fat and protein, and rich in sugar. *Asses' milk* is very similar in general composition to human milk, and where obtainable is used in preference to cows' milk for infants. *Sheep's milk* is very rich in fat and other solids; it is used quite extensively in some parts of Europe for the manufacture of cheese of high grade. *Goats' milk* is very similar to cows' milk, but contains on the average a little more protein and fat. The average composition of these milks, according to Koenig, is:

VARIETIES.	Water.	Casein.	Albumen.	Fat.	Milk-sugar.	Ash.
Mares' milk	90·78	1·24	0·75	1·21	5·67	0·35
Asses' milk	89·64	0·67	1·55	1·64	5·99	0·51
Sheep's milk	80·82	4·97	1·55	6·86	4·91	0·89
Goats' milk	85·71	3·20	1·09	4·78	4·46	0·76

Preservation of Milk.

Nearly all the changes in milk which cause it to become unsuitable for food are caused by the growth of micro-organisms, the germs of which are introduced into the milk after it is drawn. These germs fall into the milk from the udder and the skin of the animal during milking, and from the air, which always contains immense numbers of them, especially in stables where the milking is done, or are deposited upon the vessels in which the milk is handled. Scrupulous cleanliness may reduce their number, but even with the greatest care it is impossible to exclude them entirely from the milk used for domestic purposes. These germs multiply rapidly in milk, and within a few hours or at most within a few days, according to the conditions under which it is kept, the original properties of milk become entirely changed. The most common change is that known as souring, manifested by an acid taste and coagulation of the casein. There are several kinds of organisms that produce this change, which consists in the transformation of the milk-sugar into lactic acid. Only a portion of the sugar is changed in this way, as the development of the organisms is hindered by the acid formed, and ceases entirely when the acid amounts to about 1 per cent. Other organisms produce different changes, such as slimy, ropy, and bitter milk, as well as numerous taints. As it is impossible to exclude germs from milk, it is necessary, in order to preserve it unchanged for even a few hours, either to provide conditions which are unfavorable to the growth of organisms or to destroy them before the milk has become unsuitable for food. Nearly if not all of these organisms grow most rapidly at temperatures between 30° and 40° C. (86°–104° F.), decreasing rapidly as the temperature falls and ceasing at the freezing-point; at temperatures below 4° C. (40° F.) there is very little change. This suggests that the most practical way of keeping milk from day to day, or where fresh supplies can not be obtained at frequent intervals, is to cool it to as near the freezing-point as possible.

Antiseptics.—Certain mild antiseptics, among which may be mentioned boracic acid, borax, and salicylic acid, have been recommended, and to a considerable extent used, for the preservation of milk for domestic purposes. All such substances interfere more or less with the action of the digestive organs, and usually aggravate diseases of the kidneys; their use is not to be recommended, and under no circumstances should milk preserved in this way be used as food for infants or invalids. The use of the antiseptics mentioned has been prohibited in France and Germany and very generally condemned by boards of health everywhere.

Sterilized or Pasteurized Milk.—A large demand has grown up in cities for milk that has been heated in closed vessels to temperatures ranging from 65° to 80° C. for a sufficient time to kill the organisms contained in it; the best results are obtained when the milk is reheated twenty-four to forty-eight hours after the first heating, the jars being kept closed. Such milk will keep without undergoing the usual fermentations to which milk is subject so long as the cans containing it are kept closed and access of germs prevented; it will, however, soon sour after the cans are opened. The flavor of milk prepared in this way is slightly different from fresh milk, but is not objectionable; its use for invalid and infant food is rapidly increasing. The greatest objection made to it is that the cream which separates is not readily mingled again with the whole mass, especially if the cans have been kept in one position for a considerable time.

Condensed milk is prepared by evaporating milk at low temperatures *in vacuo* to about one-third of its original volume. Most of the manufacturers add a considerable quantity of cane-sugar to the milk after it is condensed. Inclosed in air-tight cans, it may be kept indefinitely and transported to all parts of the world. Diluted with about two parts of water, it is the best substitute for fresh milk. The following analyses, compiled by Dr. Koenig, show its average composition:

CONSTITUENTS OF CONDENSED MILK.	Mean of 36 analyses.	Milks to which sugar was added, mean of 64 analyses.
Water	58·99	25·61
Protein	11·92	11·79
Fat	12·42	10·35
Milk-sugar	14·49	13·84
Cane-sugar	.....	36·22
Ash	2·18	2·19

The Use of Pure Cultures.—The aroma of butter and the characteristic flavors of the different varieties of cheese are now quite generally recognized as being due to changes in the constituents of milk brought about by the action of certain species of bacteria. It is therefore important that milk and cream for dairy purposes be kept under conditions favorable to the growth of bacteria which contribute to the best results. Very successful experiments in butter-making have been made by introducing pure cultures of these bacteria into the cream and allowing them to develop before churning. In Denmark some large creameries have been operated upon the plan of first sterilizing the cream by heat and then introducing the desired culture. Butter of superior quality is being made in this way. Little has yet been done with pure cultures in the manufacture of cheese, but undoubtedly the most promising field for improvement lies in this direction.

Methods of Analysis.

The estimation of the fat and the total solids is sufficient to show the value of milk for technical purposes and to detect the usual adulterations. More detailed analyses comprise the estimation of the casein, albumen, milk sugar, and ash. The other constituents mentioned on previous pages are rarely determined, as, so far as is at present known, they play no important *rôle* in the dairy industry.

Estimation of Total Solids.—The simplest method of making this determination consists in evaporating upon a water-bath from 2–3 grammes of milk, in a flat-bottomed platinum or nickel dish 5 cm. in diameter, that has been previously weighed, and drying the residue at 100° C. until of constant weight. A little ignited asbestos placed in the dish before weighing absorbs the milk and greatly facilitates the drying by exposing a larger surface. Clean, ignited sand has been extensively used instead of asbestos for this purpose, but the latter is to be preferred. The weight of the dry residue represents the total solids in the amount of milk taken.

Estimation of Fat.—The principle involved in all of the gravimetric methods is to extract the fat from the dried residue with anhydrous ether, and after evaporating the ether in a tared dish to weigh the residual fat. Many methods of accomplishing this have been devised. That in use at the Wisconsin agricultural experiment station, which admits of the use of the same sample of milk for the estimation of both solids and fats, is as follows: A hollow cylinder 2 inches long and $\frac{3}{4}$ inch in diameter, made from finely perforated sheet copper or tin (if of copper, it should be plated with nickel or silver to prevent oxidation), is nearly filled with ignited asbestos and weighed. From 2 to 5

grammes of milk are run on to the asbestos, which quickly absorbs it. The cylinder is then dried at 100° C. until of constant weight. The difference between the first and second weight gives the total solids. When dry the cylinder is placed in a continuous extraction apparatus, and the fat extracted with ether, which, being received in a weighed flask, is dried and weighed. The Adams method, quite generally adopted by English chemists, consists in absorbing the milk upon coils of fat-free filter-paper, which, after being dried, are extracted with ether as described above.

Besides the gravimetric method for the estimation of fat, several others based upon different principles have been quite extensively used. Among these may be mentioned Soxhlet's areometric method, which depends upon the specific gravity of the ether solution, which separates when definite quantities of milk, caustic potash, and ether are mixed together. The method is accurate, and has been very extensively used in Europe. Feser's lactoscope and the pioscope depend upon the optical properties of milk. They are very simple of manipulation, but can not be depended upon for accurate work.

Since 1888 a number of simple volumetric methods designed for dairymen and others not versed in chemical manipulation have been introduced. The most prominent of these, which give accurate results, are Short's, Patrick's, the Leffman, and Beam and Babcock's methods. The latter is extensively used by dairymen for testing the value of their cows, and is being very generally introduced in creameries and cheese-factories throughout the U. S. for the purpose of making dividends upon the "relative value plan." This method is described as follows:

Apparatus.—The test-bottles (Fig. 1) for this test should contain not less than 40 cubic cm. up to the neck. The graduated neck should be about 10 cm. long and 5 or 6 mm. in diameter; the graduated portion should contain 2 cubic cm. and be divided into 50 equal parts, each of which represents ·2 per cent. of fat when 18 grammes of milk are taken for the test. The pipette for measuring milk (Fig. 2) has a mark at 17·6 cubic cm., and will deliver approximately 18 grammes of average milk. The acid graduate (Fig. 3) has a single mark at 17·5 cubic cm. The centrifugal machine for whirling the bottles should be so arranged that the drum carrying the bottles will make from 700 to 1,000 revolutions per minute. The diameter of this drum should not be less than 15 inches and need not exceed 20 inches. Commercial sulphuric acid having a specific gravity of 1·82 to 1·83 is required for the test.

Fig. 1.

Fig. 2.

Fig. 3.

Making the Test.—The milk is first carefully mixed by pouring from one vessel to another, and the proper amount is measured into the test-bottle with the 17·6 cubic cm. pipette, and 17·5 cubic cm. of H_2SO_4 added from the acid measure. The bottle is then shaken until the contents are thoroughly mixed; considerable heat is evolved, the contents being changed to a dark-coffee color. While still hot the test-bottles are placed in the centrifugal machine and whirled for four or five minutes, when the fat is found in a clear layer resting upon a dark liquid. Sufficient hot water is then poured into the bottles to fill them to about the 7 per cent. mark, after which they are whirled again for about a minute, when the reading can be taken. The method is applicable to the estimation of fat in cream, skim-milk, buttermilk, and in cheese.

Estimation of Casein and Albumen.—These are usually determined together by multiplying the nitrogen by 6·25. The nitrogen is most easily determined by the Kjeldahl method.

Sugar may be determined after precipitating the casein and albumen by titration with Fehling's solution, or more quickly with the polariscope. When the other constituents are determined the sugar may be found by difference with sufficient accuracy for most purposes.

Ash.—From 5 to 10 grammes are dried in a platinum or porcelain dish and the residue burned in a muffle-furnace at low redness until all of the organic matter is destroyed.

Detection of Adulterations.

The usual adulterations of milk are the abstraction of fat and the addition of water. Owing to the wide variations in the amount of fat which different milks contain, it is impracticable to determine by any method whether a portion of the cream has been removed from the sample of milk if the source of the milk is unknown. It is therefore necessary for the better protection of the public against frauds of this kind to prohibit the sale of any milk as pure which contains less than a minimum amount of fat, which is fixed by law. In most places this limit is placed at 3 per cent. of fat; in Massachusetts and some other States it is 3·5 per cent. Any milk which falls below the established standard is supposed to be skimmed, and the person who offers such milk for sale as pure violates the law, and may be punished, although the poor quality of the milk may be caused by poor cows and not by dishonesty on his part.

The variation in the amount of solids not fat in milk is much less than that of the fat. In mixed milks the solids not fat are usually above 9 per cent. and rarely fall below 8·5 per cent. in milks from individual cows. In Great Britain and in most of the U. S. where standards are established the minimum for solids not fat is placed at 9 per cent. Skim-milk contains a trifle more solids not fat than pure milk, while milks to which water has been added contain less. If, therefore, a sample of mixed milk is found which contains less than the established standard of solids not fat, it is considered to be watered. The judgment in regard to a watered milk turns entirely upon the amount of solids not fat, and has nothing to do with the amount of fat which the milk contains. A milk may therefore contain a higher per cent. of fat than is required by law and still be condemned as watered if the solids not fat are below standard.

In States where there is no legal standard for the solids not fat, no arbitrary rule can be given for determining a watered milk. Frauds of this kind may, however, be detected in the following manner: Whenever the solids not fat fall much below 9 per cent. it is a suspicious circumstance, and a sample of milk from the same herd, taken at the time of milking by an authorized person, should be tested in the same way. If in this sample, which is known to be genuine, the per cent. of solids not fat is found to be about the same as in previous trials, it is probable that the milk has not been tampered with at any time. If, however, the per cent. of solids not fat in the samples taken at the farm are up to the required standard, it is strong evidence that water had been added to the milk which tested low.

The usual methods of analysis already described are too complicated, and require too much time for the use of milk-inspectors, who often have large numbers of milks to examine in a single day. The method generally employed by them is to determine the specific gravity of the milk with a delicate lactometer and the per cent. of fat by some of the rapid volumetric methods. From the data thus obtained the total solids and the solids not fat can be calculated with sufficient accuracy.

The *lactometer* is a hydrometer especially adapted to the examination of milk; many kinds are in use, all of which have the same general form, viz., a narrow stem to which is attached an elongated bulb weighted at the bottom so as to float in an upright position with the stem partially submerged. The depth to which the lactometer sinks depends upon the specific gravity of the milk in which it is placed, a heavy milk causing it to rise higher above the milk than a light one. The lactometer generally used in the U. S. is graduated from 0° to 120°, 0° being the point to which the instrument sinks in pure water at 60° F. and 100° the point to which it sinks in a liquid having a specific gravity of 1 029, this being assumed to be the lowest specific


Fig. 4.—Quevenne's lactometer.

gravity compatible with pure milk. The scale of this lactometer is intended to show the per cent. of milk having a specific gravity of 1·029 which the sample examined contains. This, however, it does not do, as the addition of cream to milk, thus rendering it richer, affects the reading in the same way as the addition of water. For this reason, and also because it is necessary when the readings are to be used in connection with the per cent. of fat for the calculation of the total solids to know the specific gravity of the milk, the Quevenne lactometer is to be preferred. The scale of this lactometer expresses in thousandths the difference between the specific gravity of the liquid tested and water, the specific gravity of water being 1. The specific gravity is easily derived from the reading by dividing it by 1,000 and adding 1 to the quotient. To illustrate: a reading of 33 on this lactometer is equivalent to a specific gravity of 1·033. The scale of the ordinary lactometer may be converted into the Quevenne scale by multiplying by ·29.

Among the formulas used for the calculation of total solids from the specific gravity and per cent. of fat may be mentioned those of Fleischmann and Babcock. Fleischmann's formula is—

$$\text{Total solids} = 1{\cdot}2f + 2{\cdot}665\,\frac{100\,S - 100}{S}.$$

Babcock's formula is—

$$\text{Solids not fat} = \left(\frac{100\,S - Sf}{100 - 1{\cdot}0753} - 1\right) \times (100 - f)2{\cdot}6.$$

In both of these formulas f = per cent. of fat in milk and S = specific gravity of milk at 15° C. Both tables are given to aid in calculations.

A simple formula which does not require the use of tables is

$$\text{Solids not fat} = \frac{L + {\cdot}7f}{3{\cdot}8},$$

in which L = reading of Quevenne lactometer and f = fat.

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S. M. BABCOCK.

Milk-fever: a name applied to a short febrile attack which sometimes attends the beginning of the milk-secreting process, a few days after childbirth. It is often a mild form of infection and may be ushered in by profound and rather alarming chills, but is unimportant except as sometimes simulating the onset of puerperal fever, for which it is occasionally mistaken. Farmers and veterinarians apply the name to puerperal peritonitis of the lower animals, and to a severe form of cerebro-spinal meningitis which sometimes attacks cows after calving. The last-mentioned disease is treated by cathartics, mercury, aconite, and heat to the spine; the former, by opium, aconite, mercury, and hot abdominal fomentations. Revised by W. PEPPER.

Milk-mirror, The: See ESCUTCHEON.

Milk-sickness: an acute disease endemic in sparsely settled parts of the U. S.; affecting cattle primarily, and human beings as a result of eating the flesh or drinking the milk of affected cattle. In cattle it is called *trembles* and *slows*. It is probably infectious in nature, but no particular micro-organism has been discovered. The symptoms in cattle are marked muscular weakness, tremor, vomiting, and a peculiar fetor of the breath. In man the disease comes on suddenly and presents similar symptoms. Fever, coated tongue, great fetor of breath and vomiting, with profound weakness, are the characteristics. Fortunately, the disease is much less frequent than formerly. The treatment should aim at control of the fever and relief of urgent symptoms, with supporting remedies to prevent exhaustion. W. P.

Milk-snake: a popular name for a harmless snake found in the eastern parts of the U. S. See KING-SNAKE.

Milk-sugar: See CHEESE and MILK.

Milk-tree: popular name for any tree the trunk of which when incised yields a milky fluid fit for food. Such are the cow-tree, found in the Caraccas islands; the kiriaguma, or *Gymnema lactiferum*, of Ceylon, used for domestic purposes; and the tabayba dolce, or *Euphorbia balsamifera*, of the Canary islands, which yields a wholesome juice resembling sweet milk.

Milkweed Family: the *Asclepiadaceæ*; a large group (1,700 species) of milky-juiced dicotyledonous herbs, shrubs, and trees, with opposite leaves, gamopetalous flowers, free bicarpellary ovaries, and mostly united stamens. They are widely dispersed, especially in the warmer portions of the earth. In the U. S. there are about 100 species, more than half of which (the common milkweeds of fields and lowlands) belong to the genus *Asclepias*. Many species are grown for ornamental purposes, especially the species of ASCLEPIAS (*q. v.*), *Vincetoxicum*, *Ceropega*, *Hoya*, and *Stapelia*. The last are leafless cactus-like plants from South Africa. Their flowers are showy, but have an offensive smell.

CHARLES E. BESSEY.

Milky Way: See GALAXY.

Mill, JAMES: philosopher; b. at Logie Pert, Forfarshire, Scotland, Apr. 6, 1773; was educated at the University of Edinburgh, and was licensed as a preacher in the Scottish National Church 1798, but abandoned that career in consequence of a change of religious opinion; became a tutor in the family of Sir John Stuart, whom he accompanied to London in 1802, and settled in that capital as an author. He edited *The Literary Journal*; became intimately connected with Jeremy Bentham, residing in his house and expounding his opinions to the English public; wrote an elaborate *History of British India* (3 vols., 1817–18), which procured him an important post in the office of the East India Company; was one of the chief contributors to *The Westminster Review* (1824); published a treatise on *Political Economy* (1821–22); wrote largely for the *Encyclopædia Britannica* on political and social subjects, and was author of a remarkable philosophical work, *An Analysis of the Phenomena of the Human Mind* (2 vols., 1829). In this work the principle of "association," stated by Hartley, received a penetrating application to the whole range of psychological problems. The "association psychology" was thus expounded and the foundation laid for its great and acute development by later British writers, notably Spencer and Bain. D. June 23, 1836. Revised by J. M. BALDWIN.

Mill, JOHN STUART: philosopher, logician, and political economist; son of James Mill, philosopher; b. in London, May 20, 1806. His father took sole charge of his education, and conducted it in a way to secure a precocious development. Mill says of himself: "I have no remembrance of the time when I began to learn Greek; I have been told that it was when I was three years old." At eight he was reading Herodotus, Xenophon, and Plato; and during the next four years he read the works of the leading Latin authors and the Greek poets, dramatists, orators, and philosophers, even to Aristotle's *Rhetoric*. In the same period he was grappling with the problems of the calculus and higher mathematics, and finding his recreation in reading history and books of experimental science, interspersed with earnest conversations with his father as they took long walks together. In his fourteenth year he was taken through a complete course of political economy, with the help of such books as were then published and of discussions with his father. Up to this time he had been excluded from participation in the ordinary sports of children and from association with other boys. When about fourteen he left England for a year, spent mostly in the south of France. There he imbibed a taste for mountain scenery, took lessons in fencing and other forms of bodily exercise, attended lectures on science, and studied the higher mathematics under private tuition. He carried home with him a strong and permanent interest in continental liberalism, which qualified his subsequent political views. He received the impress of his father's religious skepticism to such a degree that he confesses, "I am one of the very few examples in this country of one who has not thrown off religious belief, but never had it. I looked upon the modern exactly

as I did upon the ancient religion, as something which in no way concerned me." On his return from France he assisted his father in preparing for the press a work on political economy. Soon after he studied law with John Austin, a disciple of Bentham. All his associations identified him with Bentham's school of philosophy, to which he claims to have given the title "*utilitarian*." When seventeen years old his father secured for him an appointment from the East India Company, in whose service he remained for thirty-five years, rising steadily from the lowest grade of clerk to the highest post in his department, that of examiner of India correspondence. The same year (1823) *The Westminster Review* was established by Bentham and his followers as a radical organ in politics and religion. Young Mill began at once contributing to its pages, and made it for many years the chief medium for publishing his literary efforts. From 1835 to 1840 he was its principal conductor. When only twenty-one he edited Bentham's great work *On Evidence*, adding notes and supplemental chapters of his own. With the bringing out of his *System of Logic, Ratiocinative and Inductive*, in 1843, he became prominent as a strong, bold, radical writer on philosophical subjects. This work embodied the peculiarities of empirical philosophy and association psychology. After having previously treated parts of the subject in a series of essays, he published in 1848 his full treatise, entitled *Principles of Political Economy, with some of their Applications to Social Philosophy*. This work, like the *Logic*, has passed through several editions in England and the U. S., and has a place among the standard works on the subject. On the dissolution of the East India Company in 1856, Mill, thrown out of his office, turned his attention altogether to literary labors. He published in 1859 a work *On Liberty*, which strikes at the despotism of public opinion over individual freedom of thought. In the same year was issued a collection of his *Dissertations and Discussions, Political, Philosophical, and Historical*, which had previously appeared in *The Westminster* and *Edinburgh Reviews*; also an essay entitled *Thoughts on Parliamentary Reform*, in which he advocated the extension of suffrage without distinction of sex on the basis of educational qualifications. In 1865 Mill was returned to Parliament, but his career in that body disappointed his constituents and the public generally. His chief prominence was in advocating the measure to admit women to the suffrage, which failed. In the new election he was rejected, and retired from public life. During his remaining years his residence was in the south of Europe, near Avignon, varied by spending some time twice a year in the neighborhood of London. He devoted his time to miscellaneous literary work, the fruits of which were in part presented to the public under his own eye and in part reserved for posthumous publication. Of the latter, his *Autobiography* and *Essays on Theism* are worthy of special notice. In 1830, when in his twenty-fifth year, he formed the acquaintance of a Mrs. John Taylor, and was drawn into an almost idolatrous devotion toward her. She shared in his literary work, and he says, rather extravagantly, "What I owe, even intellectually, to her is in its detail almost infinite." In 1851 that "most valued friendship of his life" was consummated by a formal marriage. His wife died at Avignon in 1859, after which he fixed his residence near her grave. There, with her eldest daughter, he cherished her memory as a "religion," and endeavored still to regulate his life with supreme regard to her approbation till his own death, on May 8, 1873. Besides the works above noticed, Mr. Mill gave to the public the following—viz.: *Considerations on Representative Government* (1861); *Utilitarianism* (1862); *Auguste Comte and Positivism* and *Examination of Sir William Hamilton's Philosophy* (1865); *England and Ireland* (1868); *The Subjection of Women* (1869); *Chapters and Speeches on the Irish Land Question* (1870). His *Autobiography* appeared soon after his death, in 1873, and the *Three Essays—Nature, The Utility of Religion*, and *Theism*, in 1874. A clear and candid presentation of Mill's views and character is given in a little memorial published in 1873, which is made up of twelve distinct sketches by H. R. Fox Bourne, Herbert Spencer, J. E. Cairns, Henry Fawcett, and others well acquainted with the man and familiar with his writings. Also see the biographies by Bain (1882) and Courtney (1889). The influence of J. S. Mill upon British philosophy was extraordinary, especially at Oxford, before the rise of the Neo-Hegelian movement represented by Green. The association psychology became the orthodox system, ministering as it did to utilitarian ethics and to a positivistic agnosticism in metaphysics and religion. Moreover, by his system of inductive logic, Mill emphasized the tendency to natural science conceptions and made easy the introduction of the views of Comte. Mill is the founder of the inductive or empirical logic. See INDUCTION and LOGIC.

Revised by J. MARK BALDWIN.

Millais, mil'lā', Sir JOHN EVERETT: portrait, genre, and landscape painter; b. at Southampton, England, June 8, 1829. He studied in the Royal Academy, London, where in 1843 he won a silver medal for his *Pizarro Seizing the Inca of Peru*, and a gold medal in 1847 for his *Benjamites Seizing the Daughters of Shiloh*; became a Royal Academician 1863; was created baronet in 1885; won a second-class medal at the Paris Exposition of 1855; medal of honor at the Exposition of 1878; was made an officer of the Legion of Honor 1878; member of the Institute of France 1883; member of the Academies of Antwerp, Edinburgh, Madrid, and Rome. In 1847–48 he formed one of the small group of British painters called the Pre-Raphaelites who had John Ruskin as their champion, but he did not long adhere to the peculiar theories of art held by that brotherhood. He was the leading portrait-painter in London, and some of his pictures, such as *A Huguenot* (1851), *Yes or No* (1875), and *Effie Deans* (1877), have achieved a widespread popularity through engraving and other reproductive processes. He succeeded Lord Leighton as president of the Royal Academy. D. at London, Aug. 13, 1896. WILLIAM A. COFFIN.

Mil'lard, DAVID: clergyman and author; b. in Ballston, N. Y., Nov. 24, 1794; became a minister of the "Christian" denomination 1815; was pastor of a church at West Bloomfield, N. Y., 1818–32, and at Portsmouth, N. H., 1837–40; published *The True Messiah Exalted* (1818; 2d ed. 1825); edited for several years a monthly magazine called *The Gospel Luminary*; visited Palestine in 1841, and published *A Journal of Travels in Egypt, Arabia Petræa, and the Holy Land during 1841–42* (1843); settled again at West Bloomfield, and was from 1845 to 1867 Professor of Biblical Antiquities and Sacred Geography at Meadville Theological Seminary. D. at Jackson, Mich., Aug. 3, 1873. See the *Life* by his son, Rev. D. E. Millard, 1874.

Millard, HARRISON: See the Appendix.

Millau: See MILHAU.

Millbury: town (set off from Sutton in 1813); Worcester co., Mass. (for location of county, see map of Massachusetts, ref. 3–F); on the Boston and Albany and the N. Y., N. H. and Hart. railways; 6 miles S. of Worcester, the county-seat. It contains 7 churches, 15 graded and 2 district schools held in 7 buildings, a national bank with capital of $200,000, a savings-bank with deposits of over $800,000, a town library (founded 1864) containing over 7,000 volumes, and a weekly newspaper. There are 5 woolen, 2 edge-tool, a hosiery, a linen shoe-thread, an electric-car, and a loom-heddle manufactory, indigo dye-works, 2 foundries, machine-shop, and sash, door, and blind, and wood-turning factories. In this town Thomas Blanchard constructed the first machine for turning irregular forms, the principle of which has never been improved. Pop. (1880) 4,741; (1890) 4,428; (1900) 4,460. D. EDMUND MARCH.

Milledgeville: city (formerly the State capital); capital of Baldwin co., Ga. (for location of county, see map of Georgia, ref. 4–H); on the Oconee river at the head of navigation, and on the Cent. of Ga., the Ga., and the Mid. Ga. and Atlantic railways; 39 miles E. N. E. of Macon. It is the seat of the Georgia Normal and Industrial College for Girls, the Middle Georgia Military and Agricultural College (a branch of the State University) and the Georgia State Lunatic Asylum. It is in a cotton-growing region, and has water-works, electric lights, a State bank with capital of $50,000, a weekly newspaper, and oil, machinery, pottery, and brick works. Pop. (1880) 3,800; (1890) 3,322; (1900) 4,219.

EDITOR OF "UNION-RECORDER."

Milledoler, mil'dol'er, PHILIP, D. D.: college president; b. at Rhinebeck, N. Y., Sept. 22, 1775; graduated at Columbia College in 1792; became pastor of the German Reformed church in Nassau Street, New York, in 1794, of the Third Presbyterian church in Philadelphia 1800–05, of the Rutgers Street Presbyterian church, New York, 1805–13, of the Collegiate Reformed Dutch church 1813–25, and from 1825 to 1840 was president of Rutgers College, New Jersey. He was one of the founders of the American Bible Society. D. on Staten Island, N. Y., Sept. 22, 1852.

Millena'rians, or, less commonly, **Chiliasts**: those who hold that the second advent of Christ precedes the end of the world, and that at his coming the pious dead will be raised and will reign with him upon the earth for a thousand years, the so-called millennium of Rev. xx. 1–7. This theory has always had believers and advocates in the Christian Church, but never has received confessional sanction. In the first century those who accepted it were called Chiliasts. The ablest work in English against it is by Rev. David Brown, *The Second Coming of our Lord* (London, 1846). An elaborate work upon eschatology in general, on the millenarian side, is by G. N. H. Peters, *The Theocratic Kingdom* (3 vols., New York, 1884). S. M. Jackson.

Millennium, or, less commonly, **Chiliasm** [*millennium* = Late Lat.; Lat. *mil'le*, thousand + *an'nus*, year; *chiliasm* is from Gr. χιλιασμός, deriv. of χίλιοι, thousand]: the thousand years of the Messiah's reign on earth supposed to be taught in Rev. xx. 1–7. There are two theories to which all the numerous theories on this subject may be reduced: 1. The literal, according to the Jewish form of which, as taught first 200 years B. C., the Messiah shall reign in Jerusalem, and the Jews restored to Palestine shall enjoy remarkable and continuous prosperity; and in its Christian form, the so-called Chiliasm, as found in Papias and others, Christians no less than Jews shall share these temporal blessings with the Jews. These views persisted in the Church and were revived by the radical party among the early Protestants, but the sober sense of the Church was against them. 2. The spiritual theory declares that the number 1,000 is used in Scripture as denoting an indefinite large number. So the thousand years of Rev. xx. 1–7 is not to be taken literally, but as figurative of that long period of spiritual prosperity which the Church shall enjoy before the coming of Christ and the end of time. S. M. Jackson.

Millepeds [Lat. *mil'le*, thousand + *pes*, *pedis*, foot]: See Myriapoda.

Millepore [Lat. *mil'le*, thousand + *po'rus*, pore]: name of a genus of Hydroidea, which unlike most hydroids produces a sort of coral which is smooth and branching, and has very small cells occupied by the polyps. These cells are unlike those of the true coral in that they are divided by horizontal partitions. On account of the presence of these partitions the millepores and their allies formerly were grouped with a number of fossil forms in which similar partitions or "tables" exist, in an order, *Tabulatæ*. The investigations of Hickson have shown that at least one species of millepore produces medusæ (see Hydroids), which, however, never become separated from the parent stock. The species of millepore are few, and they play but a minor part in the formation of coral reefs. The stag-horn coral, so common in tropical waters, is *Millepora alcicornis*. J. S. Kingsley.

Miller, Charles Henry: See the Appendix.

Miller, Cincinnatus Heine, known in literature as Joaquin Miller: poet; b. in Wabash District, Ind., Nov. 10, 1841. In 1854 he went to Willamette Valley, Ore., and soon after to the California mining-regions. In 1860, after studying law, he was admitted to the bar in Oregon; in 1863 edited the Eugene *Democratic Register* for a short time; in 1866 was elected district judge of Oregon, and served in that position four years; settled in New York about 1874, having made a visit to Europe in 1870. He wrote *Songs of the Sierras* (1871); *Pacific Poems* (1873); *Songs of the Sun Lands* (1873); *Unwritten History* (1874); *The Ship in the Desert* (1875); *First Families of the Sierras*, a novel (1875); *Adrianne, a Dream of Italy* (1876); *One Fair Woman*, a novel (1876); *Songs of Italy* (1878); *Shadows of Shasta* (1881); *The Gold-seekers of the Sierras* (1884); and *Songs of the Mexican Seas* (1887). His novel *The Danites* (1881) was successfully produced as a play. He afterward became a journalist at Washington, D. C., and in 1887 removed to Oakland, Cal. Revised by H. A. Beers.

Miller, Hugh: geologist; b. Oct. 10, 1802, at Cromarty, Scotland; lost his father when he was five years old, but received, nevertheless, a very conscientious and careful education by his two uncles; acquired an extensive and well-digested knowledge of English language, history, and literature, and developed early that power of acute observation which afterward made him celebrated in literature and science. He did not care, however, to attend a university. In 1819 he was apprenticed to a stone-mason, and he worked at this trade steadily till 1836, though devoting all his leisure hours to geological researches and to reading. In 1829 he published a volume of *Poems written in the Leisure Hours of a Journeyman Mason*, and became a frequent contributor to different periodicals. In 1836 he received a second-accountantship in a branch bank at Cromarty, married, published his *Scenes and Legends of the North of Scotland*, and during the Non-intrusion controversy in the Scottish Church his *Letters to Lord Brougham* on the Auchterarder case brought him prominently before the public. In 1840 he went to Edinburgh as editor of *The Witness*, a Free Church organ, and it was in the columns of this paper he first published *The Old Red Sandstone, or New Walks in an Old Field*, which made a great sensation, not only on account of the important geological discoveries it contained, but also by its exact reasoning and finished style. He also published *First Impressions of England and its People* (1847); *Footprints of the Creator* (1850); *My Schools and Schoolmasters* (1854), an interesting sketch of his education; *Testimony of the Rocks* (1857), etc. Least satisfactory were his attempts to establish perfect harmony between the details of religious doctrines and scientific views. His denial of the universality of the Deluge and of the literal meaning of the word "day" in the first chapter of Genesis aroused much suspicion among his coreligionists, and even met with some severe criticism; while, on the other hand, his assertion that the entire type of organic being was changed by each geological period did not escape the sneers of the scientists. During this hard work, continued through many years without flagging, his brain at last gave way, and he shot himself at Portobello, near Edinburgh, Dec. 26, 1856. See Peter Bayne, *The Life and Letters of Hugh Miller*, London.

Miller, James Russell, D. D.: clergyman and editor; b. at Frankfort Springs, Pa., Mar. 20, 1840; was educated at Westminster College, Pennsylvania; was pastor of the United Presbyterian church, New Wilmington, Pa., 1867–69; of the Bethany Presbyterian church, Philadelphia, 1869–78; of the Broadway Presbyterian church, Rock Island, Ill., 1878–80; of the Holland Memorial Mission, Philadelphia, 1881; and co-pastor of the same organized as an independent church. Since 1880 he has been editor for the Presbyterian board of publication, and has also published *Week-day Religion* (1880); *Home Making* (1882); *In His Steps* (1884); *Silent Time* (1886); *Come ye Apart* (1887); *The Marriage Altar* (1887); *Practical Religion* (1888); *Bits of Pasture* (1890); *Making the Most of Life* (1891); *Mary of Bethany* (1891); *Dew of thy Youth* (1891); *The Every Day of Life* (1892); and numerous smaller books, and pamphlets and leaflets.

Miller, Joaquin: See Miller, Cincinnatus Heine.

Miller, Joseph, known as Joe Miller: actor and reputed humorist; b. in England in 1684; was a comic actor in London, somewhat celebrated for his ready wit, and died there Aug. 16, 1738. The collection entitled *Joe Miller's Jests*, published the year after his death (1739), was really made by the publisher, John Mottley (1692–1750), and contained little or nothing really derived from Joe Miller.

Miller, Joseph Nelson: See the Appendix.

Miller, Lewis: See the Appendix.

Miller, Orest Fedorovich: writer and professor; b. in Reval, Russia, in 1833; studied at the University of St. Petersburg, where in 1861 he was appointed teacher of Russian literature, particularly of its beginnings. In 1865 he published *The Slav Question in Life and Knowledge*; in the following year *Lomonosov and the Reforms of Peter the Great*; in 1869 *Ilïa Muromets i Bogartyrsvo Kievskoe* (Ilïa Muromets and the Heroism of Kiev)—his best-known work, a study of the Russian popular myths. He is also the author of *The Slav World in Europe* (1877); *Lectures on Russian Literature after Gogol* (3d ed. 1887); and other works. Miller is one of the foremost of the Slavophils, although not an extremist. A. C. Coolidge.

Miller, Patrick: one of the numerous inventors of steam-navigation; b. at Dalwinston, Dumfriesshire, Scotland, about 1730. He was a wealthy country gentleman, fond of mechanical experiments; made some improvements in artillery; began in 1785 some experiments in ship construction and propulsion upon a loch near his estate, and published in 1786 a pamphlet giving an account of a vessel he had invented. In this pamphlet he stated his conviction that the steam-engine could be employed to work the wheels. In 1788 he, with the aid of James Taylor, propelled a boat 5 miles an hour by a steam-engine. The experiment proving unsatisfactory for several reasons, it was abandoned, but

after the successful experiments of Fulton his claims to the invention were put forward. D. at Dalwinston, Dec. 9, 1815.

Miller, Samuel Freeman, LL. D., D. C. L.: jurist; b. at Richmond, Ky., Apr. 5, 1816; was educated at Transylvania University; became a physician, and afterward a lawyer. In 1848 he became an advocate of the emancipation of the slaves, and in 1850 removed to Iowa; was successful as a lawyer; declined all public offices until 1862, when he was appointed one of the justices of the U. S. Supreme Court. He held this office till his death, and for many years was the senior justice of the court. Among his notable official acts were the opinions on the Louisiana slaughter-house cases, in which he defined the differences between the rights of the general Government and those of the States; and on the Kilbourn-Thompson case, where the constitutional authority of Congress as a co-ordinate branch of the Government was for the first time defined; and the motion before the Electoral Commission in 1877, which led to the judgment that Congress had no authority to go behind the returns of the legal officers of a State. At the centennial celebration of the adoption of the Federal Constitution by the convention in Philadelphia, in 1887, he was the principal orator. D. at Washington, D. C., Oct. 13. 1890.

Miller, Warner: politician; b. in Oswego co., N. Y., Aug. 12, 1838; graduated at Union College in 1860; became a teacher in the Fort Edward collegiate institute, but when the civil war broke out he enlisted as a private in the Fifth New York Cavalry. He fought under Gen. Sheridan, and attained the rank of lieutenant. He was a delegate to the national Republican conventions of 1872 and 1888; was elected to the New York Assembly in 1874 and 1875, and to Congress in 1878 and 1880. On July 16, 1881, he was elected U. S. Senator from New York for the unexpired term of Thomas C. Platt, who had resigned. Mr. Miller's term expired in 1887. He was nominated by acclamation for Governor of New York by the Republican convention Aug. 28, 1888, but was not elected.

Miller, William: founder of the sect of Millerites; b. at Pittsfield, Mass., Feb. 15, 1782; settled in Poultney, Vt., 1804; served as a captain of volunteers on Canadian frontier during the war of 1812; moved in 1815 to Low Hampton, Washington co., N. Y., and in 1831 began to announce the speedy second coming of Christ, which, by his interpretation of the biblical prophesies, he fixed for the year 1843, at which time the world would be destroyed. In a few years his converts in the U. S., Canada, and Great Britain numbered many thousands, and were popularly known as Millerites, though they styled themselves Second Adventists. (See Adventists.) D. at Low Hampton, N. Y., Dec. 20, 1849. See his *Life*, by Sylvester Bliss (Boston, 1853), and by James White (Battle Creek, Mich., 1875).

Revised by S. M. Jackson.

Miller, William Hallowes, F. R. S.: mineralogist; b. in Wales in 1801; graduated at Cambridge in 1826; became fellow and tutor of St. John's College; succeeded Dr. Whewell as Professor of Mineralogy 1832; was appointed in 1843 on a royal committee to superintend the construction of parliamentary standards of length and weight in place of those destroyed by fire in 1834, and undertook the restoration of the standard of weight, which he finished in Mar., 1854. He served in 1867 on a commission to inquire into the condition of the exchequer standards, and in 1870 on the international commission upon the metric system. He published in *The Philosophical Magazine* and the *Proceedings* of the Royal Society many important papers on mineralogy and crystallography, for which he received in 1870 one of the royal medals. He was for many years secretary, and subsequently president, of Cambridge Philosophical Society, was foreign secretary of the Royal Society 1856–73, and was a member of the principal scientific societies in Europe. D. May 20, 1880.

Millerites: See Adventists and Miller, William.

Millersburg: village; capital of Holmes co., O. (for location of county, see map of Ohio, ref. 4–G); on the Cleve., Akron, and Columbus Railway; midway between Cleveland and Columbus, and 80 miles from each city. It is in an agricultural region, with coal-fields and iron mines in the vicinity, and has 7 churches, 2 union schools, electric lights, 2 weekly newspapers, and flour and planing mills, tile and brick works, foundry and machine-shops, and furniture-factory. Pop. (1880) 1,814; (1890) 1,923; (1900) 1,998.

Editor of "Holmes County Farmer."

Millersburg: borough; Dauphin co., Penn. (for location of county, see map of Pennsylvania, ref. 5–G); on the Susquehanna river, and the Northern Cent. Railway; 26 miles N. of Harrisburg. It is in an agricultural region, and near the famous Lykens coal-fields; is an important coal-shipping point; and has manufactories of lumber, axles, wheels, taps and dies, brooms, and carpets. Pop. (1880) 1,440; (1890) 1,527; (1900) 1,675.

Editor of "Herald."

Miller's Thumb, or **River Bullhead**: a small fish of the cold streams and lakes of Northern Europe. Its scientific name is *Cottus gobio*. It lies quiescent on the bottom among stones, making a quick spring when disturbed. It is very destructive to the eggs of trout. Numerous similar species of *Cottus* are found in the cold brooks of Northern America. See Cottidæ. D. S. J.

Millet [from Fr. *millet*, dimin. of *mil* (whence Eng. *mill*, millet): Ital. *miglio* < Lat. *mi'lium*, millet; cf. Gr. μελίνη and O. Eng. *mīl*]: any one of numerous grasses of several distinct genera and species. The *Milium effusum*, found throughout Europe and Northern Asia and in the Northern U. S., is a slender grass of the tribe *Paniceæ*, 4 to 6 feet high, which has never been cultivated, but is abundant in the woodlands both of Great Britain and North America. The true, cultivated millet of ancient and modern times belongs to a third genus, *Panicum*, which embraces no less than 850 species. *Panicum miliaceum* is sown chiefly for forage, though the seeds yield a very nutritious flour. The Hungarian, German, and Italian millets are now classified by botanists under the genus *Setaria*. It is these coarse setarias which are known as millet in the U. S., where the crop is grown chiefly for forage, and is made into hay. The requisites for successful culture of this millet are a moderately rich, well-tilled soil, and a fine and closely compacted seed-bed. The seed should not be sown until the ground is thoroughly warmed, June 1–15. It is sown broadcast and lightly brushed in. Millet requires a large amount of moisture from frequent showers in order to make its best growth, but it will not do well on a wet or sodden soil. It is a plant of very quick growth, and is usually cut within two months after seeding, or as soon as the seed-heads have appeared, and before the seed has hardened. The process of cutting and curing is the same as for hay from other grasses. Millet hay is less nutritious and less palatable than that of the finer meadow-grasses, but since it furnishes a large amount of fairly nutritious forage and is easily and quickly grown on new soil, it is a favorite crop in those localities where permanent meadows have not yet become established. If the plant is allowed to become ripe before cutting, the forage is less digestible and less palatable, and the ripened or partially ripened seed contains a diuretic principle which makes its use as a fodder objectionable, particularly for horses.

Revised by H. H. Wing.

Millet, mēē'yā', Aimé: sculptor; b. in Paris, Sept. 27, 1819; studied under David d'Angers; began to exhibit in 1842, and attracted great attention in 1857 by a statue, *Ariane*, which was bought for the museum of the Luxembourg. Of his other works may be named the *Mercure*, in the Louvre, and *La Jeunesse effeuillant des roses*, on the tomb of Henri Murger, the poet of bohemian life, and an *Apollo and Pegasus* for the Paris Opera, and especially the colossal equestrian statue of Vercingetorix at Alise-Sainte-Reine, in Burgundy. He became an officer of the Legion of Honor in 1870. D. in Paris, Jan. 13, 1891.

Mil'let, Francis Davis: genre and portrait painter; b. at Mattapoisett, Mass., in 1846; was a pupil in the Royal Academy of Antwerp, where he won medals in 1872 and 1873; studied also in France and Italy; elected a member of the Society of American Artists 1880; National Academician 1885; vice-president of National Academy 1891; member of the American Water-color Society and Royal Institute of Painters, London; was awarded a second-class medal at the Paris Exposition of 1889. His pictures represent life in England during the eighteenth century, and scenes in ancient Rome, Pompeii, and Greece. He is a writer of fiction and descriptive articles in the magazines, and made a high reputation as the correspondent of the London *Daily Telegraph* in the Turco-Russian war. He illustrates his own articles. His *Between Two Fires* (engraved in *The Century Magazine* for Sept., 1892) was purchased by the Chantrey Bequest at the Royal Academy Exhibition, London, in 1892, and one of his best works, *An English Inn*, is

in the Union League Club, New York. Studios in New York and at Broadway, Worcestershire, England.

WILLIAM A. COFFIN.

Millet, mĕĕ'lā', JEAN FRANÇOIS: genre and landscape painter; b. at Gréville, Manche, France, Oct. 4, 1814; d. at Barbizon, Seine-et-Marne, Jan. 20, 1875. He was a pupil of Mouchel and of Langlois at Cherbourg, and of Paul Delaroche in Paris; was awarded second-class medals at the Salons of 1853 and 1864; first-class at the Paris Exposition 1867; decoration of the Legion of Honor 1868. He was well trained in academic study, but desiring to get inspiration from nature by direct contact with the scenes he wished to paint, he went to live in the country. He was poor, and for a long time his pictures brought him but slight pecuniary return, but toward the end of his life they began to be appreciated by collectors who had formerly been unable to see any merit in them. Since his death his works have been praised by artists and critics and sold at very high prices, one of his best-known pictures, *The Angelus*, (1859) having brought $100,000 at auction in Paris in 1889. This picture was exhibited in the principal cities in the U. S., but was finally purchased by a French amateur, M. Chauchard, and taken back to Paris. It has been called Millet's masterpiece, but it is by no means the best of his works. If this title is to be given to any of them, it undoubtedly belongs to *The Gleaners* (1857) which was bought from its owner, M. Bischoffsheim, by Madame Pommery, of Reims, in 1889, and presented to the Louvre, where it now is. Millet was one of the greatest artists of modern times. The list of his best works includes, besides the two already mentioned, *The Sower* and *The Water-carrier*, both in the collection of Mrs. W. H. Vanderbilt, New York; *The Grafter* (William Rockefeller, New York); *Peasant Leaning on his Hoe* (M. Van den Eynde, Paris); *The Sheep Park* (M. Bellino, Paris); *The Turkey-keeper* (C. A. Dana, New York); *The Churner* (F. L. Ames, Boston); *Buckwheat Threshers* (not carried to completion, Quincy Shaw, Boston); *The Planters* (Quincy Shaw, Boston); *The Potato Harvest* (W. T. Walters, Baltimore); *Breaking Flax* (W. T. Walters, Baltimore); and *Death and the Woodcutter* (owned in France). The most complete work on Millet is *Vie et Œuvre de J. F. Millet*, by Alfred Sensier (Paris, 1881). WILLIAM A. COFFIN.

Mil'li-Casso'ne, GIANNINA: poet and *improvisatrice*; b. at Teramo, Abruzzi, Italy, in 1827. She is said to have composed verses when but five years old; at the age of seventeen found a literary guide in de Martinis. Having heard the poet Regaldi improvise, she was seized with an impulse to emulate him, in which she was encouraged by Regaldi himself. She gave public improvisations in the Abruzzi, in Calabria, and finally at Naples under the protection of the learned Giulio Genoino. In the same way she made a tour through the Two Sicilies, was honored with two silver medals, and in Rome with a medal of gold. Her name was not generally known throughout Italy until after 1857, when she began her poetical excursions through Tuscany and Upper Italy. In 1860 she met with the greatest success at Turin, then the royal residence; and a pension was bestowed upon her by the minister de Sanctis. In 1869 she was appointed inspector of the elementary schools for girls of Southern Italy. A normal school for young women was afterward established in Rome, and she was appointed superintendent, a position she held till her marriage with Ferdinando Cassone, schools-inspector at Caserta. Her first published verse was entitled *Qual è il più bel pregio della donna* (1854). Later her poems were collected in two volumes (1862–63). Revised by A. R. MARSH.

Milligan, WILLIAM, D. D.: theologian; b. in Edinburgh, Mar. 15, 1821; graduated at St. Andrews (1839); was minister at Cameron, Fifeshire, and afterward at Kilconquhar 1844–60; Professor of Divinity and Biblical Criticism at the University of Aberdeen from 1860. He was principal clerk to the General Assembly, and moderator of Assembly in 1882. D. in Aberdeen, Dec. 11, 1893. Among his published works are *Words of the New Testament as Altered by Transmission and Ascertained by Modern Criticism* (with Dr. Roberts, Edinburgh, 1873); *The Resurrection of our Lord* (London, 1881, and subsequent editions); *The Revelation of St. John* (Baird lecture, 1885, published 1886); a Commentary on the *Gospel by John* (with Dr. Moulton, in Schaff's *Popular Commentary*, New York and Edinburgh, 1880); *Revelation* (in same series, 1883); *Elijah: his Life and Times* (in the Men of the Bible Series, 1889); *The Book of Revelation* (Expositor's Bible Series, 1891); *The Ascension and Heavenly Priesthood of our Lord* (London and New York, 1892); *The Resurrection of the Dead* (1894). W. J. B.

Milliken's Bend: post-village of Madison parish, La.; on the Mississippi river; 15 miles above Vicksburg, Miss. In June, 1863, near this place, a Confederate force of 2,500, under Gen. H. McCullough, attacked a body of colored troops, numbering 1,400, and part of an Iowa regiment, under Gen. E. S. Dennis, but with the assistance of gunboats from Admiral Porter's fleet they were repulsed.

Mills, ALBERT LEOPOLD: See the Appendix.

Mills, CHARLES KARSNER, M. D.: alienist and neurologist; b. at Falls of Schuylkill, Pa., Dec. 4, 1845; graduated M. D. at the University of Pennsylvania in 1871; was Professor of Physics in the Wagner Institute, Philadelphia, from 1870 to 1873, and lecturer on Physics in the Franklin Institute from 1872 to 1873; was lecturer on Electro-therapeutics and Nervous Diseases in the Philadelphia School of Anatomy and Surgery in 1876, lecturer on these subjects in the University of Pennsylvania in 1877, and in 1887 was made lecturer on Nervous and Mental Diseases in that institution. He is the editor of a *System of Nervous Diseases*, and is a well-known author of papers on his specialty in medical journals.

S. T. ARMSTRONG.

Mills, CLARK: sculptor; b. in Onondaga co., N. Y., Dec. 1, 1815. His first trade was that of a millwright, his second that of a plasterer. From this he proceeded to sculpture, which he began to practice in Charleston, S. C. He was self-taught, had never been in Europe or seen the works of the masters in his art. His first work was a bust of John C. Calhoun, which the city of Charleston purchased and placed in the town-hall in 1846. This led to other portrait-busts of local celebrities. In 1848 he was invited to furnish the design for an equestrian statue of Andrew Jackson for the Government. The result was the statue on Lafayette Square, near the White House, in Washington, chiefly remarkable for the poise of the horse on its hind legs. The next performance was the colossal statue of Washington at the battle of Princeton, also in Washington, which was unveiled Feb. 22, 1860. The casting of the colossal statue of Liberty, after Crawford's design, for the dome of the Capitol, was finished in 1863. D. in Washington, D. C., Jan. 12, 1883. Revised by RUSSELL STURGIS.

Mills, DAVID, LL. B.: politician; b. in Oxford, Kent co., Ontario, Mar. 18, 1831; graduated at Michigan University; studied law and was called to the bar in 1883. He was superintendent of schools for Kent County 1856–65; was employed by the government of Ontario to define the northwestern boundary of the province in 1872, and was one of the counsel employed in the argument before the British Privy Council in 1884. He was elected a member of the council of public instruction for Ontario in 1875; had a seat in the Parliament of Canada 1867–96; was Minister of the Interior 1876–78. He became a Senator and Minister of Justice in 1897.

Mills, ROBERT: architect and engineer; b. in Charleston, S. C., Aug. 12, 1781; studied architecture in Washington, under Benjamin H. Latrobe, the original designer of the Capitol; designed and supervised the erection of several important buildings in Philadelphia. The single-arch bridge of 740 feet spanning the Schuylkill river attests his originality and skill as an engineer. The custom-houses in New London and Middletown, Conn., and in New Bedford and Newburyport, Mass., the marine hospitals in Charleston and New Orleans, and the State penitentiary of Louisiana were all built according to his designs; so, also, was the Washington Monument in Baltimore. After completing other important works he returned to South Carolina in 1820, and was made State architect and engineer. In 1837 he was recalled to Washington, where he was appointed by President Jackson the architect of the general Government, and held this office during the administrations of Jackson and Van Buren, designing and supervising the erection of the Treasury building and General Post-office building. The Patent-office building also was erected under his supervision. The design for a national Washington Monument was made by him, but his plan for a circular colonnade around its base was not carried out, and only the bare obelisk was erected (1848–84). He published *Statistics of South Carolina* (1826), accompanied by a folio atlas; *American Pharos, or Lighthouse Guide* (1832); and a *Guide to the National Executive Offices* (1842). D. in Washington, D. C., Mar. 3, 1855.

Revised by RUSSELL STURGIS.

Mills, Samuel John: "father of foreign missions in America"; b. at Torringford, Conn., Apr. 21, 1783; entered Williams College in 1806, and in Sept., 1808, was the prineipal organizer of a society of undergraduates who eontemplated beeoming missionaries in foreign lands. This was the first organization in behalf of that object in America. He graduated in 1809; spent some months at Yale College studying theology and seeking adherents to his missionary projeet; entered Andover Theological Seminary in 1810, and associated himself with Messrs. Judson, Nott, and Newell in memorializing the General Association of Massachusetts, then in session at Bradford (June 28, 1810), upon the subject of missions, an aet whieh resulted in the formation of the American Board of Commissioners for Foreign Missions. He was licensed to preaeh in 1812, and ordained in 1815; spent three years in missionary labors in the Southern States, and two years in New York and other great eities, engaged in promoting the formation of the Ameriean Bible Soeiety and the Ameriean Colonization Society, as well as other missionary organizations, and was sent by the Colonization Soeiety, along with Rev. Ebenezer Burgess, to Western Africa, to select a site for a eolony. They proceeded first to England to confer with British philanthropists (1817), and aecomplished their objeet in Afriea in the following year, in what is now Liberia, but on the return voyage Mills died at sea, June 16, 1818. See his *Memoir*, by Rev. Gardiner Spring (New York, 1820).

Mills, Sebastian Bach: pianist and teaeher; b. at Cirencester, England, Mar. 13, 1838; was educated by his father in the strict English cathedral school. Then he studied in the Leipzig Conservatory, and on graduation made a sueeessful eoneert tour in Germany; removed to New York in 1857, and took a leading position as a eoneert pianist. He was for many years a familiar and favorite pianist, and has played with all the great orehestral soeieties. In 1866 and 1867 he made an extended concert tour with Parepa and Carl Rosa under the Bateman management; but gradually he retired from publie life, and has devoted himself exclusively to teaching. His compositions are almost exclusively for the piano, and belong to the brilliant bravura school, of whieh he was a fine exponent.

D. E. Hervey.

Mill Springs: post-village of Wayne co., Ky.; on the Cumberland river. During the eivil war, on Jan. 19, 1862, the Federal troops, 28,000 strong, under Gen. George H. Thomas, and the Confederate troops, 10,000 strong, under Gen. George B. Crittenden, met in battle about 5 miles from this plaee. The latter were led by Gen. Felix K. Zollicoffer, who was killed, and his forees defeated with a loss of 190 killed, 60 wounded, and 89 prisoners. Of the Federal force 38 were killed and 194 wounded.

Milltown: a post-village of Charlotte co., New Brunswick; on the St. Croix river; contiguous with St. Stephen, and directly opposite Milltown, a post-village ineluded in the limits of the eity of Calais, Me., with which it is connected by bridges (see map of Quebec, ref. 6–G). Immense quantities of lumber are sawed and shipped here. There are eighteen gang sawmills on the Canada side alone, besides an edge-tool factory and other works. Milltown has an aeademy, three churehes, a eireulating library, and several schools. Pop., with St. Stephen, about 4,000.

Revised by M. W. Harrington.

Millville: city; Cumberland eo., N. J. (for loeation of county, see map of New Jersey, ref. 7–B); on the Maurice river, here navigable, and the W. Jersey Railroad; 40 miles S. of Philadelphia. It eontains 12 churches, high school (building completed in 1894 at a cost of $25,000), 15 public sehools, public library and reading-room (founded 1864), gas and electrie lights, eleetric railway connecting the city with Bridgeton, the county-seat, a national bank with capital of $100,000, manufactories of iron, glass, and cotton, and 3 weekly newspapers. North of the city is Union Lake, 7 miles long, on the banks of which is an extensive public park. Pop. (1880) 7,660; (1890) 10.002; (1900) 10,583.

Editor of "Republican."

Milman, Henry Hart, D. D.: historian; b. in London, Feb. 10, 1791; was the son of Sir Franeis Milman, M. D., an eminent physician (1746–1821). He was edueated at Eton and Brasenose, Oxford; became a fellow 1815; took priests' orders 1816; was Bampton lecturer 1827; Professor of Poetry at Oxford 1821–31; rector of St. Margaret's, Westminster, and canon 1835; dean of St. Paul's 1849. D. at Sunninghill, Sept. 24, 1868. His chief works are a prize poem, *Apollo Belvedere* (1812); *Fazio*, a successful tragedy (1815); *Samos*, a poem (1818); *The Fall of Jerusalem*, a poem (1820); *The Martyr of Antioch*, and other poems (1821); *Bampton Lectures* (1827); *History of the Jews* (1829); *History of Christianity to the Abolition of Paganism* (1840); *History of Latin Christianity* (1854–55); a sumptuous edition of *Horace* (1849); an edition of Gibbon's *History of the Decline and Fall*, with notes, etc. His *Poetical and Dramatic Works*, of which a collected edition appeared in London, 1839, in 3 vols., attracted much attention in their time, but are now forgotten with the exception of a few hymns. His historieal writings at first encountered mueh criticism—chiefly on aecount of the strongly pronounced liberal Church views on which they were based.

Revised by W. S. Perry.

Milmore, Martin: sculptor; b. at Sligo, Ireland, Sept. 14. 1844; emigrated with his family to Boston in 1851; entered the studio of Thomas Ball in 1860; modeled an alto-relief of an ideal subjeet entitled *Phosphor*; made busts of Sumner, Longfellow, Tieknor, and other distinguished eitizens; reeeived in 1864 a commission to exeeute granite statues of Ceres, Flora, and Pomona for the Horticultural Hall at Boston, a task which oeeupied him two years; designed in 1867 a bronze statue for the soldiers' monument at Forest Hill Cemetery, Roxbury, and subsequently was employed by the eity of Boston to exeeute an army-and-navy monument, whieh was placed on Boston Common. D. in Boston, July 21, 1883.

Revised by Russell Sturgis.

Milne, John, F. G. S., F. R. S.: geologist and seismologist; b. in Lancashire, England, in 1848. He distinguished himself as a student at the Royal School of Mines, London; traveled in Ieeland; was engaged 1873–74 in mining in Newfoundland; visited, with Dr. Beke, Northwest Arabia, and finally in 1875 accepted a position as Professor of Mining and Geology under the Japanese Government, a post whieh he still holds. Much of his time has been devoted to seismology, on which he is the recognized authority. He founded the Seismologieal Soeiety of Japan in 1886, and is author of the volume on *Earthquakes* in the Natural Seienee Series.

J. M. Dixon.

Milne, William, D. D.: missionary; b. at Kinnethmont, Aberdeenshire, Scotland, Apr., 1785; went to China as a missionary in 1812; visited the chief islands of the Indian Arehipelago, and established himself at Malaeca, whence he circulated throughout Eastern Asia the Scriptures, as well as religious books in Oriental languages written and printed by himself. He published *The Indo-Chinese Gleaner*, a quarterly magazine, aided in translating the Bible into Chinese, and wrote *Retrospect of the Protestant Mission to China* (Malacca, 1820). D. in Malaeca, May 27, 1822. See his *Life and Opinions*, by Rev. Robert Philip (London, 1839).

Revised by S. M. Jackson.

Milne-Edwards, Alphonse, M. D.: geologist and naturalist; son of Henri Milne-Edwards, naturalist; b. in Paris, Oct. 13, 1835; graduated as doctor of medicine 1859; became professor in the Paris Sehool of Pharmacy in 1865, and member of the Legion of Honor in 1868; officer in 1884; sueeeeded his father in 1876 as professor at the Musée. He is the author of many important papers on zoölogy, and particularly on the anatomy of fossil birds, most of which have appeared in *Annales de Science Naturelle* and *Comptes Rendus*. His *Recherches Anatomiques, Zoologiques et Palæontologiques sur la Famille des Chevrotains* (1864) is an important work, but his masterpieee is *Recherches Anatomiques et Palæontologiques pour servir à l'Histoire des Oiseaux fossiles de la France* (1866–72).

Revised by F. A. Lucas.

Milne-Edwards, Henri, M. D.: naturalist; b. at Bruges, Belgium, Oct. 23, 1800; was the son of an Englishman; took his medieal degree in Paris 1823; beeame Professor of Natural History at the Lycée Henri IV.; Professor of Natural History at the Musée 1841; Professor of Zoölogy 1862; dean of the Faculty of Seiences; member of the Academies of Sciences and of Medicine; commander of the Legion of Honor, etc. Author of *Anatomical Researches Concerning Crustaceans* (1828); *Handbook of Materia Medica* (1832); *Elements of Zoölogy* (1834–35; new eds. 1840, 1851); *Natural History of Crustaceans* (1837–41); a new edition of Lamarck's *Natural History* (1838–45); *Leçons sur la Physiologie* (10 vols.), and of a great number of valuable scientific papers. D. July 29, 1885. Revised by F. A. Lucas.

Milner, John, D. D., F. S. A.: archæologist and polemical writer; b. in London, Oct. 14, 1752; was educated at Douay; became a Roman Catholic priest in 1777; became in 1803 titular Bishop of Castabala and vice-apostolic of the Midland district of England, but was expelled from his office by the English Catholic board in 1823. D. at Wolverhampton, Apr. 19, 1826. He was author of *History and Antiquities of Winchester* (Winchester, 1798–1801, 2 vols.; 3d ed. 1839, with his *Memoir*); *Letters to a Prebendary* (1800; 8th ed. Derby, 1843); *Ecclesiastical Architecture of England during the Middle Ages* (London, 1811; 3d ed. 1835); *The End of Religious Controversy* (1818; 11th ed. Dublin, 1859); and a *Vindication* of the same (1822). See his *Life*, by F. C. Husenbeth (Dublin, 1862).

Revised by S. M. Jackson.

Milnes, Richard Monckton: See Houghton, Baron.

Mi'lo [Gr. Μῆλος, whence Lat. *Me'los*]: a Greek island; the most southwesterly of the Cyclades; 14 miles long from E. to W. and 8 miles from N. to S.; 63 miles E. from Peloponnesus. Entirely volcanic, it is crescent-shaped, the vast crater forming an excellent harbor. It is rich in sulphur, vitriol, and alum. Exceedingly fertile and prosperous 150 years ago, it has been rendered sterile and almost depopulated by volcanic action and poisonous exhalations. The former population of 20,000 has shrunk to about 2,000, many of whom are sickly and deformed. Antiquities abound. The celebrated statue called *The Venus of Milo*, now in the Museum of the Louvre, was dug up here by a peasant in 1820, and was acquired for 6,000 francs by the French Government. E. A. Grosvenor.

Milo (in Gr. Μίλων): athlete of Croton, in Southern Italy; son of Diotimus. He was one of the most noted athletes of antiquity, having won the prize as wrestler in six Olympian, seven Pythian, ten Isthmian, and nine Nemean games. He was distinguished for his appetite also; at Olympia he lifted and carried on his shoulders a four-year-old ox across the race-course, then slew and ate it on the same day. He flourished about 510 B. C. He found his death by trying to split with his hands a log that had been opened by wedges. The wedges fell out, his hands were caught in the log, and he was torn to pieces by animals. J. R. S. Sterrett.

Milo, Titus Annius Papinianus: Roman politician; b. early in the first century B. C. Little is known of his life till he became tribune of the people in 57 B. C., when, as a partisan of Pompey and friend of the exiled Cicero, he incurred the enmity of Clodius. The followers of Milo and Clodius fought daily in the streets of Rome, and after Cicero returned from exile the contest became even more embittered. In Jan., 52 B. C., the rival parties met at Bovillæ, and Clodius was murdered by one of Milo's bodyguard. Cicero defended his partisan, but was deterred by intimidation from delivering his oration, *Pro Milone*, and was unable to prevent the conviction of the accused. He was condemned to exile and went to Massilia. Returning to Italy in 48 B. C. to take part in the rebellion incited by Marcus Cælius, he was killed near Thurii. F. M. Colby.

Milrea', or **Milree'** [from Portug. *milreis*, a thousand reals; *mil*, thousand + *reis*, plur. of *real*, a real < Lat. *rega'lis*, royal]: called also *corão* or *crown*; a Portuguese and Brazilian coin and money of account. The Portuguese milrea is worth about one U. S. dollar; the Brazilian is 51‡ cents of the money of the U. S.

Milti'ades (in Gr. Μιλτιάδης): general; b. at Athens; was the son of Cimon, a citizen of that place; succeeded his brother Stesagoras as tyrant of Chersonesus, and joined Darius Hystaspis in his campaign against the Scythians. Together with the other Greeks he was left in charge of the bridge over the Danube, and when Darius did not return at the appointed time he recommended the destruction of the bridge, while the Ionians, on the advice of Histiæus, insisted on its preservation. Afterward he conquered Lemnos, which was a Persian possession, and when the Persian fleet, after the capture of Miletus, approached Chersonesus, he fled and repaired to Athens. Here he was chosen commander against the Persian force, which, under Datis and Artaphernes threatened Athens, and defeated it in the memorable battle of Marathon (490 B. C.). A new armament which the Athenians placed under his command he used for an expedition against Paros for merely private purposes. He was arraigned, and condemned to defray the whole cost of the armament, and as he could not pay this enormous fine, he was thrown into prison, where he died from a wound he had received during the campaign. His son Cimon afterward paid the fine, and a monument was raised in honor of him on the plain of Marathon.

Revised by J. R. S. Sterrett.

Milton: city; capital of Santa Rosa co., Fla. (for location of county, see map of Florida, ref. 2–C); on the Blackwater river, and the Louis. and Nash. Railroad; 20 miles N. E. of Pensacola. It is in a cotton, fruit, wool-growing, and lumbering region, and has iron-foundries, dry dock, ship-yards, interior and coasting trade, and a weekly newspaper. Pop. (1880) 1,058; (1890) 1,455; (1900) 1,204.

Milton: town (settled in 1640, incorporated in 1662); Norfolk co., Mass. (for location of county, see map of Massachusetts, ref. 5–I); on the Neponset river at the head of navigation, and the Old Colony Railroad; 7 miles S. of Boston, with which it also has street-railway connection. It is the seat of Milton Academy (non-sectarian, chartered 1798); contains the Blue Hills which gave their Indian name to the State, 30 public schools, public library (founded 1871) with over 10,000 volumes, 4 churches, a national bank with capital of $200,000, and a weekly newspaper; is engaged in market-gardening, building-stone quarrying, ice-harvesting, and the manufacture of paper, chocolate, and water-crackers. The town contains the residences of many Boston business men. Pop. (1880) 3,206; (1890) 4,278; (1900) 6,578.

Editor of "News."

Milton: borough (founded in 1797, incorporated in 1817); Northumberland co., Pa. (for location of county, see map of Pennsylvania, ref. 4–G); on the Susquehanna river, the Pennsylvania Canal, and the Phila. and Read. and the Penn. railways; 62 miles N. of Harrisburg. It contains 9 churches, 22 graded schools, library (High School), 2 national banks with combined capital of $200,000, a trust and safe-deposit company with capital of $125,000, and 3 weekly and 2 other periodicals. There are railway-car works, rolling-mills, axle-forge, bolt and nut works, nail-factories, washer-works, large steam tannery, agricultural-implement works, 4 machine-shops, 2 planing-mills, 2 iron-foundries, sawmills, and fly-net factory. The borough was destroyed by fire in 1882. Pop. (1880) 2,102; (1890) 5,317; (1900) 6,175. Editor of "Miltonian."

Milton, John: poet; b. in Bread Street, Cheapside, London, Dec. 9, 1608; received a very careful education, first under a private tutor, then at Christ's College, Cambridge, which he entered Feb. 12, 1625. He was originally destined for the Church, but, reared in a family of Puritan cast, and consequently opposed in many points to the English Church of that time, he gave up this plan, and when in 1632 he left Cambridge he returned to his father's house in Horton, a village in Buckinghamshire, whither the family had retired on an independency. Here he studied classical literature and philosophy with great energy, being by nature a studious and industrious man; cultivated music, in which both he and his father were quite proficient; and composed the *Sonnet to the Nightingale*, *L'Allegro*, and *Il Penseroso*, the elegy *Lycidas*, and the two masques *Comus* and *Arcades*; the first collected edition of his poems was not published, however, until 1645. After his mother's death in 1637 he went abroad, visited Leyden, Paris, and Rome, and made the acquaintance, among others, of Grotius and Galileo. His Latin verses and other scholarly attainments, his personal beauty and noble disposition, introduced him to learned and elegant society, and made him friends. On his return home after an absence of fifteen months, he settled in London, the household at Horton having been broken up in the meantime, and took a few pupils, sons of relatives and friends, under his tuition; but soon he became deeply entangled in the turbulent controversies, religious and political, which filled that period of English literature, and for twenty years the poet of *L'Allegro* and *Comus* was engaged as a most violent and intolerant, though candid and eloquent, controversialist. His first polemical onset was an attack on the Established Church (1641–42). Five treatises belong to this contest—namely, *Of Reformation*, *Of Prelatical Episcopacy*, *The Reason of Church Government*, *Animadversions*, and *Apology for Smectymnuus*. In 1643 he married Mary Powell, but she left him after one month on account of the "spare diet and hard study" she found in his house. Four tracts on divorce followed (1644–45)—namely, *The Doctrine and Discipline of Divorce*, *The Judgment of Martin Bucer*, *Tetrachordon*, and *Colasterion*, in which he maintained that moral incompatibilities justify

divorce. The couple became reconciled afterward, and lived together until the death of the wife in 1653; she bore him three daughters. In 1644 he also published two other essays, *On Education* and *Areopagitica, a Speech for the Liberty of Unlicensed Printing*, which latter treatise is his most eloquent piece of prose writing. After the execution of Charles I. (Jan. 30, 1649) he wrote three powerful pamphlets (1649–50) in order to defend the acts of the English people in its struggle with its king—namely, *The Tenure of Kings and Magistrates*, *Eikonoclastes*, and *Pro Populo Anglicano Defensio contra Salmasii Defensionem Regiam*; and to this group of writings belongs also his controversy with Dumoulin (1654–55), comprising three pamphlets, among which was *Defensio Secunda*. The attack on Salmasius made a great sensation in Europe. It was written at the demand of Parliament, as in 1649 Milton had been appointed secretary in the ministry of Foreign Affairs by Cromwell. This position he held till the Restoration in 1660, though he became entirely blind in 1654, and could work only by the aid of a reader and a scribe. After the Restoration he was compelled to keep himself concealed for some time, and even after the Act of Oblivion he continued to live very secluded. On Nov. 12, 1656, he married Catharine Woodcock, but she died fifteen months after in childbed. In 1663 he married his third wife, Elizabeth Minshull, but his home was not a happy one. A severe regularity and haughty solitude characterized his life; studies and literary compositions occupied his time. *Paradise Lost* was published in 1667; *History of Britain* in 1670; *Paradise Regained* and *Samson Agonistes* in 1671; *Of True Religion* in 1673. A Latin manuscript, *De Doctrina Christiana*, which shows his very heterodox conceptions of different points of Christianity, was not published till 1825. He died Nov. 8, 1674, and was buried in the Church of St. Giles, Cripplegate, beside his father. At its first appearance *Paradise Lost* made no great impression. The author received £5 for the first 1,300 copies; the second edition was not published until 1673. The widow of Milton sold in 1681 her interest in the work for £8. Among others, see Masson's *Life of Milton*, 6 vols., 1858–80. The most complete edition of Milton's prose works is that in Bohn's library (1848–53, 5 vols.). The best edition of the poetical works is that by Mitford (London, 1851, 8 vols.). See ENGLISH LITERATURE.

Revised by H. A. BEERS.

Milton College: a coeducational institution at Milton, Wis., connected with the Seventh-day Baptist denomination. It was opened in 1844 as an academy, and in 1867 was chartered as a college. It furnishes both preparatory and collegiate instruction in three courses of study—classical, scientific, and English. There is a department of music. The buildings, apparatus, and libraries are valued at more than $50,000. The college has a faculty of eleven. Rev. W. C. Whitford, D. D. is president.

Milwaukee: city; capital of Milwaukee co., Wis. (for location, see map of Wisconsin, 7–F): on Lake Michigan, and the C. and N. W., the C., M. and St. P., and the Wis. Cent. railways; 80 miles N. of Chicago; area, 23 sq. miles.

It is located on a beautiful bay running inland about 3 miles, stretching 6 miles from headland to headland, part of which is being converted by the U. S. Government into a harbor of refuge for the Great Lakes. The Milwaukee river flows through the main portion of the city almost due S. till it nears the lake, when it turns abruptly S. E. About half a mile from its mouth it is joined by the Menomonee from the W., and still nearer the lake by the Kinnickinnic from the S. W. The spacious harbor and miles of dockage have been utilized by numerous steamboat lines, and the most intimate connection is kept up between Milwaukee and all the important cities of the Great Lakes. The lake also furnishes Milwaukee with the cheapest kind of transportation for the iron, copper, and lumber of Northern Michigan, Wisconsin, and Minnesota, and for the great coal mines of the Middle States. Part of the city between the river and lake lies 80 feet above the bay; and on the west side of the Milwaukee river the ground rises 125 feet above the lake, furnishing most admirable locations for residences. It is a city of wide streets and commanding views, while in its residence part it is remarkable for its fine shade-trees and spacious lawns, and the absence of fences gives it the appearance of one large park. There are seven public parks aggregating 456 acres on the lake shore, Milwaukee river, and other portions of the city and suburbs. At the Soldiers' National Home, 2 miles W. of the city, there are large and expensive buildings, where 2,000 disabled veterans are cared for, and surrounding which there are 400 acres of land which are thrown open and used as a park. The county courthouse is a large structure built of Lake Superior sandstone at a cost of over $400,000. There have recently been erected a new U. S. Government building at the cost of $1,500,000, a new city hall which cost $1,000,000, and a new public library and museum building costing $600,000; also a large and well-equipped Emergency Hospital belonging to the city. The Industrial Exposition Building, where an annual exhibit is held, cost over $300,000. The Layton Art Gallery, with a fine collection of paintings, the Union Railway Station and that of the Chicago and Northwestern are tasteful and substantial structures. Among the church edifices worthy of special mention are St. Paul's Episcopal, Norman architecture; Immanuel Presbyterian, Gothic; St. James's Episcopal, Gothic; and the Church of Gesu, Gothic—the last, built by the Jesuits, is the largest and most expensive church in Wisconsin, and has two spires, one 250 and the other 200 feet high. There are over 130 churches, including 38 Lutheran, 10 Baptist, 28 Roman Catholic, 19 Methodist Episcopal, 9 Congregational, 8 Presbyterian, and 7 Protestant Episcopal. Milwaukee is the seat of a Roman Catholic archbishopric and of a Protestant Episcopal bishopric. There is a good public-school system with 50 schools and an enrollment of 33,194 pupils. The annual cost of the schools is $714,000. The Roman Catholic and Lutheran Churches have a large number of parochial schools, which, with a few other academies, have an enrollment of 21,131. There is a normal school under the regents of the State, and 3 high schools under the city school board. Milwaukee College for women was established in 1849; it is now known as Milwaukee Downer College, and has fine buildings on a beautiful site of 10 acres near the Lake Shore. The Roman Catholics and Lutherans have large colleges in the city and suburbs. The Convent de Notre Dame, the mother-house in the U. S., owns and occupies an entire square near the center of the city. The Woman's Club of Milwaukee owns a valuable property, called the Athenæum, which is used as a headquarters for the club's social, literary, and benevolent meetings. There is a large number of charitable and benevolent institutions, among which are 3 homes for the aged, and orphan asylums, 10 hospitals, 15 relief and aid associations, 50 benevolent societies of various kinds, and 2 industrial schools. There are over 100 social, literary, national, and athletic clubs, such as the Milwaukee Club, the Calumet Club, Recreation Club, St. Andrew's Society, Chess Club, Deutscher Club, Iroquois Club, Whist Club, Bon Ami Club, Old Settlers' Club, Phœnix Club, Curling Club, etc., some of which occupy costly buildings of their own. The Turner societies are strong and wealthy, and have done much to promote physical culture. Milwaukee has long been famous as a musical center, and its Musical Society, Arion Club, and Cecilian Choir have done much to raise the musical standard. Including those connected with churches, there are in Milwaukee about 50 musical societies. The valuation of the real and personal property of the city, as assessed for taxation, is $158,174,873, while the tax levy for city purposes is $3,177,313. The bonded debt of the city is $6,090,500, a large part of which is for the water-works, which the city owns and from which it derives a handsome revenue. There are 7 daily, one of which is in the Polish language, 5 semi-weekly, 36 weekly, 5 semi-monthly, and 15 monthly periodicals. There are 2,572 manufacturing establishments, employing $106,594,752 capital and 60,455 persons, paying annually $28,871,313 for wages, and receiving $158,136,847 for products. The greatest number of hands employed is in the manufacture of iron, steel, and machinery, then follow leather, clothing, beer, knit goods, stoves, tinware, and furnaces, car-building, iron and steel, furniture, malleable iron, brick, and meat-packing. The annual values of the chief productions are: Iron, steel, and machinery, $17,398,774; beer, $15,418,000; packed meats, $14,391,488; leather, $12,424,526; malt, $6,476,251; clothing, $5,136,600; tin, $4,296,477; malleable iron, $4,157,700. The healthfulness of the city has improved every year, and now the annual deaths number but a fraction over 13·88 per 1,000. The sewers emptying into the Milwaukee river at one time were sources of disease, but a tunnel has been constructed from the lake to the river above the city, and now the water of the river is kept pure by being flushed continually from the lake. Milwaukee has one of the best electric street-railway systems in the country, connecting all parts of the city

with each other and with the neighboring towns and villages. Pop. (1880) 115,578; (1890) 204,468; (1895) 249,290; (1900) 285,315. JOHN JOHNSTON.

Mīmāṁsā: a Sanskrit word signifying "discussion"; its common use is to designate the Hindu philosophical system of Jāimini, and in this sense it is an abbreviation for *Pūrva-* or *Karma-mīmāṁsā*, "Prior discussion" or "Discussion concerning religious observances," as distinguished from the Vedānta system, which is otherwise known as the "Later discussion" or "Discussion concerning Brahman," the *Uttara-* or *Brahma-mīmāṁsā*. In both systems the subjects of the ancient Brahmanical speculations are methodically elaborated, and the two thus form a coherent whole in so far as the first is practical and the second theological: the first, a system of ritualistic precepts; the second, in connection with the idealistic monism of the older Upanishads, a doctrine of salvation by knowledge. The two systems refer each to the other, and are accordingly doubtless of synchronous origin. That the Mīmāṁsā is reckoned as one of the six Indic philosophical systems is due chiefly to this connection with the Vedānta, and, secondarily, also to the form of its discussions (see below).

The aphorisms of Jāimini, called the Mīmāṁsā-sūtras, form the oldest and most important work of this school. Like the sūtras or aphorisms of the other systems, they are so brief and obscure as to be quite unintelligible without a comment. Their most famous commentator was Çabara-svāmin, who wrote not long after the birth of Christ (Bühler's *Manu*, p. cxii.). The composition of our sūtras—and accordingly also of the Vedānta-sūtras—may be referred to the beginning of our era or to a date a little earlier.

The purpose of the Mīmāṁsā is to give the rules for the interpretation of the Vedic texts that concern themselves with the Brahmanic ritual; but these texts do not set forth the ceremonies completely and clearly, and they are everywhere mingled with discussions of the mystic significance of this or that sacrificial act or utensil; and the Brahmanical sacrificer was taught to expect the most dreadful consequences from the smallest mistake in the performance of his ceremonies; he therefore had a real need for such a compendium as the Mīmāṁsā-sūtras; for these attempt to resolve all doubts respecting the details of the sacrifice, and to reconcile the contradictions of the Vedic texts—contradictions which really exist, but which are, according to the Mīmāṁsists, only apparent. Moreover, as this system treats of the rewards held out for the correct performance of the sacrifices, it has become an epitome of the lore of the Brahmanical scriptures.

The existence of God is not recognized by the Mīmāṁsā; but this fact does not interfere in the least with the belief in the deities of the Indic popular religion; in all the Indic systems, in fact, the gods are merely beings who, by merit won in previous existences, have raised themselves in the scale of being to a divine rank in which they are loftier and happier than men; but they are not immortal; the after-effect of their merit once exhausted, they are liable to shift to other and lower forms of existence. If, in the absence of a divine source of revelation, accordingly, we ask upon what authority the doctrine concerning sacrifices and their results may rest, the Mīmāṁsists reply: "Upon the *Veda*; and the *Veda* needs no ulterior authority, being itself eternal and uncreated; and treats only of things that have existed from all eternity, and that carry their own proofs with them."

The Mīmāṁsā is not of a properly philosophic character; its inclusion among the six philosophical systems, Vedānta, Sānkhya, Yoga, Nyāya, Vāiçeshika, is due in part to the form of its exposition. The contents of the *Veda*, e. g. are classified in certain definite categories: (1) Positive precepts; (2) texts and formulas; (3) names of ceremonies; (4) prohibitions; (5) explanatory statements of acts enjoined or forbidden. Further, the discussions proceed in a manner that presupposes an advanced state of the study of logic. The established scheme contains five members: (1) Proposition; (2) doubt of its correctness; (3) false view of the subject; (4) refutation of the same by the correct argument; (5) result of the discussion. Moreover, for the establishment of Mīmāṁsā doctrines, really philosophical questions are sometimes discussed. Most notable is the discussion of the eternity of sound, and of the question whether the connection of sound and sense is natural (*φύσει*) or conventional (*θέσει*). (See Ballantyne, *Christianity contrasted with Hindu Philosophy*, London, 1854, pp. 176–195.) The doctrine of the sources of knowledge is so treated in the Mīmāṁsā that a greater number is recognized than in the other five systems—namely, perception, inference, authoritative tradition, analogy, self-evidence, and several others.

Dr. Fitzedward Hall, in his *Contribution toward an Index to the Bibliography of the Indian Philosophical Systems* (Calcutta, 1859), enumerates eighty-five Sanskrit works on Mīmāṁsā. In India, next to Jāimini and Çabara-svāmin, the most esteemed authority upon Mīmāṁsā was Kumārila-svāmin, who wrote his glossary to Çabara-svāmin's comment at the beginning of the eighth century. The Mīmāṁsā-sūtras were published with the commentary in the *Bibliotheca Indica* (2 vols., Calcutta, 1873–85); a good modern compendium, the *Jāiminīya-nyāya-mālā-vistara*, was edited by Th. Goldstücker (London, 1865), and by Pandit Çivadatta in the Ānandāçrama Sanskrit Series (Poona, 1892).

Although the Mīmāṁsā doctrines have been of great importance for the intellectual and religious life of India, the system has never been an attractive one for Occidental students. In 1826 H. T. Colebrooke published his essay on the Mīmāṁsā (reprinted in his *Miscellaneous Essays*, London, 1873); and this was the only treatise of the subject published in a modern European language and worth mentioning until the appearance of G. Thibaud's edition and English translation of the *Artha-saṁgraha* (Benares Sanskrit Series, 1882). This translation and the introduction thereto constitute the best English account of the principal contents of the system. R. GARBE.

Mime [from Lat. *mīmus* = Gr. *μῖμος*; cf. *μιμεῖσθαι*, imitate, mimic]: a development of the Sicilian farce. The word is still used as a synonym for an actor on the mimic stage. In its special application the mime represents the imitation of a definite situation or a typical character, and differs from the antique comedy of the early period by the lack of a chorus and the lack of an elaborate plot. The credit of introducing the mime into literature is ascribed to Sophron, who flourished in Syracuse about the middle of the fifth century B. C., and whose influence on the form of Plato's dialogues is a matter of literary tradition. The dramatic idyls of Theocritus doubtless owe much to Sophron's pattern, and some of the dialogues of Lucian may be called mimes, but the whole department has been brought nearer to us by the recent discovery of the *mimiambi* of HERONDAS (*q. v.*). In Rome the mime was early popular. It was introduced from Sicily by way of Magna Græcia, and developed from a rude ballet in character until it ceased to be a mere intermezzo, absorbed the comic elements of the *fabulæ Atellanæ*, and became a regular afterpiece. The height of the mime was reached in the time of Cæsar, and Decimus Laberius and Publilius Syrus are its most distinguished representatives. For an interesting description of the Roman mime, see Ribbeck, *Geschichte der römischen Dichtung*, vol. i., p. 220 foll. B. L. GILDERSLEEVE.

Mimicry: the general fact of imitation. The word is used in several more technical senses.

Mimicry in Biology.—Biologists recognize under this phrase a great class of cases of close resemblance in form, color, or habits, between insects or animals, and even between these and inanimate objects, which serve to render these creatures indistinguishable by friend or foe. In their coloration, insects—butterflies are a notable example—take on the colors of various flowers, leaves, mosses, etc., and thus avoid detection; or the colors of poisonous insects, and so share their immunity; or the shape of harmless knots, twigs, etc., and so escape attention; or the colors of conspicuous things, and so attract their mates and victims. The phenomena, of which these instances are only examples, fall thus into two classes—*protective mimicry*, the animal escaping his enemies by these deep-going organic subterfuges, and *aggressive mimicry*, the animal deceiving others thus to support himself and to destroy his enemies. Taken together the facts furnish a convincing proof of the evolution process; for no explanation is adequate except that afforded by the law of natural selection. See EVOLUTION.

Mimicry in Psychology.—In psychology the term is applied to all cases of imitation of one being by another in which the mental state of the imitator is in a measure involved. There is (1) *expressive mimicry*, referring to all the facts of organic pantomime by which one creature expresses himself by gestures, movements, etc., which another understands and responds to. It is probable that the imitations of monkeys, parrots, etc., had their origin in such a common

tendency to become gregarious by getting rudimentary forms of expression, the original movements being useful either to the individual or to the flock. Men show the same tendency to pantomime, as is seen clearly in idiots, imbeciles, and diseased persons. The loss of this gesture imitation is called *amimia* by the pathologists. Looked at theoretically as a kind of imitation, it is nearest the biological type. (2) *Conscious mimicry*, ordinarily called "conscious imitation." It applies to the fact of an innate tendency to imitate movements, actions, etc., seen early in infants. (3) *Social mimicry*, the tendency so universal and so binding upon us all to act, believe, think, dress, etc., as custom, habit, and social life dictate. These influences are summarized under the phrase "social suggestion." (See IMITATION and SUGGESTION.) On biological mimicry, see Poulton, *The Colours of Animals* (London, 1893), and on psychological mimicry, Tarde, *Les Lois de l'Imitation* (Paris, 1892).

J. MARK BALDWIN.

Mimo'sa [Mod. Lat., from Gr. *μῖμος*, imitator, mimic. So called from its imitating animal sensibility]: name of a genus of leguminous trees, shrubs, and herbs which gives name to the great sub-family *Mimoseæ*, distinguished by having regular flowers. The genus includes at least ten species which have decidedly sensitive leaves. (See SENSITIVE PLANT.) Of these, the *Mimosa pudica* is the most remarkable, and the only one familiar in cultivation. Most of the numerous species are tropical, many are African, many American, of which no less than fifteen occur in the southern and southwestern parts of the U. S.

Min: an Egyptian deity, worshiped principally at Koptos as the patron of travelers through the Hammamat valley to the Red Sea, and guardian of the Hammamat quarries. He was primarily regarded as the god of the desert, but the Greeks identified him with Pan. C. R. G.

Mi'na [= Lat., from Gr. *μνᾶ*, a measure of weight (originally Assyrian), a weight of silver, a sum of money; cf. Heb. *māneh*, a weight, *mina*, deriv. of *mānāh*, divide, measure out]: in Greek money and weights, a standard equivalent to 100 drachmæ and forming the sixtieth part of a talent. The value varied according to the talent used. (See TALENT.) The Attic mina is generally stated to have been worth $17.61 U. S. money; it was a money of account, and was not coined. Revised by J. R. S. STERRETT.

Mina, mee'năă, FRANCISCO ESPOZ Y: soldier and revolutionist; b. at Ydoein, near Pamplona, Spain, July 17, 1782; joined his nephew (see MINA, FRANCISCO JAVIER) in 1809 in organizing the mountaineers into guerrilla bands to oppose the French invasion. In the following year he succeeded to the command, and soon became the most efficient of the numerous partisan leaders of Northern Spain. In 1812 he received a commission as general, and was appointed commander-in-chief of Aragon; became "political chief" of Navarre 1813; contributed to the victories of Salamanca and Victoria; blockaded Pamplona 1812–13, and retired to private life on the restoration of Ferdinand VII. The despotic measures of that king, however, induced the two Minas to head an insurrection, but, having failed in an attack upon the citadel of Pamplona, Sept. 25, 1814, he sought refuge in France. In 1820 he took part in the constitutional revolution of Riego, becoming captain-general of Navarre; suppressed the royalist insurrection in Catalonia 1822; became captain-general of Catalonia Jan., 1823; capitulated to the French at Barcelona Nov. 1, 1823, and proceeded to England. In 1830 he was again engaged in an unsuccessful revolt against Ferdinand VII. in Navarre, and again escaped to England. In 1834 he was recalled to Spain to defend the liberal government established in the name of the young Queen Isabella against the Carlists, and took command of an army corps, but with indifferent success. Resigning in 1835, he died at Barcelona, Dec. 24, 1836.

Mina, FRANCISCO JAVIER, nephew of Francisco Mina: soldier; b. at Otan, near Monreal, Navarre, Dec. 3, 1789. He studied for the priesthood, but in 1808 headed a band of guerrillas against the French; was captured by the latter in 1810 and remained a prisoner until 1814, when he joined his uncle against Ferdinand VII. and was driven with him over the border into France. Thence he went to England and the U. S. to obtain subscriptions and recruits for an expedition in aid of the patriots in Mexico. With 200 men he landed at Galveston, Tex., in Nov., 1816, but was soon forced to retire. At New Orleans he organized a fresh force; landed in Tamaulipas, Apr., 1817, and at the head of less than 500 men fought his way into the center of Mexico. He showed great courage and generalship, and repeatedly defeated the Spanish forces; his generous policy won him many adherents, and his force increased to nearly 2,000 men. The movement was badly timed, however; the Mexican patriots were disheartened at this period by the crushing reverses which they had undergone; the support which they might have given to Mina was withheld, and his recruits gradually fell away. After sustaining himself for some months in Guanajuato, Mina was captured by surprise, and was tried and shot before the fort of Los Remedios, where some of his adherents still held out, Oct. 27, 1817. The fort was taken by the Spaniards in Jan., 1818, closing this episode of the Mexican revolution. See Bancroft, *Hist. of the Pacific States* (Mexico, vol. iv., p. 659); Robinson, *Memoirs of the Mexican Revolution* (1820). HERBERT H. SMITH.

Mi'na Bird [also *mina*, from Hind. *mainā*, starling, mino]: a member of the starling family (*Sturnidæ*) common in Southern India; its scientific name is *Gracula religiosa*. It is about 10 inches long, of a glossy purplish black, with a white patch on the primaries. A curious wattle on each side of the head, back of the eye, is orange colored; the bill and feet are yellow. It is very lively and intelligent, and when trained is considered the best talker among the birds, far surpassing any parrot. It is also a good singer. Allied species occur in Ceylon, Burma, and some parts of the Malay Archipelago. F. A. LUCAS.

Minaev, mĕĕ-naa'yef, DMITRIĬ DMITRIEVICH: poet, son of Dmitriĭ Ivanovich Minaev (1808–76), likewise a poet, though of little importance; b. in Simbirsk, Russia, Oct. 21, 1835. For a number of years he contributed to different papers and reviews humorous or satirical pieces, attacking the abuses of society with all the vivacity that characterized the Russian writers of the great reform period (from 1860 to 1870). He will, however, rather be remembered for his numerous translations from foreign authors, among others the *Ruy Blas* and *Hernani* of Victor Hugo; Marlowe's *Faust*; Byron's *Childe Harold*, *Don Juan*, and *Manfred*; Shelley's *Prometheus Unbound*, etc. A. C. COOLIDGE.

Minard, CHARLES JOSEPH: engineer; b. at Dijon in 1781; was educated at the École Polytechnique, and entered the administration of Ponts et Chaussées in 1800. He became division inspector in 1839, inspector-general in 1846, and retired in 1857. Among his numerous works were *Cours de construction des ouvrages qui établissent la navigation des rivières et des canaux* (1841); *Notions élémentaires d'économie politique appliquées aux travaux publics* (1850); and *Des embouchures des rivières navigables* (1855). He also published numerous pamphlets on technical questions relative to transportation. D. at Bordeaux, Oct. 24, 1870.

Minaret [from Span. *minarete*, from Arab. *manārat*, lantern, lighthouse, turret, deriv. of *minār*, candlestick, lamp, lighthouse; cf. *nār*, fire, and *nawwir*, illumine]: the slender, lancelike shaft of brick or stone which rises from close outside one of the corners of a Mussulman mosque. It terminates far above the roof in a tapering cone, and is ascended from inside by a very narrow spiral staircase. At varying heights it is surrounded by one or more projecting galleries, whence the MUEZZIN (*q. v.*), protected by a parapet or railing, calls to prayer. Many minarets are most graceful, ethereal structures, and the conception—considering the fact that they are used especially in countries often convulsed by earthquake—is one of the most daring in architecture.

E. A. GROSVENOR.

Minas, mee'năăs: an inland department in the southern part of Urnguay, surrounded by Treinta Tres, Rocha, Maldonado, Canelones, and Florida. Area, 4,230 sq. miles; pop. (1891) 23,466. The surface is much broken, and, in the N., mountainous. The name (meaning mines) refers to its supposed mineral wealth, but no mines have been successfully worked: cattle-raising and, to a small extent, the cultivation of grains are the only industries. The population is said to be very lawless. Minas, the capital and chief town, was founded in 1783, and has a population of about 5,000. H. H. SMITH.

Minas Geraes, mee'năăs-*zhā*-raa'*ās*: a state of Brazil; lying inland from the southeastern coast; surrounded by Bahia, Espirito Santo, Rio de Janeiro, São Paulo, Matto Grosso, and Goyaz. Area, by the best attainable estimates, 211,917 sq. miles. The principal mountain ranges are the Serra do Mar, on the eastern boundary; the Serra da Mantiqueira, running northward through the middle of the

state; the Serra da Canastra, on the W.; and a cross range, the Serra das Vertentes, joining the Mantiqueira and Canastra chains and separating the head waters of the rivers São Francisco and Paraná. Itatiaia, the highest peak in Brazil (8,900 feet), lies at the extreme southern angle; and there are several other points over 5,500 feet high. Between the mountains, especially in the western part, there are lower, rolling or hilly lands, properly extensions of the Brazilian plateau. The region between the Canastra and Mantiqueira ranges is drained by the upper part of the river São Francisco, which rises in this state; it consists mainly of open lands suitable for grazing, which is the principal industry, is thinly populated, and is still one of the most neglected parts of Brazil; but it has great natural capabilities, and since the opening of navigation on the upper São Francisco it has given promise of rapid development. (See São Francisco.) The mountainous northeastern region contains large areas of untouched forest lands, rich in valuable woods, but as yet almost unknown except to roving Indian tribes. The principal rivers are the Jequitinhonha and Doce. By far the greater part of the population is gathered in the southern part, where, among the mountains, there are many fertile valleys and slopes, well adapted for coffee-culture; this is now one of the great coffee-producing states. Southern Minas Geraes has a good system of railroads, connecting with those of São Paulo and Rio de Janeiro. Coarse cotton cloths, beer, saddlery, etc., are manufactured on a considerable scale. The captaincy of Minas Geraes was separated from Rio de Janeiro in 1709. As the name indicates, it was long noted for its mines, especially its gold and diamond washings. It is still the principal mining state in Brazil, but only a few of the gold deposits are profitably worked, and diamond-mining is nearly abandoned. The quartz crystals called Brazilian pebbles, largely used in the manufacture of spectacles, etc., are obtained from this state; sapphires and rubies are found in conjunction with the diamonds, and many other valuable minerals have been discovered, but not extracted on a large scale. Pop. (estimated, 1894) 3,604,622. Capital, Ouro Preto. See Saint-Hilaire, *Voyage dans les provinces de Rio de Janeiro et de Minas Geraes* (1830); Gerber, *Noções geographicas e administrativas da provincia de Minas Geraes* (1863); Burton, *Explorations of the Highlands of the Brazil* (1869). Herbert H. Smith.

Mincio, min'ehō: a river of Northern Italy which issues from the southern extremity of Lake Garda, passes by Mantua, and joins the Po 8 miles below this city after a course of 50 miles. It is navigable for barges from its union with the Po to Mantua. Its waters are much used for irrigation.

Minckwitz, Johannes: poet and philologist; b. at Lückersdorf, Lusatia, Jan. 21, 1812; studied at Leipzig; became professor extraordinary in the University of Leipzig in 1861. He published *Lehrbuch der deutschen Verskunst* (1844; 6th ed. 1878); *Gedichte* (1847); *Taschenwörterbuch der Mythologie aller Völker* (1852; 6th ed. 1883); *Lehrbuch der rhythmischen Malerei der deutschen Sprache* (1855); *Der illustrierte neuhochdeutsche Parnass* (1860); *Der Künstler* (1862); *Vorschule zum Homer* (1863); *Die Weisen des Morgenlands* (2d ed. 1865); *Dem neuen Kaiser* (1871). D. in Heidelberg, Dec. 29, 1885.

Mind [O. Eng. *mynd*, *gemynd*: O. H. Germ. *minna*, memory, love: Goth. *gamunds*, memory; cf. Lat. *mens*, *men'tis*, mind, Gr. *μένος*, mind, strength of spirit, Sanskr. *man*, think]: as contradistinguished from *matter*, free, self-determined being; hence it exists in the form of atomic individuals, and not, as is the case with matter, in that of mere mechanical or quantitative aggregates. Wherever we observe activity which is in conformity to an end or purpose, we attribute it to mind. Mind contemplates its potentiality or lack or need in the form of an idea, and uses means to realize it, while material things, although having potentialities, do not act with conscious purpose. Taken generally, material things are limited or constrained from without—conditioned through others—while spiritual beings are always free and self-conditioned, at least formally, originating their own limitations, first as ideas or purposes theoretically, and then realizing them by practical activity or will. Pure matter, devoid of all self-determination, is perhaps mere empty space—pure chaos; pure mind or absolute self-determined being is God. Between these ultimates lie the world of nature and that of man, the former containing material beings that manifest various degrees of self-determination—from the crystal through the plant up to the animal; the latter containing the world of man or human history, which is the revelation of self-determination or mind in its progressive emancipation from matter, the humblest human soul being immortal and potentially free, though involved in manifold external complications with circumstance. Historically, it was Anaxagoras who first announced mind (*νοῦς* = reason) as the simple self-existent essence of things, that which sways matter. Besides this general signification of the term *mind*, in which it is a synonym of spirit, and corresponds to the German term *Geist*, including the several activities of feeling, volition, and thought, the word mind is used in a narrower sense to imply only the theoretical activity or the Intellect—the activity of cognition. Aristotle's *ψυχή* is identical with mind in the first-mentioned sense, if we interpret it as including the *νοῦς ποιητικός*. In the second book of the *De Anima* in his careful manner he defines soul (*ψυχή*) to be "the first entelechy of a physical organic body having life potentially." By "first entelechy" he means a self-determining or free being in its undeveloped first stages, when it *has* not unfolded, but *may* unfold, its capacities—hence a formally free being; the "second entelechy" is the actually self-developed free being. According to this definition, soul would seem to be correlative of body. But he proceeds in the third book to describe the creative reason (*νοῦς ποιητικός*) as possessing independent and eternal existence apart from body, thus apparently making the term soul apply to God as well as to mixed earthly natures. In opposition to the theory of the speculative philosophers and theologians, represented by such names as Plato, Aristotle, Leibnitz, Hegel, St. Augustine, Thomas Aquinas, Duns Scotus, and Meister Eckhart, the materialists repudiate the co-ordination of mind with matter, or the subordination of matter to mind, and explain mind as a function of matter. Psychology with them, accordingly, falls into a department of physiology. From Democritus and Empedocles, and their gifted expounder Lucretius, down to Hartley and Bain, this unpopular doctrine has found in every age its hardy advocates. Physiological investigations into the conditions under which mind is active in its various phases have doubtless been of great benefit to psychology, and more is to be expected from this source in the future. Notably, in certain practical spheres—for instance, in the medical treatment of the insane—we have profited by adopting the physiological theory. John Stuart Mill, holding the doctrine of sensation as the original form of mental activity, defines matter to be "the permanent possibility of sensation," and likewise mind to be "a series of feelings with a background of possibilities of feeling"—definitions which point toward Berkeley's theory of immaterialism. Another class of thinkers are found in open hostility to the theological and speculative view first mentioned, although they do not adopt the physiological view of mind. The early commentators of Aristotle were divided—some, like Themistius, holding that individual men are immortal; others, like Alexander Aphrodisias, holding that only God is immortal; the lower faculties of the soul, memory, feeling, the discursive intellect, etc., called by Aristotle the passive reason (*νοῦς παθητικός*), are mere dispositions connected with the animal faculties, and therefore perishable with the body. The creative reason (*νοῦς ποιητικός*) was conceded to be immortal and independent of matter, but only as One, the deity or the world-soul, while men, who participate in this pure activity, lose their individuality at death with the lapse of sense-perception, memory, reflection, fancy, etc., which furnished the individual attributes. The adoption by Averroës of this doctrine, subversive of all claims on the part of man as man to essential participation in the divine life, made an epoch in the history of thought. The dangerous predicament of the Church upon the revival of learning, and the study of Aristotle through Arabian commentary and translation, aroused the mightiest thinkers of the period of scholasticism, and Christian theology at length settled its dogmas upon a firm foundation beyond the power of the subtle metaphysics of the Arabians. The great question regarding mind was this of the relation of the particular individual to the universal soul; and there is no second problem of equal importance to man.

The philosophy of mind must verify its theories by their application to the interpretation of human institutions. The nature and destiny of mind is revealed in those gigantic products of the united endeavor of entire peoples—the work of the will rather than of the intellect, embodied in the state, the Church, civil society—with unmistakable tracings, while the scientific theories, born of individuals, are the field

of interminable disputes. Psychology as a science has been taken by some to include the entire realm of the philosophy of mind; by others it has been understood to include only the subjective manifestation of mind, or, still more limited, the self-conscious phase of it. (See PSYCHOLOGY.) An outline of the entire philosophy of mind as treated by one of the most comprehensive and profound of modern thinkers includes the following departments; A. Subjective Mind falls under three heads—I. Anthropology, or the science of those phases of mind beginning with its enthralment in nature and its struggle for individuality; these are (*a*) the peculiar qualities and processes arising from race, climate, age, sex, sleep, sensation, passions, etc.; (*b*) feeling, the interaction between consciousness and the unconscious life of instinct, ideas for the most part remaining obscure and in the form of mere impulses; (*c*) symbolism and language, the mind creating for itself a conventional medium in which it fixes the products of its thinking activity for the sake of communication, combination of the individual with the race, and self-contemplation. The human mind thus frees itself from animal impulse and elevates itself to consciousness. II. Phenomenology of mind is the science of the process by which mind comes to recognize free self-determining intelligence as the presupposition and logical explanation of the objective world. It begins (*a*) with the consideration of immediate consciousness of objects, and traces the history of its (*b*) discovery of their relativity and the origin of their properties and attributes in their mutual relations, until (*c*) it arrives at the conviction that the objects of sense-perception are mere phases or manifestations of forces which are in a state of perpetual transition into each other, originating and annulling individual things, leaving no permanent material beings, but only an abstract internal power, of which the phenomenal world is a manifestation. The thought of a genesis of difference and distinctions from an abstract force in which all concrete distinctions have vanished is the thought of a self-determining or self-duplicating entity, a manifestation by means of self-opposition; and this radical idea that underlies the thought of force is the idea of a universal that exists as a particularizing process. Here may be recognized the thought or concept of the personal Ego or of mind. Hence all distinctions among objects in the outer world are traced ultimately to mind as their Creator, and this investigation has found the substance underlying objects and identified it with the Ego or a thinking subject. III. Psychology, considered as a special department, is the science of mind as subject; it considers the subjective factor of knowledge and investigates its forms. It treats (*a*) of theoretical mind as sense-perception, representation and pure thought; (*b*) of the emotional activity of mind; (*c*) of the practical activity, or the will. B. Objective Mind includes the world of human history and the organized institutions of man—(*a*) the family, (*b*) civil society, (*c*) the state. C. Absolute Mind (*νοῦς ποιητικός*) includes (*a*) the phase of manifestation of the divine mind to sense-perception in the form of the beautiful in art; (*b*) the revelation of the divine to the will in the form of the good as set forth in religion; (*c*) the systematic exposition of the divine mind as the ultimate truth in the form of science, culminating in theology or philosophy.

WILLIAM T. HARRIS.

Mindanao, min-dăă-naa′ō: the southeasternmost of the Philippine islands, the largest next to Luzon, and the least known; between 5° and 10° N. lat. and 122° and 126° E. lon. It is shaped like a calabash, with the handle to the W. and the mouth to the N. It is a part of the old Spanish colony of the Philippines. Area, 37,500 sq. miles. The census of the population submitted to Spain gave in 1887 a count of 209,086. The independent population is much larger, and is estimated at 400,000, giving a total of about 600,000, or 160 per sq. mile. It is the most densely populated of the group. The surface is very mountainous; the highest known mountain is Apo, near the Gulf of Davao, on the south coast; height, 10,300 feet. The very numerous volcanoes, though essentially modern, as shown by the lavas, are now inactive. Earthquakes are very frequent, but generally slight, though very destructive ones sometimes occur. The island is rising along the western coast. Streams and lakes are numerous, but generally small. The Palangui or Grande carries 2 fathoms for 80 miles from its mouth. There is a dry and wet season each year, but their occurrence depends on the topography. The southwestern slopes are wet and the northeastern dry during the southwest monsoon, and the reverse for the northeast monsoon. During the wet season local storms are frequent, and typhoons occasionally, though rarely, pass over the island. The soil is extremely fertile. The surface is closely covered with fine forests abounding in useful woods, resins, and gums. The fauna is tropical and rich. A rare and little-known species of wild cattle exist in swamps in the interior which have the same appearance for cattle that the turnspit has among dogs. The inhabitants are negritos, the aborigines, few in number, generally vagabonds, sometimes slaves; Infedels, under which the Spaniards included the independent interior tribes, Indonesian, resembling the Dyaks and Battas, wild, man-hunters, but scrupulously honest, numbering about 300,000; Malays, along the coast, especially on the S. E., N. W., on the interior lakes, and in the valley of the Grande; Mohammedans, predatory, resembling the inhabitants of the Sulu islands, submissive along the coast, but independent inland, numbering about 100,000; Visayas, who are submissive, Catholics, the descendants of native colonies from the Visaya islands, numbering 120,000; and the Chinese, who are increasing rapidly in number, are scattered along the coasts and in the towns, and are devoted to agriculture and trade. The Spaniards are few in number, mostly at Zamboanga, a fortress and the end of the handle. This island was the first of the Philippines seen by Magellan (1521), and since that date Spanish conquest had been under way with varying success. The most difficult peoples to deal with are the Malays. See PHILIPPINES in the Appendix.

MARK W. HARRINGTON.

Mind and Body: See the Appendix.

Mind-cure: the cure of bodily ailments through mental influences without use of medicines or other treatment. The influence of mind on body is now recognized to a degree in therapeutics; but no systematic or scientific formulation is yet possible. The therapeutic uses of HYPNOTISM (*q. v.*) show that the dwelling of the attention upon certain ideas tends to bring about the usual physical effects. This is now known as SUGGESTION (*q. v.*), and extends to all mental conditions to some degree. It is only an aspect of this general fact that strong belief in certain physical effects, predicted and strongly suggested by another, should have some influence in producing them, especially in minor functional and nervous troubles. It should be distinctly understood, however, that reputable physicians will have nothing to do with any mind-cure which is based on appeals to credulity or professes to go beyond the slight moral influences auxiliary to regular medical treatment. The various forms of mind-cure exploited under the names of "Christian science," "personal magnetism," "cure by will power," etc., are, apart from the slight suggestive influence mentioned, nothing short of frauds; and the case is made worse when it is remembered that the professors of such power are usually either schemers, who make money by preying upon the credulity of others, or enthusiasts of too little medical information to know one disease from another.

J. MARK BALDWIN.

Mindeleff, COSMOS: archæologist; b. in 1863 of Russian parents, who settled in the U. S. in 1861. His father, Dimitry Mindeleff, had more than a national reputation as a chemist and inventor. The son graduated at a private school at the age of fifteen, and at once engaged in business. In 1882 he became connected with the bureau of ethnology, and since that time has been engaged in the study of the aboriginal architecture of the pueblo region. In 1886 he published the first description of the snake-dance of the Tusayan (Moki) Indians that appeared in a scientific publication. In collaboration with his brother Victor he took part in the preparation of a report on pueblo architecture, which was the first comprehensive and scientific treatment of that subject. This appeared under the title *A Study of Pueblo Architecture: Tusayan and Cibola*. In 1891 he prepared plans for the repair and preservation of the famous Casa Grande ruin in Arizona. He published the first report on aboriginal remains in the valley of the Rio Verde, Arizona. He is perhaps best known as a modeler of archæologic and topographic subjects.

J. W. POWELL.

Minden: town; in the province of Westphalia, Prussia; on the Weser; 40 miles W. of Hanover (see map of German Empire, ref. 3–E). It is an old town, closely built, with few open places or interesting buildings. The Roman Catholic church, however, has a tower which dates back to the eleventh century, and illustrates the first stage in the development of the Gothic spire. The town was formerly

strongly fortified, and has been the scene of some hard fighting; now the place of its fortifications is occupied by manufacturing suburbs. It has manufactures of soap, chemicals, glass, tobacco, beer, brandy, and hosiery. Pop. (1891) 20,223.

Minden: city (founded in 1876); capital of Kearney co., Neb. (for location of county, see map of Nebraska, ref. 11–E); on the Burlington Route and the St. Jos. and Gr. Is. railways; 128 miles W. of Lincoln. It is in an agricultural region, and contains 8 churches, 2 public-school buildings, wagon and milling works, and 3 weekly newspapers. Pop. (1880) 98; (1890) 1,380; (1900) 1,238.

EDITOR OF "GAZETTE."

Mindo'ro: one of the larger of the Philippine islands; S. and W. of Luzon; on the China Sea; in lat. 13° N., lon. 121° W.; area, 3,800 sq. miles; pop. estimated at 40 per. sq. mile, or 150,000. The Spanish domination is limited to a narrow strip of coast, and the interior is perhaps the least known of the group. It has suffered much from the depredations of the Sulu pirates. M. W. H.

Mind-reading: See MUSCLE-READING and HYPNOTISM.

Mincola: town; Wood co., Tex. (for location of county, see map of Texas, ref. 2–J); on the Int. and Gt. N., the Mo., Kan. and Tex., and the Tex. and Pac. railways; 77 miles E. of Dallas, 110 miles W. of Shreveport, La. It is in a cotton-growing region, is an important commercial distributing point, and has a high school, private bank, and two weekly newspapers. Pop. (1880) 1,175; (1890) 1,333; (1900) 1,725.

Mineralogy [Lat. *minera'lis*, pertaining to a mine, mineral (deriv. of *mi'nera*, mine) + Gr. λόγος, discourse, reason]: the science which treats of the chemical and physical properties, relations, occurrence, and classification of minerals; the word *mineral* denoting any homogeneous, inorganic, natural product, not gaseous, and not the immediate result of organic processes. A mineral may be the indirect and altered product of organic life, like coal, which results from the alteration of the once organic wood, or amber, which is an altered vegetable resin; but fossil bones, shells, etc., are not to be classed as minerals. Minerals are distinguished by their chemical properties, their form, structure, luster, color, hardness, specific gravity, etc.

Chemistry.—The exact composition of a mineral is ascertained by quantitative analysis; the nature of its constituents by qualitative analysis, the blowpipe reactions being especially useful in determining minerals, from their simplicity and certainty. Every one of the elements occurs in the mineral kingdom, and a mineral may consist of one element or of a combination so complex that no present system of chemical notation will give a satisfactory representation of its composition. Like any other chemical compounds, minerals are to be regarded as combinations of atoms and molecules, and in writing the formulas for these the ratios of the elements present are calculated in three ways. The *atomic ratio* is the ratio between the number of atoms; thus for the aluminium, silicon, and oxygen in Al_2O_3,SiO_2 it is 2 : 1 : 5. The *oxygen ratio* is the ratio between the number of atoms of oxygen in the different oxygen compounds present. In Al_2O_3,SiO_2 the O ratio of the Al_2O_3 and SiO_2 is 3 : 2. The *percentage ratio* is the number of parts in 100, and is deduced from the ratio between the atomic weight of the compound and that of each constituent. The atomic weight of Al_2O_3 is 51·5 (old system); of O_3 it is 24; hence 51·5 : 100 : : 24 : 46·6, the percentage of oxygen. For Al_2 (at. wt. = 27·5) we have 51·5 : 100 : : 27·5 : 53·4, the percentage of aluminium. The at. wt. of Al_2O_3,SiO_2 is 81·5, and that of SiO_2 is 30; hence 81·5 : 30 : : 100 : 36·8, the percentage of SiO_2 in the compound. The atomic ratio of the constituents may be calculated from their percentage ratio by dividing the latter by the atomic weight of each constituent. In Al_2O_3 the percentage ratio of Al and O is 53·4 : 46·6; hence $53{\cdot}4 \div 13{\cdot}75 = 3{\cdot}93$, and $46{\cdot}6 \div 8 = 5{\cdot}82$, from which we obtain the ratio 3·93 : 5·82, or nearly 2 : 3, the atomic ratio of the aluminium to the oxygen. The ratio of any constituents in a compound may also be obtained by comparing the amounts of oxygen in the percentages of the constituents. Thus in Al_2O_3,SiO_2 the percentage of $SiO_2 = 36{\cdot}8$, of $Al_2O_3 = 63{\cdot}2$. In 100 of SiO_2 there are 53·33 of oxygen; hence $36{\cdot}8 \times {\cdot}5333 = 19{\cdot}625$; 100 of Al_2O_3 contain 46·6 O; hence $46{\cdot}6 \times {\cdot}632 = 29{\cdot}45$; then 19·625 : 29·45 : : 2 : 3, and since SiO_2 contains 2O and Al_2O_3 3O, the result shows that the compound contains one of silica and one of alumina, or has the formula Al_2O_3,SiO_2. The atomic ratio is therefore of use in obtaining the formulas of minerals.

Compounds containing two kinds of elements are called *binary*, and one element is regarded as negative to the other. A *ternary* compound contains three kinds of elements, which are so combined as to form a base and an acid. Thus MgO,SiO_2 contains the base of MgO and the acid SiO_2, or the *basic* element Mg, the *acidic* Si, and the *acidific* O. The *replacing power* of the elements is in proportion to their combining power, reckoned in number of atoms of the acidific element, oxygen, sulphur, or whatever it may be. In accordance with this principle, if R represent any basic element, $R_{\frac{2}{3}}O$ may be written for R_2O_3, and may then replace RO in a compound.

According to the new system of chemistry, in the formulas of ternary compounds the acid and base are not written separately, as $2MgO,SiO_2$, but the symbol of each element is written by itself—Mg_2SiO_4. Regarding certain elements as negative to the others, it is held that each element has power to fix a certain number of atoms of a more negative element. The elements are divided into two classes—perissads (περισσός, odd), which combine with one another in the ratios 1 : 1, 1 : 3, 1 : 5, taking hydrogen as the unit; and *artiads* (ἄρτιος, even), with combining ratios 2 : 2, 2 : 4, 2 : 6, taking the same unit.

In some classes of compounds it is held that only a part of the oxygen present serves to unite the acidic element to the base. For example, in the formula MgO,SiO_2 we have Si combining with 2O, equivalent to 4H, and Mg with 1O, equivalent to 2H. The *tetrad* Si has then four bonds of attraction, and the *dyad* Mg two; O is likewise a *dyad*. Hence we may represent the combination of Si, Mg, and 3O by the graphic formula $O = Si \langle^{O}_{O}\rangle Mg$, the dashes representing so many bonds of attraction, and indicating that only 2O unite the Mg and Si, one O being combined with Si alone. Dana writes this formula $SiO \parallel O_2 \parallel Mg$. The formula $2MgO,SiO_2$ may be represented similarly by $Mg \langle^{O}_{O}\rangle Si \langle^{O}_{O}\rangle Mg$; by $Mg = O_2 = Si = O_2 = Mg$; or, as Dana writes it, $Si \parallel O_4 \parallel Mg_2$. These formulas are written on the principle that the number of atoms of uniting oxygen is equal to the number of bonds of attraction of the basic or acidic element, according as the former or latter has the smaller number. The formulas are similar for sulphur, tellurium, and selenium compounds, and for ternary fluorides.

Form and Structure.—Some minerals occur only in an amorphous state, never showing any signs of crystallization, but the majority are at times well crystallized or distinctly crystalline. Any crystal can be referred to one of seven systems, in which the crystal faces are determined by their position in regard to a set of assumed axes intersecting within the crystal. In six of these systems there are three axes, and in one of them four. See CRYSTALLOGRAPHY.

The crystalline form is very useful in distinguishing minerals, because it is an established fact that the angle between any two faces of a crystal will, under similar conditions, always be the same for the same minerals, subject to slight variations corresponding to changes in the composition of the varieties of the mineral. The similar faces may vary greatly in size, so that one or more faces may almost or entirely disappear, but the angles between the similar faces will remain the same.

Isomorphism, or the property of similar substances to crystallize in very similar forms, admits of their mutual replacement in crystallized minerals, this replacement being often accompanied by a slight change in the angles of the crystals. Thus lime, magnesia, the protoxides of iron and manganese, and oxide of zinc, are isomorphous bases, and yield very similar crystals when combined with the same acid. Hence the close relation between the forms of calcite, dolomite, and the related minerals. *Dimorphism* is the property of the same substance to crystallize in two different systems, or two different types of the same system; thus carbonate of lime appears in the hexagonal system as rhombohedral calcite, and in the orthorhombic as aragonite. *Trimorphism* and *polymorphism* refer to crystallization in more than two forms. *Pseudomorphism* is the assumption by one mineral of the peculiar form of another, but the second mineral always retains its own internal structure and physical characteristics. Pseudomorphs may result from the deposition of one mineral upon another, followed by the removal of the first mineral by solution, and subsequent filling up of the mold thus formed

with the material of the second mineral; by filling up of the cavity left by previous removal, through solution or otherwise, of the first mineral from its matrix; by alteration of the original crystal through removal or addition of some components; or, lastly, by simple molecular change within the mineral, which is possible only in case of dimorphous substances, as in the alteration of andalusite into cyanite.

A distinction is made between crystallized and crystalline minerals, the latter not showing free or partially individual crystals. If a crystalline mineral does not even show recognizable individuals, it is called cryptocrystalline. Crystalline minerals are classified, according to their structure, into *granular*, *lamellar*, *scaly*, *radiated*, and *fibrous*.

Lamellar structure is described as *parallel*, *divergent*, etc.

In amorphous minerals there is no trace of crystalline form or special characteristic of structure due to individual crystals, although an intermittent deposition of the mass composing the mineral may have occasioned differences of color, hardness, and texture. The majority of the solid amorphous minerals are the result of a gradual change from a gelatinous state, or of rapid cooling from a melted condition, but many of them are the result of the alteration of pre-existing minerals.

Cleavage, or the tendency to split in certain directions, is characteristic of most crystallizable minerals, and is of great use in determining minerals, the cleavage planes being always the same for the same mineral, no matter what the modifications of the crystal. Thus *calcite*, whether occurring as a rhombohedron or a hexagonal prism, will cleave always parallel to the faces of the type rhombohedron of calcyte; *fluorite*, whether occurring in cubes, octahedrons, or any other form of the isometric system, will always cleave parallel to the faces of the octahedron. Cleavage takes place parallel to certain planes, but there may be two or more sets of cleavage-planes in the same crystal, and in this case the cleavage will be easier parallel to one set of planes than to another, but will always be easiest parallel to the same planes. Thus *orthoclase*, in the monoclinic system, has a very perfect cleavage parallel to the base of the prism, a less distinct cleavage parallel to the clino-pinacoid, faint parallel to the ortho-pinacoid, and only in traces parallel to one face of the prism. Some minerals are devoid of cleavage, especially the amorphous minerals and native malleable metals, while the cleavage of some minerals, like mica and gypsum, is so perfect that they can be easily split into very fine laminæ. Other minerals have a distinct cleavage, which may be very hard to obtain, as in quartz, while some, like argentite, show scarcely any traces of cleavage.

Fracture differs from cleavage in not being parallel to fixed planes. It is classified as conchoidal, even, and uneven, according to the shape, and smooth, splintery, earthy, and hackley (like broken copper), according to the nature of the resulting surface.

Hardness.—Minerals vary in hardness, from the liquid hydrocarbons and water to the diamond. Hardness does not usually vary much for the same mineral, and is therefore a valuable aid in determining minerals. Its degree is ascertained by reference to the following scale, beginning with the softest: 1, talc; 2, gypsum; 3, calcite; 4, fluorite; 5, apatite; 6, orthoclase; 7, quartz; 8, corundum; 9, diamond. A mineral scratched easily by apatite, and easily scratching fluorite, would be fixed at 4·5.

According to their *tenacity*, or resistance to blows and cutting edges, minerals are classified as *brittle*, *sectile*, *malleable*, and *flexible*, the latter being *elastic* or *non-elastic*. It has been shown that the degrees of tenacity depend properly upon the elasticity of minerals.

Specific gravity is confined to narrow limits in its variations for the same minerals, and is of importance in distinguishing them.

Magnetism, or the power of affecting the magnetic needle, is possessed by a few minerals containing the magnetic oxide or sulphide of iron, and *magnetite* sometimes possesses polarity.

Electricity is developed in all minerals by friction; certain minerals become electric by pressure, cleavage crystals of calcite showing positive electricity when pressed between the fingers; others show electrical disturbance on warming, and are called *thermo-electric*. When opposite kinds of electricity are simultaneously developed at opposite parts of such crystals, they are said to possess polar thermo-electricity, and certain of these crystals are *hemimorphic*, or have different faces at their opposite ends. Tourmaline affords a very striking example of polar thermo-electricity.

Optical Properties.—All transparent crystals not belonging to the isometric system (anisometric) possess *double refraction*, or divide into two rays a ray of light passing through them. (See Refraction, Double.) A ray of light passing through a doubly refracting crystal may escape double refraction if it passes through in certain directions, according to the crystalline system. These directions are called the *optical axes*. In crystals belonging to the tetragonal and hexagonal systems there is one optical axis, parallel to the vertical axis, and such crystals are called *uniaxial*. The other systems are *biaxial*, and the optical axes lie in one of the three planes passing through any two of the crystallographic axes, and are usually symmetrically situated with reference to the crystallographic axes in the same plane. The angle between the optical axes is called the optic-axial angle. A line bisecting the acute optic-axial angle is called the *acute bisectrix*, or simply *bisectrix*, and one bisecting the obtuse angle and which is at right angles to the acute, is the *obtuse* or *conjugate bisectrix*. The optic-axial angle may vary widely for different varieties of the same mineral, but the position of the bisectrix is nearly constant.

The emerging doubly refracted rays are *polarized*, but this phenomenon disappears when the light passes in the direction of an optical axis, and in the case of easily cleavable minerals we can readily determine whether they are uniaxial or biaxial by examining thin laminæ between two crossed Nicol's prisms or other suitable apparatus, because uniaxial crystals cleave best parallel to the base, and hence normal to the optical axes, while very cleavable biaxial crystals cleave best parallel to the base or one of the pinacoids, and would have neither of the optical axes normal to the laminæ. See Polarization.

Sections of doubly refracting crystals of proper dimensions exhibit colored rings when examined by convergent polarized light, owing to the interference of the rays. Uniaxial crystals show one set of rings, intersected by a dark cross; biaxial crystals, one or two systems of elliptical rings, crossed by a dark band. A section of a quartz crystal vertical to the optical axis exerts double refraction in a peculiar way, the rays progressing not in direct oscillations, but with varying velocity in circular oscillations, producing what is called *circular polarization*.

Certain crystals sometimes show double refraction, especially *senarmontite*, *diamond*, *boracite*, *analcite*, and *alum*. This is owing sometimes to incipient alteration: sometimes perhaps to pressure exerted by gases within the crystal; sometimes to interposed layers of some doubly refracting mineral; and sometimes perhaps to a lamellar structure of the mineral itself, which produces the same results as a system of glass plates, and has given the name of *lamellar polarization* to the phenomenon.

Some crystals transmit light of different colors and intensity in different directions. This property is called *pleochroism*, and belongs more or less to all crystals with unequal axes. Colorless crystals cause only variation in the intensity of the light—colored crystals in the color also. Uniaxial crystals are *dichroic*, and biaxial crystals *trichroic*. The phenomenon is closely connected with double refraction, as the two rays suffer different absorption, and in general the more refracted ray also suffers the greater absorption. The phenomenon is observed by means of the *dichroscope*.

Labradorite, chrysoberyl, and other minerals show a peculiar change of color in reflected light, attributed partly to the presence of microscopic lamellæ and scales of foreign minerals, partly to very minute fissures in the mass of the mineral. *Asterism*, sometimes resulting in the appearance of a star, as in certain sapphire crystals, sometimes as a changeable streak of light across the fibers of certain varieties of gypsum, etc., is allied to the above phenomenon.

Luster, Color, and Translucency.—Minerals are divided according to their *luster*, or appearance in reflected light, into two grand classes, *metallic* and *non-metallic*, and the non-metallic again into adamantine, vitreous, greasy, pearly, silky, and lusterless or earthy. *Color* is always the same, and characteristic in the case of some minerals, as metals, pyrites, the sulphides, certain metallic oxides, and salts; others are white or colorless and transparent, like ice, quartz, many silicates, etc., but these may be colored by mechanical admixture or isomorphous combination of colored constituents. The colors of minerals vary greatly, and so does their translucency, the native metals and minerals with me-

tallic luster being generally quite opaque, even in very thin films.

Phosphorescence is induced in some minerals, as diamond and calcined barite, by exposure to daylight; in others, topaz and fluorite, by warming, by electricity, or by mechanical disturbance, as pressure, cleaving, etc. The *taste*, *smell*, and *feel* of minerals are additional means of distinguishing them.

Classification.—For a long time mineralogy as a systematized science was in a very confused state, minerals and rocks (often only aggregates of different minerals) were confounded together, and widely different minerals were placed in the same classes. Cronstedt, about 1758, pointed out the difference between a rock and a mineral; de Lisle soon after applied crystallography to the study of minerals, and finally Mohs produced a natural system, founded chiefly on external characteristics. In the early part of the nineteenth century Berzelius introduced chemistry in classifying minerals, and at the present day chemistry, combined with crystallography, forms the basis of the generally accepted systems of mineralogy. Dana's system of mineralogy, as given in the fifth edition of his work on the subject, an unexcelled example of research and judgment, may be cited in illustration of the chemical grouping of minerals combined with crystallography. He first arranges the elements into three series, beginning with the more basic, then the more negative, and finally the eminently negative: *Series I. Gold group*, gold, silver; *iron group*, platinum and allied metals, mercury, amalgams, copper, iron, zinc, lead; *tin group*, tin. *Series II. Arsenic group*, arsenic, antimony, bismuth; *sulphur group*, tellurium, sulphur, selensulphur; *carbon-silicon group*, diamond, graphite. *Series III.* Chlorine, bromine, iodine, fluorine, oxygen. The gold group also includes hydrogen and the alkali metals; the arsenic group, phosphorus, nitrogen, and probably boron; the iron group, calcium, magnesium, aluminium, cobalt, nickel, zinc (chromium, manganese, lead, in part, etc.); the tin group, titanium and zirconium. The general subdivisions are then as follows: I. native elements; II. compounds, the more negative element an element of Series II. (1) Binary—sulphides, tellurides of metals of the sulphur and arsenic groups; (2) binary—sulphides, tellurides, selenides, arsenides, etc., of metals of the gold, iron, and tin groups; (3) ternary—sulpharsenites, sulphantimonites, sulphobismuthites. III. Compounds, the more negative element belonging to Series III., Group I.: chlorides, etc. IV. Compounds, the more negative element of Series III., Group II.: fluorides. V. Compounds, the more negative element of Series III., Group III. Oxygen compounds: (1) Binary—oxides; (2) ternary, the basic element of Series I., the acidic of Series II., the acidific of Series III. (1) Silicates; (2) columbates, etc.; (3) phosphates, etc.; (4) borates; (5) tungstates, etc.; (6) sulphates, etc.; (7) carbonates; (8) oxalates. VI. Hydrocarbon compounds. The silicates may serve as an example of the further arrangement into groups and species. First, they are divided into anhydrous and hydrous silicates, and each of these into bisilicates, unisilicates, and subsilicates. In the anhydrous silicates the oxygen ratio for bases and silica is for the bisilicates 1 : 2; unisilicates, 1 : 1; subsilicates, 1 : less than 1. The bisilicates are arranged into groups: amphibole group, crystallization orthorhombic or clinohedral; angle of prism not 120°: beryl group, hexagonal; pollucite group, isometric. The amphibole group has sub-groups: *pyroxene sub-group*, angle of prism, 86–88°; composition, RO,SiO_2 or $(3RO,R_2O_3)3SiO_2$, and when both RO and R_2O_3 are present, ratio of $3RO:R_2O_3 = 3:1$ to $1:2$. *a*, Orthorhombic; *b*, monoclinic; *c*, triclinic. *Spodumene sub-group*, angle of prism, 86°–88°; composition $(3RO,R_2O_3)3SiO_2$, and $3RO:R_2O_3 = 1:4$. *Amphibole sub-group*, angle of prism, 123°–125°; *a*, orthorhombic; *b*, monoclinic.

The sulphides, etc., of the gold, iron, and tin groups may serve for further illustration. There are three divisions: (1) *Basic*, atomic ratio between the sulphur, arsenic, etc., and the basic metal is less than one to one; (2) *Proto*, with the ratio 1 : 1; (3) *Deuto*, ratio 2 : 1. The *Proto* division has four groups: (1) *Galena group*, isometric, holohedral; (2) *Blende group*, isometric, hemihedral; (3) *Chalcocite group*, orthorhombic; (4) *Pyrrhotite group*, hexagonal. The *Deuto* division has two groups: (1) *Pyrite group*, isometric; (2) *Marcasite group*, orthorhombic.

Revised by CHARLES KIRCHHOFF.

Mineral Oil: See PETROLEUM.

Mineral Point: city; Iowa co., Wis. (for location of county, see map of Wisconsin, ref. 7–D); on the Chi., Mil. and St. P. Railway; 36 miles N. E. of Dubuque, Ia., 45 miles W. S. W. of Madison. It is in a farming, stock-raising, and lead-mining region, and has lead and zinc furnaces, iron-foundries, planing and grist mills, oxide-of-zinc works, national bank (capital $100,000), private bank, and two weekly newspapers. Pop. (1880) 2,915; (1890) 2,694; (1900) 2,991.

Mineral Springs: See SPRINGS, MINERAL WATERS, and WATER.

Mineral Waters: waters such as contain unusual quantities of various salts in solution, or sometimes simply very pure water. In the latter case they are not properly called mineral waters. Springs that are found in localities where soluble substances occur in the earth are likely to contain some of these substances in solution. Such natural solutions have long attracted the attention of mankind, and are used medicinally to an enormous extent, under the impression that they have curative powers that are not possessed by solutions of the same kind made artificially. In some cases a water owes its reputation to its temperature alone; in other cases to the presence of substances that unquestionably produce effects upon the system; in others still to the presence of minute quantities of rare substances, the names of which produce a psychological effect, thus influencing the body indirectly.

Mineral waters are classified into (1) *thermal waters*; (2) *common salt or muriated saline waters*; (3) *alkaline waters*; (4) *sulphated saline waters*; (5) *iron or chalybeate waters*; (6) *sulphur waters*; (7) *earthy and calcareous waters*; (8) *alum waters.*

(1) *Thermal waters* are valued for their high temperature, from 27°–65° C. Examples of springs of this kind are the Hot Springs of Arkansas and Virginia, in the U. S., and those of Bormio, Gastein, Pfäffers, and Ragatz, in Europe.

(2) *Common salt or muriated saline waters* contain common salt or sodium chloride as the principal constituent. Such waters are very common. The Saratoga waters contain common salt together with a number of other substances. In the table are given the results of analyses of some of these waters. The analyses were made by Prof. Charles F. Chandler, of New York. Other well-known springs belonging to this class are those of Middlewich, Harrogate, Leamington, and Cheltenham, in England; Kissingen, Homburg, Pyrmont, Kreuznach, Wiesbaden, and Baden-Baden, in Germany.

(3) *Alkaline waters* contain sodium carbonate with more or less free carbonic acid and sometimes with a large quantity of sodium chloride. Some of the Saratoga waters belong to this class, as is shown by the table (on next page) of analytical results. Other celebrated waters of this class are Vichy, Apollinaris, Salzbrunn, Vals, Ems, Selters.

(4) *Sulphated waters*, as the name implies, contain sulphates, and these are either sodium or magnesium sulphate, or both. In some cases sodium carbonate and chloride are also present. They are often called "bitter waters." Prominent among such waters are Hunyadi Janos, Epsom, Friedrichshall, Scarborough, Carlsbad, Marienbad, etc.

(5) *Iron or chalybeate waters* contain iron in some soluble form. The waters of Schwalbach, Spa, Tunbridge Wells, and Alexisbad are examples of comparatively pure chalybeates, that is to say, of waters that contain some salt of iron but are otherwise comparatively pure. Several of the Saratoga waters contain iron in addition to the other constituents, and the same is true of the waters of Pyrmont, Petersthal, and St. Moritz.

(6) *Sulphur waters* contain either sulphuretted hydrogen, H_2S, or the sulphides of sodium, potassium, calcium, or magnesium. Those of Harrogate and Aix-la-Chapelle are renowned in Europe, while in the U. S. there are numerous examples, among which are the White, Red, and Salt Sulphur Springs of Virginia, the White Sulphur Springs of Ohio, and the Richfield, Sharon, Chittenango, and Florida Springs of New York State. The sulphuretted hydrogen gives these waters a sweetish taste and a very peculiar odor, which some consider offensive. These waters have the property of blackening silver.

(7) *Earthy and calcareous waters* contain large proportions of the carbonate and sulphate of lime. Some of the most important of these abroad are found at Wildungen, Weissenburg, St. Arnaud, and Couran. Again it is to be noted that several of the Saratoga waters are rich in carbonate of lime.

(8) *Alum Waters.*—In several localities waters occur charged to a greater or less extent with alum. These waters

frequently contain free sulphuric acid. The Rockbridge Alum Spring and the Church Hill Alum Spring, in Virginia, are examples of this class.

ANALYSES OF SOME OF THE SPRINGS AND ARTESIAN WELLS OF SARATOGA CO., N. Y.

COMPOUNDS AS THEY EXIST IN SOLUTION IN THE WATERS.	IN SARATOGA.											IN BALLSTON.		
	Star Spring.	High Rock Spring.	Seltzer Spring.	Pavilion Spring.	United States Spring.	Hathorn Spring.	Crystal Spring.	Congress Spring.	Empire Spring.	Geyser spouting well.	Glacier spouting well.	Ballston artesian lithia well.	Franklin artesian well.	Conde-Dentonian well.
Chloride of sodium	398·361	390·127	134·291	459·903	141·872	509·968	328·468	400·444	506·630	562·080	702·239	750·030	659·344	645·481
Chloride of potassium	9·695	8·974	1·335	7·660	8·624	9·597	8·327	8·049	4·292	24·634	40·446	33·276	33·930	9·232
Bromide of sodium	0·571	0·731	0·630	0·987	0·844	1·534	0·414	8·559	0·266	2·212	3·579	3·643	4·665	2·368
Iodide of sodium	0·126	0·086	0·031	0·071	0·047	0·198	0·066	0·138	0·606	0·248	0·234	0·124	0·235	0·225
Fluoride of calcium	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.
Bicarbonate of lithia	1·586	1·967	0·899	9·486	4·847	11·447	4·326	4·761	2·080	7·004	6·247	7·750	6·777	10·514
Bicarbonate of soda	12·662	34·888	29·428	3·764	4·666	4·288	10·064	10·775	9·022	71·232	17·624	11·928	94·604	34·400
Bicarbonate of magnesia	61·912	54·924	40·339	76·267	72·883	176·463	75·161	121·757	42·953	149·343	193·972	180·602	177·868	158·348
Bicarbonate of lime	124·459	131·739	89·869	120·169	93·119	170·646	101·881	143·399	109·656	170·392	227·070	238·156	202·332	178·484
Bicarbonate of strontia	trace.	trace.	trace.	trace.	0·018	trace.	trace.	trace.	trace.	0·425	0·082	0·867	0·002	0·189
Bicarbonate of baryta	0·096	0·494	trace.	0·875	0·909	1·737	0·726	0·928	0·070	2·014	2·083	3·881	3·231	4·739
Bicarbonate of iron	1·213	1·478	1·703	2·570	0·714	1·128	2·038	0·340	0·793	0·979	0·647	1·581	1·609	2·296
Sulphate of potassa	5·400	1·608	0·557	2·032	trace.	trace.	2·158	0·889	2·769	0·318	0·252	0·520	0·762	trace.
Phosphate of soda	trace.	trace.	trace.	0·007	0·016	0·006	0·009	0·016	0·023	trace.	0·010	0·050	0·011	0·003
Biborate of soda	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.
Alumina	trace.	1·223	0·374	0·329	0·094	0·131	0·305	trace.	0·418	trace.	0·458	0·077	0·263	0·395
Silica	1·283	2·260	2·561	3·155	3·184	1·260	3·213	0·840	1·458	0·665	0·699	0·761	0·735	1·026
Organic matter	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.	trace.
Total per U. S. gal., 231 cub. in.	617·367	630·500	302·017	687·275	331·837	888·403	537·155	700·895	680·436	991·546	1,195·582	1,233·246	1,184·368	1,047·700
Carbonic acid gas	407·650	409·458	324·080	332·458	245·734	375·747	317·452	392·289	344·669	454·082	465·458	426·114	460·066	358·345
Density	1·0091	1·0092	1·0034	1·0095	1·0035	1·0115	1·0060	1·096	.....	1·0120	.....	1·0159	1·0135	1·0125
Temperature	52° F.	52° F.	50° F.	.....	.....	.....	50° F.	52° F.	.....	46° F.	.....	52° F.	52° F.	49° F.

Among waters that can not properly be classed under any of the above heads may be mentioned Buffalo lithia water and strontia water.

In 1899 there were 541 commercial mineral springs in the U. S. The total product was 39,562,136 gal., at a valuation of $6,948,030. IRA REMSEN.

Mineral Wax: See PARAFFIN.

Mineral Wool, or **Silicate Cotton**: thread-like filaments which have the appearance of wool or cotton when massed together; produced by the action of steam or air under pressure upon vitreous or scoriaceous substances when in the molten state. As an article of commercial value the material first came into use in 1871, it having been produced in that year at Osnabruck, Germany. The production of it in the U. S. began about four years later, and subsequently in England. In the various processes of smelting ores of metals the compressed air necessary to accelerate combustion sometimes escapes from the furnaces through the tapping-hole or tuyeres in such a way as to separate the cinder into shot-like particles, which in tearing themselves from the fluid stream draw out threads of various length and fineness. Most furnacemen are familiar with such freaks of the blast, so that the material in this sense has but little novelty, and it is to be noticed that as a result of this occurrence the only patent which seeks to protect the article at all does not claim the product as such, but the method of manufacture. John Player, of Norton, near Stockton-on-Tees, England, was the inventor of the process as practiced at the present time.

The slag of blast-furnaces is the cheapest and most abundant substance which can be utilized for the manufacture of the article. This, however, is only a coincidence, and furnace-slags in every case can not be utilized, for some of them contain too large a proportion of silica to make fine and pliable fibers, while others are so basic, owing to the high percentage of lime, that they will not draw out satisfactorily. Besides, when there is an excess of lime, the tendency is for the fibers to become caked or solidified, there not being sufficient acid present to give stability and permanence to them. An objection to the use of mineral wool made from slag is that it generally contains sulphides of calcium, potassium, and sodium which are soluble in weak acids and in water containing alkalies, and to some extent also in warm water. When such a sulphur-bearing material is used on pipes or boilers there is a danger of its becoming wet from leaks or from external moisture, and the sulphur thus brought into solution to attack the iron. Cases of corrosion from this cause are, however, very rare, and it is contended that so long as the heat is kept on the pipe no dampness will reach its surface. In order to produce a non-sulphur-bearing mineral wool a plant has been put in operation to melt down such rock-mixtures as are free from the obnoxious element and are of the proper composition to form a cinder of a specific character. By mixing together four parts of orthoclase feldspar and six parts of dolomitic limestone a cinder is obtained which runs fluid and is susceptible of conversion almost entirely into fibers of a stable nature. In treating slag 2 lb. of shot are made to every pound of fiber, while in the case of cinder prepared from minerals the proportion is about 2½ lb. of fiber to 1 lb. of shot. These different products are named "slag-wool" and "rock-wool," the chief distinction between them being the presence of sulphides in the former, while the latter is free from them. As a general thing, the color of mineral wool is white. The fibers of mineral wool act as a medium to prevent the circulation of the air; which being accomplished, the passage of heat is retarded. By reason of its porosity the material also forms a most effective barrier to the transmission of sound. The indestructible character of the fibers makes mineral wool available for all purposes of insulation. Insects or vermin find in it nothing wholesome to eat, while its glassy nature forbids their making homes in it.

Miner's Inch: a unit for measuring water frequently employed in mining regions. It may be roughly defined to be the quantity of water which flows from a vertical standard orifice an inch square when the head on the top edge of the orifice is 6 inches. The mean discharge from such an orifice is 1½ cubic feet per minute. The actual value of the miner's inch varies, however, in different localities. In California it ranges from 1·20 to 1·76 cubic feet per minute, according to the arbitrary definitions adopted. For example, at Smartsville an orifice 4 inches deep and 250 inches long, with a head of 7 inches above the top edge, is said to furnish 1,000 miner's inches. In Montana a vertical rectangle an inch deep is generally used, with a head of 4 inches, and the number of miner's inches is said to be the same as the number of linear inches in the rectangle. An orifice through which a given number of miner's inches of water is furnished is called a module. The important feature to be observed is that the head should be kept nearly constant over the module, and in order to insure this many automatic appliances have been devised. For the sake of uniformity it is much to be desired that water should be sold by a constant unit, such as per cubic foot per hour, instead of by the miner's inch. MANSFIELD MERRIMAN.

Minersville: borough; Schuylkill co., Pa. (for location of county, see map of Pennsylvania, ref. 5–H); on the Schuylkill river, and the Phila. and Read., the People's, and the Schuyl. and Lehigh Val. railways; 4 miles W. of Pottsville, the county-seat. It is principally engaged in coal-mining, and has improved water-works, iron-foundries, electric lights, public library, and two weekly newspapers. Pop. (1890) 3,504; (1900) 4,815. EDITOR OF "FREE PRESS."

Miner'va [= Lat. < O. Lat. *Menerva*, appar. for **Menesva*, deriv. of **menes-*; Gr. *μένος*, mind, strength of spirit: Sanskr. *manas-*, strength, mind. See MIND]: in the Roman

mythology, the goddess of reason, and so of all invention, of the arts, and of science. With this original conception of the goddess were blended at a later time certain warlike attributes, arising from the identification of Minerva with the ATHENA (*q. v.*) of the Greeks. The oldest sanctuaries of the goddess were situated on the Capitol, the Aventine, and the Cælian Mons. On the Capitol she possessed a cella in the triple temple of Jupiter Capitolinus, to the right of the god. The temple of Minerva on the Aventine was the headquarters of the earliest association of artists in Rome, the *scribæ* and *histriones* (poets and actors), whose organization dated from the time of Livius Andronicus. The principal festivals in honor of the goddess took place on the 19th of March and June, i. e. the fifth day after the ides, *Quinquatrus*, and while the name indicates that the celebration was originally only on that day, it was eventually extended to five days (described by Ovid, *Fasti*, iii., 809–48). It was the first day's celebration which gave to this festival its characteristic tone, and it was shared in by school children and teachers, as being under the special guardianship of Minerva; by women and girls, who worshiped her as the patron of all the domestic arts, such as spinning, weaving, etc.; by artisans of various kinds, notably fullers and cobblers, and by all those whose occupations were distinctively literary or artistic, such as poets, painters, sculptors, etc. The fact that this festival touched so many spheres of life made it a popular one even down to late imperial times. The remaining days of the feast, from the end of the republic on, were devoted to the worship of Minerva as the warlike daughter of Jupiter (a character which was given to her from identification with the Greek Athena), and they were occupied chiefly with gladiatorial exhibitions. The lesser *Quinquatrus*, on June 19, was a festival of pipers (*tibicines*), and was observed with much riotous celebration. In the course of time more characteristics of the Greek Athena were introduced into the worship of Minerva. Thus the founding of a temple to her by Pompey from the spoils of his Eastern conquests seems to have been due to the analogy of the Greek Athena Niké, and the later identification of Minerva with the senate house is apparently due to the Athena *Βουλαία* at Athens. The Emperor Domitian claimed to be under the special guardianship of Minerva, and to her he dedicated two temples, slight remains of one of which, in the Forum of Nerva, still survive. Besides the artistic representations of Minerva, which did not differ from those of Athena, there was an ancient and very sacred image of the goddess called the Palladium which had been brought to Rome from Troy after the destruction of the latter city, and was preserved with great care in the temple of Vesta. See Preller, *Röm. Mythologie* (i., p. 289 ff. Cf. index in vol. ii.). G. L. HENDRICKSON.

Mines and Mining: Mining in its widest sense is the winning of useful minerals, or metals, when the latter are found native. Among the useful minerals are included, by statisticians, mineral oils, natural-gas, mineral springs, and building-stones, which are included by the U. S. Geological Survey in its reports of the product of the mineral industry of the U. S. Mining engineering embraces the study of deposits (see ORE DEPOSITS) of useful minerals, the search for workable deposits, and the final preparation of the material extracted by mechanical means prior to its treatment by metallurgical processes for the extraction of the marketable product. The act of excavation may be termed mining in its narrower sense. The aim is extract with the maximum profit at the minimum of risk to life and property.

The search for deposits of useful minerals is conducted by methods varying with their character. The simplest means is to dig a series of trenches at right angles to the supposed course of the deposit, or if the covering be too heavy to sink a number of test pits. When the mineral is inbedded deposits, shafts or borcholes are sunk or tunnels are driven. In the case of deposits of magnetic-iron ore, the dipping-needle is employed. For salt, oil and natural-gas boreholes are usually sunk, occasionally to great depth.

The methods of mining pursued depend upon the location of the deposit, the character of the mineral, its value, the nature of the rock in which it is imbedded, and the extent and position of the deposit. When the mineral is exposed at the surface, or is covered only by a shallow layer of soil, quarrying is resorted to. Modern machinery for the removal of earth has been so much improved that stripping of the ore deposit or bed can be carried to considerable depth. Open-air work is carried on in this manner in a number of iron mines in New York, New Jersey, and Minnesota, and in the anthracite-coal regions of Pennsylvania. It has been employed in a conspicuous manner in the diamond mines of South Africa and Brazil, and in the great pyrites deposits of Spain and Portugal. This method possesses the advantage of permitting of very cheap extraction, but is hampered with growing difficulties with increasing depth. Surface mining plays a very important part, however, in the working of alluvial deposits. A very large part of the gold produced in the world and the greater part of the tin ore mined is obtained through surface mining. It has led in the U. S. to the development and application on a grand scale of what is called *hydraulic* mining to the recovery of gold from alluvial deposits. See GOLD.

Mining, as usually understood, deals, however, with the extraction of the useful mineral by underground operations. A multiplicity of conditions must determine how they must be conducted to produce the best results. Conspicuous among these is the character and the position of the deposit itself. First of all means of ingress and egress must be provided. These serve at the same time for the removal of the mineral and of accumulated water, for ventilation, and for the delivery into the mines of timber, filling material, and supplies.

Whenever it is possible the deposit is attacked by a tunnel, since it saves hoisting and pumping and in many instances greatly facilitates ventilation. Below the superficial drainage a vein or bed must be reached by a shaft or a slope, with a series of horizontal adits, spaced conveniently apart, which lead to the mineral mass at different levels.

If we imagine an inclined tabular deposit, such as a metallic vein usually is, and as a coal-bed may be, it would seem cheapest to run down in it by means of a slope dug in the material itself. That process, in fact, turns out the valuable matter at once, and might more or less pay for itself while in operation; but as a shaft or slope is the most important of all the preparatory works, usually being intended to endure, and requiring substantiality for the incessant needs of hoisting and pumping, it is necessary to make such a construction solid, and therefore a slope in a vein must be supported by flanking masses devoted to that object alone. In a coal mine this sacrifice is not of much importance, but in a metallic one it might be a greater loss than the slight advantage of a slope would compensate for. Moreover, a slope to a given level is longer and more irregular than a shaft sunk vertically in the country-rock; the development of hoisting-ways, cables, pump-rods, pipes, etc., is therefore greater and the service more inconvenient. The usual method, particularly when some capital is at command, is to sink a vertical shaft so as to strike the deposit in depth.

Supposing, then, that a vertical shaft for the attack of a vein has been sunk, and as deep down at once as various reasons will allow, it is next put into connection with the deposit by means of the cross-cuts, which are galleries sloping a little toward the shaft for drainage and rolling. These, like the shaft, should be ample for the circulation expected, and spaced apart vertically, say 100 feet. The cross-section of a shaft adapted to hoisting, pumping, and ladders, or a man-engine, all together, may be 20 by 30 or more, and the section of galleries for single track about 6 by 6 feet. From where the cross-cuts pierce the vein next are run gangways to right and left in the vein itself. These make the different levels; and as they are permanent ways for rolling, they have the same dimension as the cross-cuts, and like them and the shaft are strongly timbered. Finally, these levels being put into communication by slopes in the vein—200 feet apart, for example—the mineral mass is seen to be subdivided into a set of parallelopipeds 100 by 200, and presenting each four disengaged angles on which they may be easily attacked for the prosecution of exploitation. This finishes the preparatory work, and it remains to be said that such interior preparation should always be kept up and urged in advance of the exploitation proper, so as to explore the vein for at least a year's work in prospect.

Exploitation is the taking out of the parallelopipeds so prepared and exposed. If such a parallelopiped be attacked on an upper corner by miners, who with pick, drill-bar, and shovel delve into and break away the mass beneath them, such is called underhand stoping, which is now rarely practiced. Overhand stoping is where the workmen attack one of the lower angles of a parallelopiped. In this case the miners, all of them, are, as it were, undermining the whole parallelopiped; the one in advance is directly on the timbering of the gangway beneath him; the refuse

is piled up behind on this timbering, and the other miners follow standing on that or on trestles, so that the profile of attack becomes and shows like a stairway upside down.

When the vein matter itself does not furnish enough refuse, it is usual, in the case of minerals of considerable value, to send waste rock down into the mine from the surface, or procure it by excavations outside of the vein. When the vein lies flat it is evident that the same profile of steps may be laid out for the attack; but then, also, a larger style may be adopted with advantage, and particularly in coal-beds, where it is always an object to get out the material in ample dimensions. In this case either longer steps are designed, with several miners on each face, or the long-wall method is applied. This, which is common now even in beds of coal 9 to 10 feet thick, where strong propping is attainable, consists in attacking a long, straight line of face with all the miners abreast. They prop behind them, and if there is refuse sufficient to fill up in rear, they do so, reserving open rolling ways to the shaft. This method is convenient for every element of interior economy, such as rolling, ventilating, lighting, overseeing, etc. If filling can not be procured adequate to replenish the vacancy, then what little there may be is built into pillars or walls, and the ground is allowed to sink upon these, or even completely down if the rolling-ways can be kept open by hacking into the roof.

The exploitation of thick veins is effected by different dispositions. For example, when there is abundant filling they may be attacked from below upward, taking out horizontal slices, which are successively filled; or, again, where caving is allowable, they may be taken from above downward, each slice being treated like a horizontal bed, without filling. Finally the method by pillars and galleries is applicable anywhere. That title ordinarily refers to an exploitation in which the pillars of the mineral are used for support alone, and are supposed to be left and abandoned utterly. This relinquishes one-third to one-half the material in the earth, and is the worst possible almost, though in thick veins of cheap ore or coal sometimes the only one possible. It is combined often, however, with a subsequent robbing of the pillars, whereby it becomes more economical and rational. The robbing involves caving, of course, and when the creep of the caving can be commanded nicely the method is as exhaustive as any.

All the foregoing, except underhand stoping, applies to coal-mining, but this last is at the same time a larger and yet a more delicate kind of mining than metallic. Coal-mining differs from other mining principally because the fronts ought to be larger, because there is comparatively little refuse in ordinary coal-beds, and because the generation and ignition of fire-damp in fiery mines exact peculiar lighting, particular ventilation, and besides a disposition of works which admits of handling large quantities economically. This consideration leads to disposing the main plan in boundaries, with walls of coal left between, and also to the well-known style of pillar-and-stall exploitation. In this the pillars are long strips left between the stalls, which are headings run into the coal, directed so as to take an easy grade, and out of which the coal is entirely won. The pillars are intended to be subsequently cut through and robbed out; in the meantime there is in each front or breast quite a seclusion from outside damage. The perfection of an exploitation is to get out all the valuable material, and nothing else, with rapidity and with safety and comfort to the miners.

With softer materials the actual work of extraction by the miner consists in cutting a deep groove under the mineral to be won, sometimes supplemented by vertical cuts and prying off the body thus loosened. In harder material blasting is resorted to. See BLASTING.

Interior Transportation.—From the fronts down to the gangways the matters are sent in barrows, sledges, shutes, or cars. In the main ways there are always railways; the tracks are narrow and the rails light, but laid best on sleepers, as above-ground. The cars may be iron or wood; they must have a low center of gravity; wheels close together, for the curves are short, and encumber with the least possible dead weight. The motors are men and boys, mules, small horses, stationary engines with endless chains to take trains, locomotives, or electric motors. Examples of great drains used as canals for subterranean transportation are also familiar.

Hoisting.—At the mouth of the shaft is planted a great derrick, usually made with four uprights, on top of which are two large sheaves or pulleys to bend the cables from the shaft to the winding-drums or reels. The cables are hemp, aloes, iron or steel wire, and either round or flat; they are terminated with an end of chain, which is hooked to the buckets, skips, or cages. The cages, now so prevalently used, are simple elevators, which carry one or more cars; they are guided by vertical strips of timber fixed to the sides of the hoisting-way for that purpose, and these also serve in connection with the safety-catches, which are attached to all cages, particularly if miners are hoisted in them. Safety-catches are of various patterns; the best are probably those with toothed eccentric wheels, which, when the cable breaks, encrust themselves into both lateral flanks of each guide. The best winding apparatus is for round cables conical drums, and reels for flat. The operation of hoisting is for many reasons delicate, and the engines ought to be sensitive. The best hoisting system of these is composed of two horizontal cylinders, without any fly-wheel if possible.

Pumping.—In the Cornish type the pumps of a deep mine are composed of a series of lifts, each more than 100 feet high. All the pumps are force-pumps with plungers, except the lowest, which is a lift-pump, more convenient for following the sinking of the shaft or being moved about. One main rod of wood and iron stretches from top to bottom of the shaft, and to this are fixed by spurs or shoulders the rods of the force-pumps. The weight of the main rod is almost always greater than that of the column to lift; therefore the work of the engine is limited to lifting that rod, which when released sinks and moves the plungers. In the U. S. practice favors the use of direct acting pumps.

Ventilation is either natural or artificial. Many circumstances may cause a natural draught between two orifices, such as difference of level, difference of section, variety of exposure, and prevailing winds. Artificial ventilation is produced by pneumatic machines, the cheapest of which is the old Hartz blower; by fans, such as Guibal's and Fabry's; by furnaces, a common and cheap method, but dangerous in fiery mines; and by jets of steam. The use of compressed air in the drills of mines assists ventilation, but not so much as might be imagined. On the whole, it is found preferable to ventilate by drawing out the air, rather than by forcing it in; and this course is particularly advantageous in coal mines, because by rarefying the air, instead of condensing it, the fire-damp is more freely liberated to be wafted away. As for the distribution of the air, a general principle is to carry the current low down at first, directing it afterward through the works upward, and split it into numerous untainted streams, until it reaches the upcast. The directing and modifying of the currents is effected by doors and air-shutes in the mine-ways. Most miners who perish by explosion in coal mines are victims not of the fire-damp, but of the choke-damp, or carbonic acid, after the catastrophe, particularly if the doors and ventilating-flues are disabled; therefore, in these dangerous mines the means and potentiality of ventilation are vitally important.

Milling at coal mines consists only in breaking, picking, screening, and washing the coal. The breakers are toothed cylinders; the screens are revolving screens, with different-sized apertures for sorting the lumps as they pass through; the washing is done in large jigs or cisterns, where the coal, like metallic ore in smaller apparatus of the same kind, is subjected both to a current of water and to a movement of vertical oscillation of the same impelled by pistons. Masses of metallic ore when first extracted and dumped are first broken by hammers or sledge-work in a pile-driver frame; then treated by jaw-crushers and cylinder rolls, sometimes toothed, then transmitted to the stamps, which are of various patterns, the most powerful being regular steam-pestles working direct from the steam-cylinder. The metallic mud thus obtained is concentrated further by washing in jigs, shaking-tables, cloth-rollers, and the slimes are finished off in sluices and long tailing labyrinths. It is advantageous, even in the cheaper metals, to carry slime-washing far, and in the preparation of coal, washing tends to come more and more in vogue.

Mining Surveying.—No engineer ought to be content without accurate and adequate maps of his underground works. The main ways are surveyed with a transit, the narrower ones and the fronts of work with a compass and half circle suspended from a cord stretched at convenient points. The vertical and horizontal angles and linear measurements being referred to three co-ordinate planes, it is easy therefrom to make maps, sections, and elevations,

or to solve any problem of underground projection, by the ordinary methods of descriptive geometry or trigonometry.

Revised by CHARLES KIRCHHOFF.

Minghetti, min-get'tē, MARCO: statesman; b. in Bologna, Italy, Sept. 8, 1818; studied physical and social science, and as soon as he was of age traveled extensively in Italy, France, and Germany. In 1846 he pronounced a discourse at Bologna on the corn-law reform in England, declaring himself in favor of free trade. His next work was a *Dialogue on the Philosophy of History*. In 1854 he published an essay on the *Decay of the Fine Arts* and a eulogy on Gastano Recchi; in 1859 a treatise entitled *Della Economia publica, delle sue attinenze con la morale e col diritto*, which is the most remarkable of his works. Meanwhile, Minghetti had established in 1846 a journal, *Il Felsineo*, which gave him great consideration at Bologna. In 1847 he was invited to Rome as member of the Consulta della Finanze. In 1848 he was named by Pius IX. Minister of Public Works, but on the defection of the pope from the liberal cause Minghetti left the ministry and hastened to the Lombard camp, where he was appointed captain on the staff of Charles Albert. After the battle of Goito he was created major, and after that of Custozza (1848) he was decorated by the hand of the king himself. Rossi invited him to form a part of his constitutional ministry. Minghetti arrived in Rome on the very day of the assassination of his friend, and at once published an indignant protest against the infamous crime. Pius IX. desired Minghetti to take the place of the murdered minister, but he refused, and returned to the Piedmontese army. After the battle of Novara the gave himself up to his private studies, taking part in politics only when it was necessary to sustain the policy of Cavour. In 1858 he went to Egypt and Sinai; in 1859 he was appointed by Cavour secretary-general of foreign affairs, and contributed powerfully to secure the annexation of the duchies and of the Romagna. After the peace of Villafranca he became a member of the assembly of the Romagna, and upon the annexation he was elected member of Parliament from Bologna. In 1860 Minghetti was named Minister of the Interior; in 1862 Minister of Finance, and at the same time president of the council; in 1864 he effected a loan of 700,000,000 francs, and with the concurrence and aid of Peruzzi brought about the famous September convention which transferred the capital of the kingdom of Italy to Florence. In the Menabrea ministry Minghetti was at the head of the agricultural and commercial department, and from 1873 to 1876 he was at the head of the cabinet—first as Minister of Finances, afterward as Minister of Foreign Affairs. He published *Opusculi Letterari ed Economici* (1872); *Le Donne Italiane nelle Belle arti al Secolo XV. e XVI.* (1877); *La Chiesa e lo Stato* (1878). D. in Rome, Dec., 1886. *Miei Ricordi* (3 vols.) appeared after his death.

Mingrelia: down to 1804 an independent principality of Transcaucasia; in that year became subject to Russia. It corresponds to the ancient *Colchis*, and its capital, Izgaur or Iskuriah, situated on the Black Sea, is identified with the ancient *Dioscurias*, a colony of Miletus. The Mingrelians, numbering (1890) about 214,000, are closely related to their neighbors the Georgians.

Minho, meen'yō [Portug.: Span. *Miño*], or **Entre Douro e Minho**, en'trā-doo'rō-ā-meen'yō (between the Douro and the Minho, rivers which bound it on the S. and N. respectively): a former province of Portugal; bounded N. by Spain, E. by Traz os Montes, S. by Beira, and W. by the Atlantic. Area, 2,807 sq. miles. It is the most populous, the richest, and the best cultivated province of the kingdom. Everywhere are fertile valleys, rich meadows, fields, and vineyards. The products are fruit, wine, oil, figs, oranges, barley, rye, and wheat. Chief town, Oporto. Pop. (1881, official estimate) 1,014,768.

Miniature [from Fr. *miniature*, from Ital. *miniatura*, deriv. of *minia're*, to paint with *minium* or red-lead < Lat. *minia're*, deriv. of *mi'nium*, red-lead. The modern change of meaning to include the idea of smallness may be by confusion with Lat. *mi'nimus*, Ital. *minimo*, etc.]: a very small picture of any kind. Some writers have included in the term small sculptures, medallions, wax models, and the like, but this is unusual. Miniatures in the usual sense, i. e. of small pictures, belong generally to one of two classes, viz.: (1) The paintings in manuscripts. (2) The paintings, usually portraits, on paper, cardboard, ivory or vellum, or in vitrifiable colors, on porcelain or enameled metal plates, which were introduced in the sixteenth century, became fashionable in the seventeenth, and went out of common use when photographic portraits became common, about the middle of the nineteenth century.

A collection of fifty-eight illustrations of the *Iliad*, exhibited in the manuscript room of the Ambrosian Library at Milan, is of peculiar value because the writing on the back of the pictures, by its character, fixes the date very nearly. This approximate date is 400 A. D., a time when classic art was in a state of degeneracy. It is suspected, however, that the miniatures have been copied from much earlier works. The Vatican Vergil of about the same date is stated to contain fifty pictures. A few Greek manuscripts of about the same epoch are known in which are miniatures of great beauty. Several of these have been copied in color and with great care in Labarte's *Histoire des Arts Industriels*; the manuscripts themselves are accessible to students in the great libraries of Vienna, Paris, and the British Museum. (See ILLUMINATED MANUSCRIPTS.) Greek manuscripts of the tenth, eleventh, and twelfth centuries, such as are generally called Byzantine, give us also some idea of the pictures which earlier books must have contained. It is quite evident that many of these pictures are copied from those of the great times. Others seem to be rather original conceptions of the time when they were painted. Byzantine painting is known to us chiefly by means of these miniatures, and by the mosaics which remain in churches. See MOSAIC.

In Ireland in the sixth and seventh centuries there was a very remarkable development of decorative and representative art. The manuscripts of this time contain very decorative miniatures, some of which, however, are extremely barbarous in expression of faces and in drawing. Another surprising development of art at an early epoch is that of the time of Charles the Great (Charlemagne). The manuscripts of his reign contain some splendid pictures, worthy of comparison with work of a much later and more generally artistical epoch. Both the Irish and the Carolingian miniatures, as well as the early English ones of a period not much later, are more generally conventional portraits of Christ or of some one of the evangelists; but there are occasional pictures of incident, like the very spirited picture given by Westwood in the *Palæographia Sacra Pictoria*, and taken from a splendid ninth-century Bible in the National Library in Paris. This represents St. Jerome about to take ship; behind him is Rome, a fortified city, with a draped figure armed with spear and shield—perhaps a reminiscence of some ancient statue of the goddess Roma; the saint himself is in his bishop's robe; the ship is of classic type. Much of this is an echo of some much older painting, but the picture is full of vigor and interest.

Miniatures of the later Middle Ages are to be found in Gospels, Psalters, and church-service books, and their number and character are fixed by tradition. Thus opposite the page devoted to St. Barbara appears a picture of the saint with her tower in a pleasant landscape; in corresponding place is St. Christopher bearing the infant Christ; or St. George killing the dragon while the sultan's daughter in an old Eastern costume kneels in the distance, and beyond is a towered city. A Crucifixion, a figure of the Saviour in the act of benediction, a group of the Virgin and Child and St. Anne, the mother of the Virgin, have each its appointed place in these elaborate service-books. These are full-page pictures, but the books are generally small. Miniature-painting in books reached its greatest elaboration in the work of Jean Fouquet, who died about 1480, and of such Flemish painters as decorated the Grimani Breviary in the Venice Library. These artists have left elaborate pictures, with landscape, many figures, free and vigorous action. The well-known and generally respected traditions of the art, that no shadows shall be cast, but everything modeled in pure color, are now, at least, disregarded, as in the borders of many late miniatures, and in some of the pictures of the *Brevario Grimani*. Mediæval miniature-painting went through its last stage in the brilliantly colored pictures which the practiced illuminators knew how to make out of early wood-cuts in outline. Some of these are richly painted in vivid colors and touched with gold, so that the frontispiece of a printed book of the sixteenth century would not be known for a wood-cut but that other copies of the same book exist with the same print uncolored.

Portrait miniatures began to be fashionable almost exactly as pictures in manuscripts ceased to be painted in the sixteenth century. Under Henry VIII. in England very small circular portraits painted in water-color and in oil,

chiefly on cardboard and on paper, were very common, and the painters were well paid. Some of these miniature portraits have even been ascribed to the great Holbein, but without sufficient evidence. A little later, under Elizabeth, Nicholas Hilliard was the favorite miniature-painter, and he was succeeded by Isaac Oliver. These were the most famous artists in this line about the English court, but other portrait-painters worked in small as well as in life-size, and a great number of round and oval portraits, from 2 to 3 inches in diameter, were produced, many of which are preserved. The fashion was a little less prevalent on the Continent during the sixteenth century, but in the seventeenth this was reversed, and the splendid court of Louis XIV. led all Europe into a custom of having portrait and other miniatures set in lockets, mounted in the tops of sweetmeat-boxes and snuff-boxes, or richly framed for hanging up. The introduction of enamel-painting gave great impetus to the custom, for enamel-painting is of all processes the most fit for such a purpose, because of its brilliancy of color, the ease with which gold can be introduced into it, and its perfect durability. Of the enamelers the most famous was Jean Petitot, who worked in England under Charles I., but soon returned to France, where he lived till nearly the close of Louis XIV.'s reign. It is probable that many existing enamel miniatures are improperly ascribed to Petitot, but it is quite certain that many are his, and his work, continued through a long life, set up the standard for such painting, for its quality has never been surpassed. Under the reigns of Louis XV., Louis XVI., and Napoleon, it still remained a fixed custom to present costly snuff-boxes with the portrait of the sovereign set in the lid to ambassadors and other persons to whom honor was to be done. A common way to make a money gift to any one thought to need such help was to present to him a miniature portrait of the giver and a *rouleau* of gold "to pay for having it mounted." There is constant mention of that proceeding in the memoirs of the time. Besides portraits, pictures of incident, sometimes very free in subject, were set in snuff-boxes, patch-boxes, and the like. Moreover, porcelain boxes were made, the hinge and rim of the cover being of gold or silver-gilt, and the porcelain of these boxes painted with delicate landscape and figure subjects. The little round portraits painted on ivory, even as late as 1840, and in a few cases still more recently, preserve a faint tradition of what was once a marvelous extravagance of demand and supply in one department of fine art.

Bibliography.—For miniatures in manuscripts, see the bibliography under Manuscripts; for the miniatures of the sixteenth century and later, see Bradley, *Dictionary of Miniaturists* (3 vols., 1888–89), and J. L. Propert, *History of Miniature Art* (1887). Russell Sturgis.

Minicoy, Minucoy, or **Minakai**: a small island between the Laccadives and Maldives, separating the eighth parallel channel of the navigators from that of the ninth parallel, politically belonging to the former group, and hence to Kananur of the Malabar coast, but ethnographically to the latter. It is a coral formation, crescent shaped; about 5 miles long, with a total area of 2½ miles. The population in 1881 was 3,915, giving the enormous density of 1,566 per square mile, or that of a continuous village. The inhabitants are Mohammedans. Mark W. Harrington.

Minié, mē̆e′ni-ā′, Claude Étienne: soldier and inventor; b. in Paris in 1814; early entered the army as a volunteer; fought in Algeria; was made a captain in 1849; became a teacher in gunnery at the school of Vincennes in 1852, and went in 1858 to Egypt as superintendent of a factory of firearms and director of a musketry school at Cairo on the invitation of the viceroy, who gave him the title of general. In 1849 he brought out his invention of the rifle-ball that bears his name. It is cylindrical, conical in the front, hollow in the rear, and provided with a ridge of thin iron, which by being pressed into the grooves of the barrel when the ball is forced through, gives to this a much higher precision and range. His invention was the first application of the principle of expansion in the construction of firearms. D. Dec. 14, 1879.

Min'ims, or **Min'imi,** Order of the [*minims* = Lat. *mi'nimi*, plur. of *mi'nimus*, least]: a monastic order founded by St. Francis de Paul in Calabria in 1436, confirmed by Sixtus IV. in 1474, and given its present name by Alexander VI. in 1493. Its founder called them the Hermits of St. Francis of Assisi. In Paris they were called Bons Hommes; in Spain, Fathers of Victory, because Ferdinand the Catholic ascribed to their prayers his victory at Malaga over the Moors; in German, Pauliner. The name Minim (least) is derived from the humility of their bearing—this being one of their characteristics. They were forbidden to eat flesh, likewise eggs, butter, cheese, and milk; bread, water, and oil alone formed their sole dietary, and fasts were numerous and severe. Besides monks there were nuns and tertiaries. At first the order spread rapidly, but now it has only a few monasteries in Italy, and still fewer nunneries. See Louis Dony d'Attichy, *Histoire générale de l'ordre sacré de Minims* (2 vols., Paris, 1824). S. M. Jackson.

Mining: See Mines and Mining.

Ministers: See Diplomatic Agents.

Minium: See Lead.

Miniver: See Ermine.

Mink [of uncertain etymology]: a name given to certain animals belonging to the weasel family (*Mustelidæ*) and the genus *Putorius*, especially *P. lutreola* of Europe and North Asia, and *P. vison* of North America. The former is a smaller animal, with a much finer fur than the American mink. Still the mink of North America, especially northward, yields fine and high-priced furs. The mink is 15 to 18 inches long, of a rich glossy brown with a white patch on the chin, or sometimes a white line down the throat. Minks frequent small streams and forests and mountains, swim well, and catch fish, frogs, mice, and birds. They are easily bred in a half-domesticated state. They are easily trapped, being neither suspicious nor cunning. They are very destructive in poultry-yards, often taking up their abode near them.

Minks.

Revised by F. A. Lucas.

Minneapolis: city; capital of Ottawa co., Kan. (for location of county, see map of Kansas, ref. 5–G); on the Solomon river, and the Atch., Top. and S. Fé and the Union Pac. railways; 23 miles N. W. of Solomon City. It is in an agricultural and stock-raising region, and has grist and saw mills, foundry and machine-shop, carriage and other factories, and 4 weekly and 3 monthly periodicals. Pop. (1880) 1,084; (1890) 1,756; (1900) 1,727.

Minneapolis [Dakota *minne*, water + Gr. πόλις, city]: city (settled in 1849, incorporated in 1867, enlarged by annexation of the city of St. Anthony in 1873); capital of Hennepin co., Minn. (for location of county, see map of Minnesota, ref. 9–E); on both sides of the Mississippi river, at the Falls of St. Anthony, and on the Burl. Route, the Chi. and N. W., the Chi. Great W., the Chi., Mil. and St. P., the Chi., St. P., Minn. and Om., the Great N., the Minn. and St. L., the Minn., St. P. and St. Ste. M., the N. Pac., the St. P. and Duluth, and the Wis. Cent. railways; 10 miles N. W. of St. Paul. It is on a broad esplanade, which commands a fine view of the falls; has an area of 55⅜ sq. miles; is regularly laid out, with straight avenues averaging 80 feet in width; and has several beautiful lakes, including the famous Minnetonka, and the celebrated Falls of Minnehaha, within easy access. The lake region, affording excellent boating, bathing, hunting, and fishing, is becoming a popular summer and autumn resort. The city is the seat of the State University (chartered in 1851) and of the Augsburg Theological Seminary (Lutheran, opened in 1869), and contains 167 churches, 62 public-school buildings, an academy,


MANITOBA
ONTARIO
Lake of the Woods
NORTH DAKOTA
SOUTH DAKOTA
IOWA
WISCONSIN
Rainy Lake
Rainy R.
Lake Superior
Mississippi R.
Red R.
Red Lake
Lake Winnibigoshish
Leech L.
Cass L.
Pokegama L.
Mille Lacs
Minnesota River
Chippewa River
St. Croix R.
Lake Traverse
Big Stone Lake
Pigeon R.
Grand Portage
Hovland
Grand Marais
Lutsen
Tofte
COOK CO.
Same scale as main map
ROSEAU
KITTSON
MARSHALL
RED LAKE DIMINISHED
RED LAKE IND. RES.
BOIS FORT IND. RES.
ITASCA
BOIS FORT IND. RES. (CHIPPEWAS)
ST. LOUIS
LAKE
POLK
BELTRAMI
WINNIBIGOSHISH IND. RES.
NORMAN
WHITE EARTH IND. RES.
CHIPPEWA IND. RES.
CASS
HUBBARD
LEECH L. IND. RES.
CLAY
BECKER
CROW WING
AITKIN
CARLTON
PINE
OTTER TAIL
WADENA
GRANT
DOUGLAS
TODD
MORRISON
MILLE LACS
KANABEC
TRAVERSE
STEVENS
POPE
STEARNS
BENTON
ISANTI
CHISAGO
BIG STONE
SWIFT
KANDIYOHI
MEEKER
SHERBURNE
WRIGHT
ANOKA
LAC QUI PARLE
CHIPPEWA
MCLEOD
CARVER
HENNEPIN
RAMSEY
WASHINGTON
YELLOW MEDICINE
RENVILLE
SCOTT
DAKOTA
LINCOLN
LYON
REDWOOD
SIBLEY
NICOLLET
LESUEUR
RICE
GOODHUE
WABASHA
PIPESTONE
MURRAY
COTTONWOOD
WATONWAN
BROWN
BLUE EARTH
WASECA
STEELE
DODGE
OLMSTED
WINONA
STONE
ROCK
NOBLES
JACKSON
MARTIN
FARIBAULT
FREEBORN
MOWER
FILLMORE
HOUSTON
IOWA
MINNESOTA
County Towns
0 10 20 30 40 50 60 70 80 Miles
Longitude West from Greenwich
L.L.POATES, ENGR., N.Y.

2 female seminaries, a medical college, a conservatory of music, a free public library (building cost $350,000) with over 112,631 volumes, 4 opera-houses, 18 miles of boulevard drives, 1,194 acres of lands devoted to public parks, and 2 large cemeteries. Among notable buildings are the city and county building (cost $4,000,000); Northwestern Guarantee Loan (cost $1,250,000); New York Life Insurance (cost $800,000); and the Masonic Temple (cost $400,000). The census returns of 1890 showed that 2,649 manufacturing establishments (representing 162 industries) reported. These had a combined capital of $40,763,718; employed 26,453 persons; paid $14,439,005 for wages and $50,116,362 for materials; and had products valued at $77,146,451. The principal industry, according to the amount of capital employed, was the manufacture of flour and grist mill products, which had 18 establishments, and $9,960,997 capital, paid $946,958 for wages and $24,703,703 for materials, and had products valued at $27,758,790. Next was sawed lumber, with 20 establishments and $8,577,304 capital, which paid $1,002,949 for wages and $4,894,257 for materials, and had products valued at $7,215,293. Then followed agricultural implements, 7 establishments, $2,382,318 capital, $173,370 wage and $205,573 materials payments, and $848,466 value of products; planing-mill products, 22 establishments, $2,188,093 capital, $803,243 wage and $1,231,398 materials payments, and $2,411,682 value of products; and foundry and machine-shop products, 36 establishments, $1,374,924 capital, $509,280 wage and $413,785 materials payments, and $1,411,721 value of products. The taxable valuation of the city in 1893 was $140,624,490, the tax levy amounted to $2,995,301, and the city owned property valued at $18,512,330. The net debt Jan. 1, 1894, was $6,637,573, including a water debt of $1,230,000. There were 7 national banks, combined capital $5,450,000, 15 State banks, of which 13 reported combined capital $2,655,000, and 2 other banks, and 6 daily, 43 weekly, 6 semi-monthly, 27 monthly, and 2 quarterly periodicals. Pop. (1880) 46,887; (1890) 164,738; (1895) 192,833; (1900) 202,367. EDITOR OF "NORTHWESTERN MILLER."

Minnedo'sa: a town of Manitoba, on the Little Saskatchewan, an affluent of the Assiniboine; 135 miles W. N. W. of Winnipeg, on the Manitoba and Northwestern Railway (see map of Canada, ref. 9–H). It is a flourishing business place in a region of excellent farming land which is rapidly filling up with colonists. Pop. 1,500. M. W. H.

Minneha'ha [Dakota, liter., laughing water]: a waterfall in Hennepin co., Minn., celebrated for its beauty. Here the small river Minnehaha leaps 60 feet down a limestone precipice. It is half a mile from the Mississippi and near Minneapolis. The interesting legend of an Indian maiden leaping this fall when thwarted in her love for an Indian brave has been finely treated by Longfellow in *The Song of Hiawatha*.

Minnesingers [from Germ. *minnesinger*, *minne*, love (< O. H. Germ. *minni*) + *singen*, sing]: the name of that class of German poets, belonging chiefly to the nobility, who, from the latter part of the twelfth to the close of the thirteenth century, cultivated lyric poetry as an art. Although this name was applied to this class of poets by Hartmann von der Aue, and used during the later Middle High German period, it was lost during the subsequent centuries, and finally was reintroduced by Bodmer, who revived the interest in the study of these poets by the publication of a collection of their poems (1758). The origin and growth of the minnesong coincides with the development of the German chivalry during the twelfth century, though it is incorrect to regard the minnesong a product of the French influence which at that time made itself felt in the social life of the German courts and castles. The oldest specimens of the minnesong which originated in Austria do not indicate the least trace of such foreign influence. Their resemblance in contents and language to the popular song recorded in the fourteenth and fifteenth centuries makes it, on the contrary, quite evident that the oldest minnesong developed from the popular German love-song, of which we possess unfortunately no documents previous to the middle of the twelfth century. While we have thus in Austria a German minnesong of purely native origin (Kürenberg, Burggraf von Regensburg, etc.), we can observe in the western part of Germany the rise of a more artistic minnesong, which is due to the influence of Provençal and French models. The imperfect rhymes prevailing in the old Austrian songs are now gradually being replaced by perfect ones; the structure of verse and strophe is regulated by artistic principles, and instead of the old monostrophic song we now find the poets combine a number of strophes into one poem. Besides, we may notice how the views of the fashionable court society, the strict rules of chivalrous etiquette which form the basis of the troubadour poetry, also became the conditions upon which the artistic minnesong rests. Now the German knight, like his French model, addresses his lamentations to some married noble lady, whose servant he becomes, whose name he dare not betray, and whose favor, if ever attained, he had to enjoy secretly, amid great dangers, as she was being watched very closely. Under these conditions there was little room left for the descriptive element of poetry, since the poet was restricted to the depiction of a very few situations. With the exception of the *Tagelieder*, in which the parting of the lovers in the morning after a clandestine meeting is more or less dramatically described, there is to be found a great monotony in the minnesongs of this kind. We are compensated, however, for this defect and the consequent introspectiveness of most minnesongs by the graceful expression of tender and deep sentiments, and by conceptions concerning womanhood and love, which in their sublime idealism are distinctly German and far surpass the frequently frivolous tone of the troubadour songs.

The earliest representatives of this artistic minnesong are Heinrich von Veldeke and Friedrich von Hausen. They have numerous followers, the most prominent of whom are Heinrich von Morungen and Reinmar der Alte. In the latter poet, who lived at the Austrian court, we may probably see the model, if not the teacher, of Walther von der Vogelweide, whose earliest minnesongs show in thought and style a great similarity to those of Reinmar. Walther, who was the greatest lyric poet of the Middle Ages, soon felt the burdensome narrowness and monotony of the minnesong, as well as the apparent immorality of the whole minnedienst, and we can follow him in his poems opposing the unnatural artificiality of the minnesong and claiming the right of healthy nature. In his best songs Walther again approaches the simplicity of the popular love-song, which he ennobles by the means of his exquisite art. The decline of the minnesong sets in with Walther's death. While some of the minnesingers, like Ulrich von Lichtenstein, carry the old traditions to a ridiculous extreme, a number of poets, like Tannhäuser, Steinmar, Neifen, and others, continue the opposition inaugurated by Walther, ridiculing the sentimentality of the minnedienst, and finally dissolving the whole fabric of minnepoetry. The songs of Neidhart von Reuenthal who, assuming the air of a minnesinger, sings the praise of peasant girls and makes the villages near Vienna the scene of his love adventures, must also be classed among the opposition to the artificial minnepoetry of Reinmar and Ulrich von Lichtenstein. With the close of the thirteenth century the minnesong has practically died out or become petrified among the mastersingers, the inheritors of the highly developed metrical form and other artificialities of the last minnesingers.

BIBLIOGRAPHY.—The poems of the minnesingers have been handed down to us in a number of good manuscripts, among which the so-called *Mannessische*, now in Heidelberg, is the costliest and most famous. It has been reprinted in the large edition of the minnesingers by F. von der Hagen. The minnesingers previous to Walther may be found in the classical edition *Des Minnesangs Frühling*, by Lachmann and Haupt. See also Uhland, *Schriften* (vol. v., pp. 111–182); Becker, *Der altheimische Minnesang*; W. Scherer, *Deutsche Studien*; Julius Goebel, in *The American Journal of Philology* (vol. viii.); K. Burdach, *Reinmar d. Alte und Walther v. d. Vogelweide* (1880); Wilmanns, *Leben und Dichten Walthers v. d. Vogelweide* (1882); Schönbach, *Walther v. d. Vogelweide* (1890): Roethe, *Reinmar von Zweter* (1888); Bielschowsky, *Geschichte der deutschen Dorfpoesie im 13 Jahr.* (1891). See also GERMAN LITERATURE.

JULIUS GOEBEL.

Minnesota [named from Minnesota river]: one of the U. S. of North America (North Central group); the nineteenth State admitted into the Union.

Location and Area.—It is bounded N. by the Dominion of Canada, E. by Lake Superior and Wisconsin, S. by Iowa, and W. by North Dakota and South Dakota. The west part of the north boundary is the parallel of 49° N. lat.; the Iowa line is the parallel of 43° 30′ N. lat. The extreme longitudes are the meridians of 89° 39′ and 97° 5′ W. The area of the State, including all marginal waters except those

of Lake Superior, is 84,286·53 sq. miles (53,943,379 acres). The geographic position of Minnesota is almost central in the continent of North America, and her drainage reaches the Atlantic by way of Hudson Bay, the Gulf of St. Lawrence, and the Gulf of Mexico.

Seal of Minnesota.

Physical Features. — In the north central part of the State is a plateau, the highest points of whose surface are 1,750 feet above sea-level. From this height the general surface slopes gradually in all directions toward the boundaries, but curving upward in both the northeastern and southwestern corners, so as to give still higher elevations. The granite pinnacles of the Giant Mountains N. of Lake Superior reach a height of 2,200 feet, while the Coteau des Prairies gives to several southwestern counties an elevation of some 1,800 feet. The slopes, of very unequal area, are each quite uniform in declivity. The average elevation of the whole State is 1,275 feet above sea-level. The feature which most conspicuously breaks the general uniformity of surface is the great trough formed by the valley of the Mississippi in the S. E., the valley of the Red River of the North, and, intermediate and continuous with them the broad valley of the Minnesota river, making a big V with its salient thrust well into the southern part of the State. The highest point in this trough is 975 feet.

The Itasean plateau contains the sources of four river systems, each draining one of the great slopes. The Red River of the North, receiving the waters flowing from the western slope, discharges them into Lake Winnepeg and ultimately into Hudson Bay. The area thus drained is 15,107 sq. miles. The northern slope is less extensive, occupying an area of 10,330 sq. miles, traversed by numerous short streams emptying into the Rainy river or into the chain of lakes forming a considerable part of the northern boundary of the State. The ultimate outlet is into Hudson Bay. The eastern slope is smallest in area, covering only 8,552 sq. miles, and has the greatest angle of declivity, the lowest land in the State being found near Fond du Lac, where the St. Louis empties into Lake Superior. This system is understood to embrace a number of streams flowing S. E. directly into Lake Superior. The head waters of the Mississippi river spring from the heart of the Itasean plateau, in the lake named by Schooleraft "Itasca." They flow first northerly, then curve eastward through a great chain of lakes, and describe more than a half circle before striking out in a main southerly course for the Gulf of Mexico. After receiving the St. Croix 20 miles below St. Paul, the Mississippi forms the eastern boundary of the State, and leaves it at an elevation of 620 feet above sea-level. The flow of the Mississippi, like that of most of the rivers of the State, is on the drift till its descent of the Falls of St. Anthony, whence it follows a deeply eroded preglacial channel. Of numerous tributaries the Minnesota is by far the most important. The area drained by the Mississippi is 45,566 sq. miles, more than half of the State. The Mississippi, the Minnesota, and the Red are the only rivers that are navigable, and navigation has almost ceased on the last two. In the extreme southern part of the State are found the head waters of the Cedar and the Des Moines, which, flowing southerly, at length reach the Mississippi. The Rock river empties into the Missouri. The total area drained by these streams is 4,731 sq. miles.

It is estimated that the surveys of the State when completed will enumerate 10,000 lakes. They are of all sizes, from Red Lake, with an area of 340 sq. miles, down to inconsiderable ponds. At least three-fourths of the lakes are found in the "morainic till" which forms the surface of the greater part of the State. A smaller number, generally shallow, but often extensive, lie in the "modified drift." A very few, like Lakes Traverse and Big Stone, in the Minnesota trough, and Lake Pepin, in the Mississippi valley, are mere enlargements of river beds. The remainder are the rock lakes, lying along the northern boundary and in the triangle, where they display bold and tortuous shores.

Geology.—From the reports of the State Geological Survey, which has been prosecuted since 1872 under the auspices of the University of Minnesota, the following statement, in which the local terminology is employed, has been gathered: An ancient Archæan axis traverses the State centrally from N. E. to S. W. On the opposite flanks of this axis the later rocks are laid in belts approximately parallel, though they are much more extensive on the southeastern flank. These belts in order are—(1) The Taconic, embracing two systems, (*a*) the Animikie, which has at its base the quartzite seen at Pakegama Falls, New Ulm, and in Pipestone County, and (*b*) the Keeweenawan or copper-bearing traps of the Lake Superior region; (2) the St. Croix series, displayed extensively in the bluffs of the St. Croix and Mississippi rivers, being of Cambrian age; (3) the Lower Silurian, extending from the St. Peter sandstone upward to the Hudson river formation, seen in the interior of the State; (4) a feeble representation of the Upper Silurian; and, (5) nonconformable upon the last, the lowermost members of the Devonian, viz., the Corniferous, and doubtfully some traces of the Hamilton. All these systems and formations are clearly made out in the S. and E., but in the N. W. they lie deep under the drift. Later than all the foregoing, Cretaceous strata were deposited with discordant stratification on their outcropping edges. The State as a whole lies under a heavy mantle of drift, which is deepest in the western half and thins out gradually, to disappear in the triangle N. of Lake Superior and in the ancient rocky valley of the St. Croix and the Mississippi. The principal rock exposures are found in these denuded areas. In the western half of the State exposures are few and widely separated, the principal being those of the upper Minnesota valley and the quartzites of the extreme southwestern counties. As a general fact, the great drift sheet consists of that confused mixture of sand, gravel, and clay known as till, and believed to be the immediate product of glacial action. Along the river valleys, however, are found extensive areas of stratified sand and gravel, evidently deposited in water on a foundation of till. In some cases these deposits form narrow terraces, in others they widen out into plains. Extensive beds of stratified sand and gravel are also found outside of river gorges, and they constitute a large portion of the surface drift in the Leaf Hills, the Mesabi Range, and in the Coteau des Prairies. These drift materials are the subsoil of the State, and mingle with other elements to form also the surface soil. There is very little stony ground. The top covering of the soil, commonly known as "black dirt," varies in depth from a few inches to several feet. The color and richness of this coating are due to the residuum of immemorial prairie-fires, or, in the forest regions, to the accumulations of decayed vegetation.

The stratified clays of the drift are wrought into bricks of many degrees of color and hardness. Excellent pottery is made from the finer clays, and kaolin and other materials for crockery are found on the Cretaceous area.

Clean, sharp sand for building purposes is generally abundant, and the pure white sands from the St. Peter formation are pronounced unsurpassed for glass-making. Building-stones are found in great variety, and may be classified as follows: (1) Crystalline, as in the granites at St. Cloud; (2) quartzite, as in the red jasper of the southwestern counties; (3) dolomites, as in the beds at Frontenac; (4) dolomitic limestone, as quarried at Red Wing and Kasota; (5) limestone, as in the Trenton beds about Minneapolis; and (6) sandstones, as found at Hinckley, Dresbach, and Jordan.

The Archæan formations of the State contain iron mines of phenomenal richness and accessibility. The region known as the Vermilion Iron Range extends both E. and W. from Tower. From this range in 1899 were produced 1,643,984 long tons of high-grade ore, mostly suitable for Bessemer steel. Another range of iron-bearing rock lies at the base of the Palæozoic in the Taconic formation, known as the Mesabi Range. This region extends from the Pokegama Falls of the Mississippi river easterly 145 miles. The ore is soft hematite, very free from impurities. Extensive mining is carried on by means of steam shovels, which lift the ore directly from the bed to the railway cars. The production in 1899 was 6,517,305 long tons. The total shipments of iron ore from Minnesota mines in 1899 were 8,161,289 long tons.

Productions.—The great geographic extent of the State, the richness of soil, and the abundance of water give rise to a varied and abounding flora. The valley of the Minnesota, occupying less than one-fifth of the area, contains 1,174 flowering plants. Contrary to a common belief, Minnesota is a country of forest rather than of prairie. About 52,000 sq. miles are, or have been, wooded, the remaining 32,000 sq. miles being prairie.

The timber of the woods of the Coteau des Bois region consists chiefly of oak, elm, bass, and maple. In the north half of the State are found white and yellow pine, white cedar, spruce, tamarack, and birch. The winter climate is too rigorous for the peach and the cherry, but the hardier varieties of the apple are grown, and many varieties of the native plum are being propagated. Small fruits, including the grape, flourish in great abundance and excellence. Nowhere are the usual garden vegetables grown in greater perfection than in the black soil of this State.

The buffalo and antelope, which were once plentiful, have disappeared, but in the great forest to the N. are elk, moose, bear, deer, and rarely the beaver. Grouse, partridge, and quail still survive the war of the pot-hunter. There are few waters that are not well stocked with valuable species of fish. The State has an efficient game law, and a State fish commission is engaged in restocking lakes and streams.

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	92,386	116,851	+26·5
Total acreage of farms	13,403,019	18,663,645	+39·2
Value of farms, including buildings and fences	$193,724,260	$340,059,470	+75·5

The following table shows the acreage, yield, and value of the principal crops in the calendar year 1900:

CROPS.	Acreage.	Yield.	Value.
Corn	963,476	31,794,708 bush.	$9,220,465
Wheat	4,905,643	51,509,252 "	32,450,829
Oats	1,662,978	41,907,046 "	10,057,691
Rye	53,151	1,036,444 "	435,306
Barley	324,788	7,275,251 "	2,764,595
Buckwheat	9,564	143,460 "	81,772
Potatoes	106,618	8,636,058 "	2,590,817
Hay	1,227,021	1,423,344 tons	9,892,241
Totals	9,253,239	.....	$67,493,716

On Jan. 1, 1900, the farm animals comprised 459,673 horses, value $25,256,763; 8,248 mules, value $489,858; 672,540 milch-cows, value $21,285,891; 564,463 oxen and other cattle, value $13,700,354; 419,218 sheep, value $1,333,113; and about 600,000 swine, value $5,000,000; total value, $67,065,979.

Climate.—The climate of the mid-temperate zone is in Minnesota modified and ameliorated by local conditions. It is rare that an abundant rainfall in the growing season is not followed by dry weather favorable to harvesting. The winters are dry, with moderate snowfall. The high latitude gives a long day in the growing season. Fair weather is the rule for the whole year, so that Minnesota has been a favorite resort for invalids needing to live out of doors. Malarial diseases are unknown.

The average temperature for the year of the central part of the State is 44·6°, for the summer 70·5°, and for the winter 16·1°. The average precipitation for the year is 28·75 inches; the mean height of barometer, 30·00; and the lowest winter temperature in 1893 was —26° F.

The record of observations made at Minneapolis (lat. 45° N., lon. 93° 14′ W.) by William Cheney, voluntary observer, U. S. Weather Bureau, Department of Agriculture, shows the average temperature and precipitation by months from 1865 to 1893 inclusive:

MONTHS.	Temperature, average for 29 years.	Rainfall in inches, average for 28 years.
January	8·72°	1·218
February	14·23	1·206
March	24·76	1·484
April	43·65	2·419
May	57·23	3·516
June	67·03	4·282
July	71·38	3·304
August	68·22	3·776
September	58·79	3·413
October	45·76	1·858
November	29·16	1·307
December	15·70	1·249

The average temperature of the year at this station is 42·05 (twenty-nine years); the average summer temperature, 68·88°; the average winter temperature, 12·88°; and the average rainfall per year, 29·032 inches (twenty-eight years).

Divisions.—For administrative purposes Minnesota is divided into eighty-four counties, as follows:

COUNTIES AND COUNTY-TOWNS, WITH POPULATION.

COUNTIES.	* Ref.	Pop. 1890.	Pop. 1900.	COUNTY-TOWNS.	Pop. 1900.
Aitkin	6-E	2,462	6,743	Aitkin	1,719
Anoka	9-F	9,884	11,313	Anoka	382
Becker	5-B	9,401	14,375	Detroit	2,060
Beltrami	3-C	312	11,030	Bemidji	2,183
Benton	8-D	6,284	9,912	Sauk Rapids	1,391
Big Stone	8-A	5,722	8,731	Ortonville	1,247
Blue Earth	11-D	29,210	32,263	Mankato	10,599
Brown	10-D	15,817	19,787	New Ulm	5,403
Carlton	6-F	5,272	10,017	Carlton	449
Carver	9-E	16,532	17,544	Chaska	2,165
Cass	5-D	1,247	7,777	Walker	500
Chippewa	9-B	8,555	12,499	Montevideo	2,146
Chisago	9-F	10,359	13,248	Center City	.....
Clay	5-A	11,517	17,942	Moorhead	3,730
Cook	8-H	98	810	Grand Marais	.....
Cottonwood	11-C	7,412	12,069	Windom	1,944
Crow Wing	6-D	8,852	14,250	Brainerd	7,524
Dakota	10-F	20,240	21,733	Hastings	3,811
Dodge	11-F	10,864	13,340	Mantorville	602
Douglas	7-B	14,606	17,974	Alexandria	2,681
Faribault	11-E	16,708	22,055	Blue Earth City	2,900
Fillmore	11-G	25,966	28,238	Preston	1,278
Freeborn	11-E	17,962	21,838	Albert Lea	4,500
Goodhue	10-F	28,806	31,137	Red Wing	7,525
Grant	7-B	6,875	8,935	Elbow Lake	625
Hennepin	9-E	185,294	228,340	Minneapolis	202,718
Houston	11-H	14,653	15,400	Caledonia	1,175
Hubbard	5-C	1,412	6,578	Park Rapids	1,313
Isanti	9-F	7,607	11,675	Cambridge	737
Itasca	3-E	743	4,573	Grand Rapids	1,428
Jackson	11-C	8,924	14,793	Jackson	1,756
Kanabec	7-E	1,579	4,614	Mora	785
Kandiyohi	9-C	13,997	18,416	Wilmar	3,931
Kittson	2-A	5,387	7,889	Hallock	1,058
Lac-qui-Parle	9-A	10,382	14,289	Madison	1,336
Lake	3-H	1,299	4,654	Two Harbors	3,278
Le Sueur	10-E	19,057	20,234	Le Sueur Center	478
Lincoln	10-A	5,691	8,966	Lake Benton	890
Lyon	10-B	9,501	14,591	Marshall	2,088
McLeod	9-D	17,026	19,595	Glencoe	1,780
Marshall	2-A	9,130	15,698	Warren	1,276
Martin	11-D	9,403	16,936	Fairmont	3,040
Meeker	9-D	15,456	17,753	Litchfield	2,280
Mille Lacs	7-E	2,845	8,066	Princeton	1,319
Morrison	7-D	13,325	22,891	Little Falls	5,774
Mower	11-F	18,019	22,335	Austin	5,474
Murray	11-B	6,692	11,911	Slayton	883
Nicollet	10-D	13,382	14,774	St. Peter	4,302
Nobles	11-B	7,958	14,932	Worthington	2,386
Norman	4-A	10,618	15,045	Ada	1,253
Olmsted	11-G	19,806	23,119	Rochester	6,843
Otter Tail	6-B	34,232	45,375	Fergus Falls	6,072
Pine	7-F	4,052	11,546	Pine City	993
Pipestone	11-A	5,132	9,264	Pipestone	2,536
Polk	3-A	30,192	35,429	Crookston	5,359
Pope	8-B	10,032	12,577	Glenwood	1,116
Ramsey	9-F	139,796	170,554	St. Paul	163,065
Red Lake	.....	.....	12,195	Red Lake Falls	1,885
Redwood	10-C	9,386	17,261	Redwood Falls	1,661
Renville	10-C	17,099	23,693	Beaver Falls	565
Rice	10-F	23,968	26,080	Faribault	7,868
Rock	11-A	6,817	9,668	Luverne	2,223
Roseau	2-B	.....	6,994	Roseau	301
St. Louis	4-F	44,862	82,932	Duluth	52,969
Scott	10-E	13,831	15,147	Shakopee	2,047
Sherburne	8-E	5,908	7,281	Elk River	831
Sibley	10-D	15,199	16,862	Henderson	904
Stearns	8-C	34,844	44,464	St. Cloud	7,340
Steele	11-F	13,232	16,524	Owatonna	5,561
Stevens	8-B	5,251	8,721	Morris	1,934
Swift	9-B	10,161	13,503	Benson	1,525
Todd	7-C	12,930	22,214	Long Prairie	1,385
Traverse	7-A	4,516	7,573	Wheaton	1,132
Wabasha	10-G	16,972	18,924	Wabasha	2,528
Wadena	6-C	4,053	7,921	Wadena	1,520
Waseca	11-E	13,313	14,760	Waseca	3,103
Washington	9-F	25,992	27,808	Stillwater	12,318
Watonwan	11-D	7,746	11,496	St. James	2,607
Wilkin	6-A	4,346	8,080	Breckenridge	1,282
Winona	11-H	33,797	35,686	Winona	19,714
Wright	9-E	24,164	29,157	Buffalo	1,040
Yellow Medicine	10-B	9,854	14,602	Granite Falls	1,214
White Earth Indian Reservation	.....	.....	3,486		
Totals		1,301,826	1,751,394		

* Reference for location of counties, see map of Minnesota.

Principal Cities and Towns, with Population in 1900.—Minneapolis, 202,718; St. Paul, 163,065; Duluth, 52,969; Winona, 19,714; Stillwater, 12,318; Mankato, 10,599; St. Cloud, 8,663; Faribault, 7,868; Red Wing, 7,525; Brainerd, 7,524; Rochester, 6,843; Fergus Falls, 6,072; Little Falls,

5,774; Owatonna, 5,561; Austin, 5,474; New Ulm, 5,403; Crookston, 5,359; Albert Lea, 4,500; Hastings, 3,811.

Population and Races.—In 1850, 6,077; 1860, 170,023; 1870, 439,706; 1880, 780,733; 1890, 1,301,826 (native, 834,470; foreign, 467,356; males, 695,321; females, 606,505; white, 1,296,159; colored, 5,667, of whom 3,683 were persons of African descent, 94 Chinese, 2 Japanese, and 1,888 civilized Indians); 1900, 1,751,394.

Industries and Business Interests.—The census returns of 1890 showed that 7,505 manufacturing establishments reported. These had a combined capital of $127,686,618, employed 79,629 persons, paid $38,189,239 for wages and $118,481,941 for materials, and had products valued at $192,033,478. The leading manufacture is that of spring wheat-flour, and its chief seat is in Minneapolis, where the immense water-power of the Falls of St. Anthony is mostly thus utilized. The daily capacity of its mills is 46,800 barrels, and the output of the year 1892 was 9,750,470 barrels, of which 3,337,205 barrels were exported directly from the mills to foreign markets. A considerable manufacture of flour is growing up in Duluth, attracted by the convenience of shipment directly by water. Lumber, chiefly pine, holds the next place to flour. The total cut of pine in 1892 was reported as 1,091,917,003 feet. The greater part of this was manufactured into lumber in the State, Minneapolis holding the leading place, with Duluth as second. Next in importance and of considerable magnitude are foundries and machine-shops, builders' supplies, meat-packing, agricultural implements, furniture, printing, car-building, boots and shoes, and paper.

Banking.—On Sept. 5, 1900, there were 83 national banks with combined capital of $12,682,040, individual deposits of $45,805,379.48, and surplus and profits of $3,671,687.91; and 188 State banks with combined capital of $6,654,800, individual deposits of $28,130,738, and surplus and profits of $1,442,940. There were also 47 private banks, 6 loan and trust companies, and 11 savings-banks, with combined capital of $2,992,507, deposits of $16,277,189, and surplus and profits of $751,029.

Commerce.—Minnesota has two U. S. customs districts and ports of entry—Duluth, on Lake Superior, and Minnesota City, with the chief office at St. Paul, on the Mississippi river. During the calendar year 1900 the imports of merchandise at Duluth aggregated $96,400 in value, and the exports $3,659,241; and the imports at Minnesota City $1,581,390, and exports $357,778; total imports, $1,677,790; exports, $4,017,019; total foreign merchandise trade, $5,694,809.

Finance.—The assessed valuation is about $700,000,000. State tax rate (1898), $1.50 per $1,000. In the year ending July 31, 1900, the receipts of the State aggregated $9,015,168.24, and the expenditures $6,845,830.72, leaving balance of $2,169,337.52. The total debt, all funded, on July 31, 1900, was $1,279,000.

Means of Communication.—With some exceptions the railways may be considered as radiating from a center in the "twin cities," St. Paul and Minneapolis. Their aggregate mileage on June 30, 1899, was 6,560·26 miles. The 3 per cent. tax on gross earnings, in lieu of all other taxes, amounted to $1,443,992.13. Minnesota has no canals. The rivers furnish over 2,500 miles of navigation, and Lake Superior, penetrating to the heart of the State, gives water communication eastward to the seaboard.

Churches.—The census of 1890 gave the following statistics of the principal religious bodies having a membership of 5,000 and upward each in the State:

DENOMINATIONS.	Organizations.	Churches and halls.	Members.	Value of church property.
Roman Catholic	465	445	271,319	$3,514,325
Lutheran, United Norwegian	405	388	49,541	608,200
Methodist Episcopal	534	532	30,837	1,725,843
Lutheran Synodical Conference	217	178	30,398	443,700
Lutheran, General Council	220	223	27,609	616,720
Lutheran, Norwegian Evan.	164	147	21,832	267,950
Baptist	194	194	14,698	1,107,839
Presb. in the U. S. of America	167	173	13,732	1,292,670
Congregational	175	177	13,624	1,114,800
Protestant Episcopal	171	173	11,142	931,100
Lutheran, Hauge Synod	55	55	6,534	99,345
Evangelical Association	134	134	6,181	170,550
German Evan. Synod of N. A.	53	53	5,567	97,900

Schools.—The system of public instruction consists of (1) the common schools and the normal schools for supplying them with teachers; (2) the graded schools, including the high schools; and the State University. These institutions are organically affiliated and are unique in presenting a complete system of secularized school instruction, in which tuition is absolutely free of charges, from A B C to the doctorate of philosophy.

The State superintendent is at the head of the system. County superintendents have immediate supervision of the common schools. The graded schools are supervised by local superintendents. Most of the high schools are subject to the visitation of the State high school board, which controls the distribution of a State fund to such approved schools as undertake to prepare students for the university. In 1898–99 there were 6,940 schools; the school property was valued at $14,800,000. There were 11,250 teachers—2,306 men and 8,944 women: the average pay a month was, for men $41, for women $29.50. The total revenue for school purposes was $5,550,437, and the expenditure $5,172,110. There were 384,063 children enrolled; average daily attendance, 237,145. School was held 159 days. The expenditure per pupil, based on the average daily attendance, was $21.81. The permanent school fund derived from the sales of public lands granted by the general Government amounted in 1899 to $696,842. Under a "local-option" law textbooks are generally supplied to pupils of common and graded schools at public expense.

Libraries.—According to a U. S. Government report on public libraries of 1,000 volumes and upward each in 1891, Minnesota had 56 libraries which contained 304,668 bound volumes and 35,690 pamphlets. The libraries were classified as follows: General, 12; school, 19; college, 9; law, 2; theological, 2; medical, 1; public institution, 2; Y. M. C. A., 1; social, 5; scientific, 2; and historical, 1.

Post-offices and Periodicals.—In Jan., 1901, there were 1,660 post-offices, of which 148 were presidential (3 first-class, 18 second-class, 127 third-class) and 1,512 fourth-class. There were 782 money-order offices and 50 money-order stations. The newspapers and periodicals comprised 36 daily, 4 semi-weekly, 560 weekly, 1 tri-monthly, 1 bi-weekly, 19 semi-monthly, 58 monthly, 1 bi-monthly, and 3 quarterly publications; total, 683.

Charitable, Reformatory, and Penal Institutions.—A legislative act of 1883 established a State Board of Corrections and Charities, and formed all of these institutions into an aggregate, the board having charge of the whole system. Each institution is under the immediate supervision of a board of trustees or managers, excepting the schools for the deaf, dumb, and blind, which are grouped into an Institute for Defectives. The whole number of inmates in 1900 was 5,730, and the total expenditure in the 13 charitable and penal institutions was $969,337. The hospitals for the insane are at St. Peter, at Rochester, and at Fergus Falls. The Institute for Defectives is at Faribault, and the School for Dependent and Neglected Children at Owatonna. The Soldiers' Home occupies a beautiful site on the Mississippi river in Minneapolis. The reformatory institutions are the State Prison at Stillwater, the State Reformatory at East St. Cloud, and the Reform School at Red Wing.

Political Organization.—The constitution comprises a bill of rights, a frame of government with the usual tripartite division of functions, and separate articles on elective franchise, finances, and education. The executive department comprises a Governor, Lieutenant-Governor, Secretary of State, auditor, treasurer, attorney-general, land commissioner (the auditor), commissioner of statistics (the assistant secretary of State), superintendent of public instruction, public examiner, State librarian, commissioner of labor statistics, insurance commissioner, inspector of illuminating oils, seven inspectors of logs and lumber, five inspectors of steam-boilers, and about 7,000 notaries public. Besides the regents of the State University, the Governor appoints the members of seventeen boards and commissions. The Legislature meets biennially, and remains in session for 90 legislative days. The 80 counties are divided into 54 districts, each of which elects one Senator and one or more Representatives, of whom the whole number in 1894 was 114; Senators are elected for four years, Representatives for two. The Legislature is prohibited from passing special acts when a general law can be made applicable, and no bills can be introduced in the last twenty days of a session excepting by a special message from the Governor. The Governor may veto any item or items of an appropriation bill while approving the remainder. The judiciary has the usual gradation of courts. All judges and clerks of courts of record are elected, judges for six years, clerks for four years. Minnesota being a "code State," the distinction between actions at law and suits in equity is abolished, and there is but one

form of action, called "a civil action." The franchise is extended to males twenty-one years old and upward who have resided in the U. S. for one year, in the State for four months, and in the election district for ten days, providing they are citizens of the U. S., foreigners who have declared their intentions of becoming citizens, civilized half-breed Indians, and civilized Indians examined in any district court and pronounced capable. Women of legal age may vote for school officers and measures, and may hold school offices. All voters must have been registered previously. A modification of the Australian ballot system is in use. Elections are held on the first Tuesday after the first Monday in November in alternate even-numbered years. The legal rate of interest is 7 per cent.; the rate allowed by contract, 10 per cent.

History.—The most conspicuous of the early missionaries and fur-traders who penetrated the territory was Father Hennepin, who in 1680 discovered the falls, to which he gave the name of his patron saint, Anthony of Padua. Deserving of mention also was Capt. Jonathan Carver, who set out in 1766 to explore the new lands which under the treaty of 1763 had passed from France to England. The part of Minnesota E. of the Mississippi became U. S. territory by the treaty of 1783, and was included in the "Northwest Territory," organized under the ordinance of 1787. It was later part of Indiana, Michigan, and Wisconsin territories successively.

The lands W. of the Mississippi came into possession of the U. S. by the Louisiana purchase, and were included successively in the territories of Upper Louisiana, Arkansas, Missouri, and Iowa. The expedition of Lieut. (later Gen.) Zebulon Pike in 1805 furnished to the Government and to the people the first definite and authentic information of the climate, soil, and natural resources of the region. Later military explorations enlarged and confirmed Pike's reports. In 1819 the Government took measures which resulted in the completion of a military post, later known as Fort Snelling, at the junction of the Minnesota and Mississippi rivers. For the use of the garrison a sawmill was built at the Falls of St. Anthony, 7 miles above, in which in 1823 machinery for flouring was set up.

In 1827 a body of Swiss refugees from Lord Selkirk's colony at Pembina, on the Red River of the North, appeared at Fort Snelling, and were allowed to cultivate lands belonging to the post. These were the first white settlers. In the decade 1830–40 a post of the America Fur Company was established at Mendota, near Fort Snelling, by Henry Hastings Sibley, later first Governor of the State. In the same period the scientific explorations of Featherstonehaugh, Mather, Nicollet, Frémont, Cass, and others were prosecuted, and such missionaries as the Ponds, Riggs, Williamson, and Boutelle began their labors. By them the Dakota language was reduced to writing. In 1837 the Chippewa title to the lands E. of the Mississippi was extinguished, and thereupon pioneers swarmed in to take up farms and cut pine lumber on the St. Croix. In 1841 the Catholic missionary Father Galtier erected a small log chapel on the site of the city, which took its name, St. Paul, from that given to the edifice.

Congress passed an act creating the Territory of Minnesota on Mar. 3, 1849. In 1851 21,000,000 acres of land were acquired of the Dakotas by the treaty of Traverse de Sioux. The influx of settlers was immediate and rapid, and industry and trade increased at a prodigious rate, which later was but slightly checked by the disasters of the panic year of 1857. In 1858 Minnesota was admitted to the Union as a State, with an area much reduced, under a constitution closely modeled on those of States previously created out of the Northwest Territory.

The Dakotas in selling their lands in 1851 reserved a considerable territory on the Upper Minnesota, toward the southwestern corner of the State. Exasperated by the encroachments of settlers, the extortions of traders, and the mismanagement of Government agents, the Sioux in Aug., 1862, raided the adjacent settlements. In the course of thirty-six hours, as stated by Neill, some 800 whites were murdered. As soon as possible a military force was organized under Gen. H. H. Sibley, which after a series of affairs and two considerable battles at Birch Coolie and Wood Lake, captured or dispersed the savages. Of the leaders, thirty-eight were executed on one scaffold at Mankato Dec. 26, 1862.

In the course of the civil war Minnesota furnished 11 regiments of infantry, a regiment of heavy artillery, 3 batteries of field-artillery, 4 regiments or battalions of cavalry, and 2 companies of sharpshooters, in all 25,052 men, equal to one-seventh of her population.

GOVERNORS OF MINNESOTA.

Territorial.	
Alexander Ramsey	1849–53
Willis A. Gorman	1853–57
Samuel Medary	1857–58
State.	
Henry H. Sibley	1858–60
Alexander Ramsey	1860–64
Stephen Miller	1864–66
William R. Marshall	1866–70
Horace Austin	1870–74
Cushman K. Davis	1874–76
John S. Pillsbury	1876–82
Lucius F. Hubbard	1882–87
Andrew R. McGill	1887–89
William R. Merriam	1889–92
Knute Nelson	1892–95
David M. Clough	1895–99
John Lind	1899–1901
Samuel R. Van Sant	1901–

AUTHORITIES.—*Executive Documents of the State of Minnesota*; *Legislative Manuals of the State of Minnesota*; *Minnesota in the Civil and Indian Wars, 1861–1865*; *Collections of the Minnesota Historical Society* (vol. iii. contains a bibliography of the State by J. F. Williams); *Publications of the Geological and Natural History Survey of Minnesota* (in progress, 1894); Neill, *History of Minnesota*; Neill, *Concise History of the State of Minnesota* (Minneapolis, 1887); J. F. Williams, *History of St. Paul* (St. Paul, 1876); West, *Life of Henry Hastings Sibley* (St. Paul, 1889); John H. Stevens, *Personal Recollections* (Minneapolis, 1890); Heard, *History of the Sioux War* (New York, 1863).

WILLIAM W. FOLWELL.

Minnesota River [*Minnesota* is from Dakota *minne*, water + *sota*, muddy]: a stream which rises in Big Stone Lake, on the boundary between Minnesota and South Dakota, traverses the State of Minnesota, flowing first S. E. and then N. E., reaching the Mississippi 5 miles above St. Paul. It flows through the Coteau des Bois, or Big Woods, a great forest of deciduous trees, and is navigable 300 miles in high and 45 in low water. Total length, 470 miles.

Minnesota, The University of: a public institution for superior education in Minneapolis, Hennepin County, established by territorial statute 1851, confirmed by the State constitution adopted in 1857. The present charter dates from 1868, and the first collegiate work was begun in 1869.

The government is vested in a board of regents consisting (1) of nine members appointed for six years and (2) of three members *ex officiis*—the Governor of the State, the State superintendent of public instruction, and the president of the university. Tuition is free in the non-professional departments. Both sexes are admitted. There is no dormitory system. No honorary degrees have been or can be conferred. The libraries contain over 55,000 volumes. The laboratories are extensive and well equipped. The geological survey of the State was intrusted to the university in 1872 and has since been in successful progress. The first volume of the final report was published in 1884, the second in 1888.

The endowment consists of 202,083 acres of lands granted by the national Government, or the proceeds of the sales thereof. Over half of the lands have been sold and the amount of the permanent fund was, in 1899, $1,307,219. The current-expense fund is hereafter to come mainly from a share—three-twentieths of one mill—of the general State school tax.

In the early years the university was obliged to maintain a "preparatory" department. The plan of organization adopted in 1870 provided for the gradual elimination not only of the preparatory department, but also of the first two years of the usual college work, thus relegating all secondary instruction to the affiliated high schools of the State. The last preparatory class was dropped in 1887, but a considerable time must elapse before the university may safely throw more work on those schools. By the mediation of a State high school board, charged with the management and distribution of a State fund to such high schools as will undertake to prepare students of both sexes free of charges for tuition for the university, eighty high schools are brought into close filiation with the university, and the system of public instruction unified and completed.

The following colleges or departments have been organized and are in operation: The College of Science, Literature, and the Arts; the College of Agriculture; the College of Engineering, Metallurgy, and the Mechanic Arts; the College of Law; the Colleges of Medicine, Dentistry, and Pharmacy. The number of students in all departments in Jan., 1900, was 3,410, and the faculty numbered 246.

WILLIAM W. FOLWELL.

Minnetarees: See SIOUAN INDIANS.

Minnewaukon, or **Devil's Lake**: a body of water in the northern part of North Dakota, on the 48th parallel of N. lat. It is about 40 miles long, and 12 miles wide in its broadest part. Its water is of a deeper tint than that of the surrounding fresh-water lakes, and is so brackish as to be unfit to drink.

Minnow [M. Eng. *menow* < O. Eng. *myne* (cf. dial. Mod. Eng. *minny*, minnow)]: a name applied to many small fresh-water fishes of the family *Cyprinidæ*. The English minnow is *Leuciscus phoxinus*, a very common little fish of the brooks, with blunt head, small scales, and the males brightly colored in spring. In the U. S. the name is extended to some 200 small fishes, species of *Hybognathus*, *Notropis*, *Leuciscus*, *Rhinichthys*, etc. They are used as live bait in pike and pickerel fishing, and are important as affording food to larger and better fishes.

Revised by D. S. Jordan.

Mino da Fiesole, mee'nō-daa-fē̆e-es'ō-lā: sculptor; b. in Italy about 1430. He went to Rome at an early age, but he had already attained a prominent position in his art, for he was commissioned to adorn with bas-reliefs the marble altar of St. Jerome for Sta. Maria Maggiore. The monument of Paul II. was intrusted to him, and was considered at the time the most beautifully ornamented of any of the papal tombs. He then made a tabernacle to contain the holy oil for St. Maria in Trastevere, and in Sta. Maria sopra Minerva, the tomb of Francesco Tornabuoni, the marble statue on which was much admired. After this he returned to Fiesole and settled there, producing innumerable works for the convents and churches of Florence, and monuments, of which the one to the Markgraf Hubert of Magdeburg is one of the finest. Prato, Perugia, and Volterra also possess examples of his art. D. in 1486. W. J. Stillman.

Minonk: city; Woodford co., Ill. (for location of county, see map of Illinois, ref. 4–E); on the Atch., Top. and S. Fé and the Ill. Cent. railways; 29 miles N. of Bloomington, 53 miles N. E. of Peoria. It has valuable coal mines, brickyards, tile-works, steam flour-mills, grain elevators, and 2 private banks. Pop. (1890) 2,316; (1900) 2,545.

Minor: See Infant.

Minor: Robert Crannell: See the Appendix.

Minor: Virginia Louisa: See the Appendix.

Minor'ca [Span. *Menorca*; from Lat. *mi'nor*, less, the lesser. Cf. Majorca]: the second largest and easternmost of the Balearic islands; situated in the Mediterranean, 27 miles E. N. E. of Majorca, and belonging to Spain; is about 35 miles in length and 17 broad. Area, 301 sq. miles. Pop. 35,000. It is mountainous, its highest point, Mt. Toro, rising 1,148 feet. It produces oil, wine, hemp, and fruits. The *Hedysarum coronarium*, or zulla, is extensively cultivated for fodder. Sweet potatoes are also raised here and exported to Algeria. The caper plant is abundant. The island has manufactures of wool, hemp, flax, etc. Among the principal exports are wheat and cattle. The island is less fertile than Majorca; lead, copper, and iron are found, but the scarcity of fuel prevents extensive working of them. Superior marbles and porphyries are found here, also lime and slate. The coast contains numerous creeks and bays, especially on the north side. The chief town, Port Mahon, the capital, situated on the southern coast of the island, has a spacious, safe, and strongly fortified harbor capable of accommodating a whole fleet of men-of-war. Minorca has also the ports of Addaya, Fornells, Nitja, and Ciudadela, which was formerly the capital, and has a cathedral and several convents, also woolen manufactures. The island has been declining in business and population since it passed from English into Spanish hands (1803). A considerable emigration is taking place to Algeria, where the Minorcans are called Mahonais. Revised by M. W. Harrington.

Mi'norites [from Lat. *minor*, lesser. Cf. Lat. name *Fra'tres Mino'res*, lesser brothers]: the name given by St. Francis of Assisi to his original order. (See Franciscans.) The name is still borne by some congregations of that great order or group of orders.

Minority Representation: See Representation.

Minor Mode, **Minor Scale**: See Mode and Scale.

Mi'nos (in Gr. Μίνως): a King of Crete, to whom the Cretans traced their laws and political institutions; said by Homer and Hesiod to have been a son of Zeus and Europa, a brother of Rhadamanthus, father of Deucalion and Ariadne. He was on familiar terms with his father Zeus, in whose sacred grotto he lived for nine years, being instructed by his father in the science of laws. His laws were therefore promulgated in the name of the god. Minos died and was buried in Sicily, whither he had gone in pursuit of Dædalus (*q. v.*). After his death he became one of the judges in Hades. Later poets and mythologists speak of two Kings of Crete of the name of Minos, probably in order to establish harmony between the many contradictory myths which clustered around the name. See Pasiphaë and Minotaur.

J. R. S. Sterrett.

Minot, George: jurist; b. at Haverhill, Mass., Jan. 5, 1817; graduated at Harvard in 1836 and at Harvard Law School in 1838; finished his law studies under Rufus Choate; was admitted to the bar in 1839, and became distinguished in his profession. He was associate reporter of the decisions of Judge Woodbury of the first circuit court; published in 1844 his *Digest of the Decisions of the Supreme Court of Massachussetts* (45 vols., with *Supplement*, 1852); edited the *English Admiralty Reports* (9 vols., 1853–54); aided Richard Peters, Jr., in editing the first 8 vols. of the *United States Statutes at Large* (1848), for which he prepared the *Index*, and was the editor of that important publication for the ten years preceding his death, which occurred at Reading, Mass., Apr. 16, 1858.

Min'otaur [from Lat. *Minotau'rus* = Gr. Μινώταυρος; Μίνως, husband of Pasiphaë + ταῦρος, bull]: in Grecian mythology, a monster with the body of a man and the head of a bull, the offspring of Pasiphaë, the wife of Minos, and Poseidon's bull. Minos shut the monster up in the Cnossian labyrinth, where it was fed on criminals and on the youths and maidens paid as a tribute by Athens, until it was killed by Theseus, with the help of Ariadne. The monster has been frequently represented by Greek artists in its early adventures, inclosed in the labyrinth, and fighting with or subdued by Theseus. The Minotaur was identical with the Moloch of the Phœnicians in form and in the fact that human sacrifice was offered to it. The slaying of the monster by Theseus means that Greek civilization (Theseus) put an end to human sacrifice. Revised by J. R. S. Sterrett.

Minot's Ledge, or **Minot's Rocks**: a portion of the extensive reefs called Cohasset Rocks, lying off Cohasset, Mass., the southeastern promontory of the coast of Boston Bay, E. S. E., and 14 nautical miles from the city. A granite lighthouse with fog-bell is situated on the outer rock. See Lighthouse.

Minsk: government of Russia, on the upper part of the Dnieper. Area, 35,293 sq. miles. The watershed between the basin of the Niemen, flowing to the Baltic, and the basin of the Dnieper, flowing to the Black Sea, is formed by a narrow plateau and a range of low hills seldom reaching the height of 1,000 feet. Otherwise, the ground is low and level; the soil often sandy, often marshy; the climate in winter very severe. Extensive forests cover much of the land. Rye, flax, and hemp are raised, sheep and horses are reared, and tar, timber, and potash are produced. Pop. (1897) 2,156,343.

Minsk: town of Russia; capital of the government of Minsk, on the Svislocz, a tributary of the Beresina; 436 miles by rail W. S. W. of Moscow (see map of Russia, ref. 7–C). It has many good educational institutions and is the seat of the provincial government, but its trade and manufactures are unimportant. It is mostly built of wood. Pop. (1897) 91,113, including about 20,000 Jews.

Minstrels [from O. Fr. *menestrel*, by analogy of dimins. in *-el*, from Mediæv. Lat. *ministra'lis*, servant, retainer, jester, singer, deriv. of Lat. *minis'ter*, servant, liter., inferior, deriv. of *minus*, less]: the name applied during the Middle Ages in England, Scotland, France, and Normandy to strolling musicians who sang to the harp verses composed by themselves or others, and usually accompanied their songs with dancing, mimicry, and other devices to *minister* to the amusement of royal or noble patrons. There can be little doubt that they were the direct successors of the skalds and gleemen of earlier Scandinavian and Teutonic antiquity, and connected, though more remotely, with the "bards" who figured so largely among the Celtic and Gothic tribes. They were, however, no longer the custodians of the national epics, like the Minnesingers (*q. v.*), nor even permanently attached to the noble families as genealogists, but had begun to degenerate into jesters. The last representative of the earlier type of warrior-minstrels was probably Taillefer, who at the battle of Hastings rode before Duke William, tossing up and

catching his sword, and singing the song of Roland. By the time of Edward IV. the nobler occupations of the minstrels had given place to masquerading and playing at mysteries, and in the thirty-ninth year of Elizabeth a statute was passed classing minstrels and "jugglers, bearwards, fencers, common players of interludes, tinkers, and peddlers" as "rogues, vagabonds, and sturdy beggars," and to be punished accordingly. From that period nothing more is heard of minstrelsy as a profession. In modern times the name has been employed in a double sense. The comic singers of Negro and other melodies are known as "minstrels," while the same term is often employed in a complimentary sense nearly as the equivalent of "poet." Of the latter conception Scott's *Lay of the Last Minstrel* is a good example.

Mint [O. Eng. *minte*, from Lat. *menta*, from Gr. *μίνθη*, mint]: the name of various fragrant labiate plants, especially those of the genus *Mentha*. Of these the Peppermint and Spearmint (*qq. v.*) are the most important. The whole genus and other plants of the order possess aromatic qualities. The European pennyroyal (*M. pulegium*), bergamot mint (*M. citrata*), and others have considerable use in domestic medicine, and some are employed in cookery.

Mint Family: a large and well-defined group (*Labiatæ*) of dicotyledonous, mostly herbaceous plants, with opposite leaves, and with gamopetalous, mostly two-lipped flowers, four or two stamens, and superior four-lobed ovary. They are distributed throughout all parts of the earth, and number 2,700 species, of which about 150 are natives of the U. S. Many are grown in gardens and greenhouses, e. g. species of *Salvia*, *Coleus*, *Perilla*, *Æolanthus*, etc. Many domestic medicines are obtained from species of this family, as peppermint, horehound, hyssop, lavender, rosemary, sage, thyme, pennyroyal, catnip, balm, etc. Charles E. Bessey.

Minto, Earl of: See the Appendix.

Mints and Minting [*mint* is from O. Eng. *mynet*, coin: O. H. Germ. *muniza* > Mod. Germ. *münze*, mint, coin, from Lat. *mone'ta*, mint, coined money (deriv. of *Mone'ta*, surname of Juno, in whose temple money was coined) > O. Fr. *moneie*, whence Eng. *money*]: A mint is a factory of coin conducted under the sanction of public authority. The use of the precious metals, as measures of value and mediums for effecting the exchange of commodities, dates from the earliest period in the history of the human race of which any record exists. Originally, gold and silver passed by weight in the form of lumps, buttons, wedges, and spikes. With the progress of civilization, increase of barter, and the extension of commerce came the necessity for individual pieces of metal of uniform fineness, weight, and value, in form for convenient use, and bearing in effect the certificate of the supreme authority as to such fineness, weight, and value, and to pass by tale or count. The best authorities are generally agreed in according the invention of coins to the Lydians, and the period of their first use to about the seventh century B. C. Their introduction enabled the weighing of bullion in ordinary business transactions to be dispensed with, and placed the unskilled multitude upon an equality in the use of money with the skilled few. The use of coins rapidly spread, aiding materially in the exchange of commodities, and powerfully promoting intercourse between the different countries of the world.

In describing the processes of minting those in use in the mints of the U. S. may be taken as typical of all others.

The mints and assay-offices are under the supervision of a director, whose headquarters are in the Treasury Department at Washington, and who is subject to the general direction of the Secretary of the Treasury. The former are located at Philadelphia, San Francisco, Carson City, and New Orleans; and the latter at New York, St. Louis, Denver, Col., Boisé City, Ida., and Charlotte, N. C.

The various operations and processes to which bullion is subjected may be summarized as follows:

(1) *The preparatory melting*, usually with protective or refining fluxes, as the case may be; (2) *the assay*, which determines the precise proportion of fine gold or fine silver in each case, and also whether both metals are present and require parting; (3) *the parting process*, often called *refining*, since it takes the silver out, and leaves pure gold and pure silver as the separate products; (4) *the alloying of the metal*, so as to make ingots or thin bars of standard fineness, and the casting of such ingots; (5) *the assay of ingots*, to determine whether they are of the legal or standard fineness for coinage; (6) the various manipulations by which such standard ingots are converted into coin.

Conversion of Bullion into Standard Ingots.—As a general rule, all bullion when received is subjected to a preparatory or "deposit" melting, for the purpose of freeing it from all earthy matter and adhering substances, as well as to render the mass homogeneous preparatory to assay. Samples for assay are taken for gold from the cast bar, and from silver while the bullion is in a fused condition. The weight of the bullion after deposit-melting is that with which the depositor is credited and the melter and refiner charged. The bullion, if not of sufficient fineness and otherwise in condition to admit of being brought to the legal standard for coinage—nine parts pure metal and one of copper—is subjected to purification by melting and the use of protective and refining fluxes. If gold bullion contains silver, or silver bullion contains gold, in quantities sufficient to defray the expense of separating the two metals, it is subjected to the parting operation, which is based on the fact that silver is soluble in both nitric and sulphuric acid, while gold is not affected by either. If the metal to be parted is not present in quantity sufficient to equal the expense of the operation, it passes off in the coins, but without valuation. In the gold coins the law permits one-tenth of the alloying metal to be composed of silver. Tests made by the assay commission show that the silver in gold coins is almost inappreciable, amounting to but a trace, while out of five examinations made for gold contained in silver coins the highest limit was 1 part in 5,000. The most economical proportion of the two metals for the parting operation is 2 oz. of silver to 1 oz. of gold.

The bullion, having been freed from all foreign substances and base metals, or separated where gold and silver are associated in the same bullion, is alloyed with copper and brought to the legal standard for coinage. It is then cast into ingots and assayed, and if found to be sufficiently within the deviation from standard or "tolerance" allowed by law, is transferred to the coiner, who by a series of operations converts it into coin.

The Conversion of Ingots into Coin.—The principal operations and processes to which ingots of standard fineness are subjected in their manufacture into coin may be classified as follows:

(1) *The rolling*, which reduces the ingots to strips or fillets of a thickness proper for the denominated coins. (2) *The annealing*, which is rendered necessary to preserve the ductility of the metal during the rolling operation. (3) *The drawing*, whereby any want of uniformity in the thickness of the strips is corrected. (4) *The cutting*, or forcing from the strips "planchets" or blanks of the size and shape of the coin. (5) *The adjusting*, or weighing separately of each blank, and bringing those above standard within the working limit of deviation by filing. (6) *The milling*, which presses up the edge of the blank in order to protect the surface of the coin. (7) *The cleaning*, whereby all oxidation is removed from the face of the blank. (8) *The coining*, or impressing upon the blanks the devices and inscriptions prescribed by law.

When ingots are received by the coiner from the melter and refiner, and the weight noted, they are taken to the rolling-room, and passed through heavy iron or steel rolls, each melt being kept and passed through separately. At each successive rolling the rolls are brought together by means of a screw, their adjustment or proximity to each other being indicated upon a dial which is regulated by the workman in charge. Successive rolling hardens or renders brittle the strips, and necessitates annealing in order to preserve their ductility. The length of time required to anneal gold is from one to one and a half hours, and for silver about twenty minutes. The first annealing having been completed, the strips are passed a few times through the finishing-rolls, and after a second annealing are ready for the drawbench. The pointed end of the strips are inserted between the drawplates, and drawn through a small pair of perpendicular steel rolls by means of a treadle and an endless chain. Two drawings are necessary for each strip. In the first a slight reduction is made, and in the last the drawplates are carefully adjusted to the thickness of the coin. A few strips are then passed through, from both ends of which blanks are cut and weighed, and if the weight is found to conform to the working tolerance, the drawing of the entire lot is proceeded with.

The strips are then taken to the cutting-press and planchets cut therefrom. This operation consists in passing the strip across a conical steel bed, while a punch just fitting the bed operates on the upper side of the fillet and forces a piece

of the exact size and shape of the punch through the sharp bed beneath. The punch, operated by steam, moves with great rapidity, and cuts from 150 to 280 pieces a minute. The number of pieces that can be cut from ingots is as follows:

GOLD.

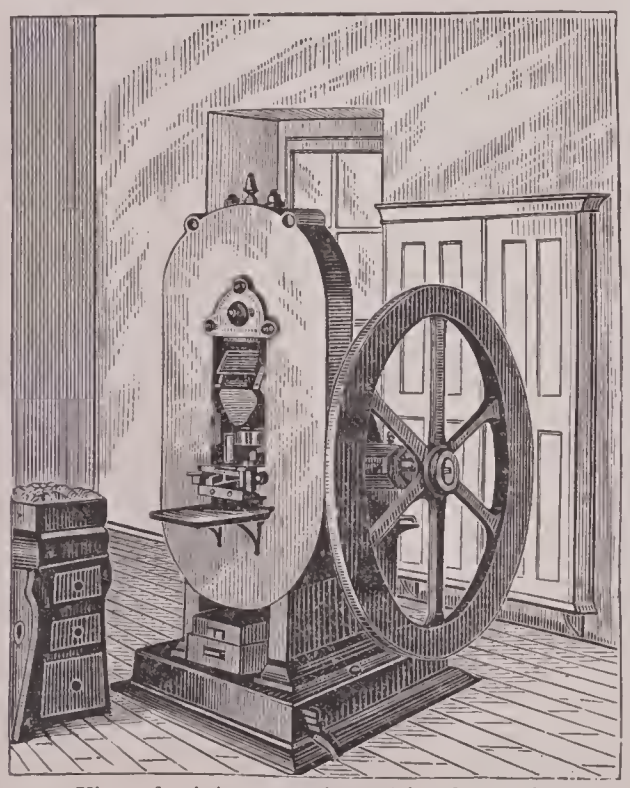
From one double-eagle ingot	.....	40 pieces.
" " eagle "	.....	60 "
" " half-eagle "	.....	75 "
" " three-dollar "	.....	136 "
" " quarter-eagle "	.....	100 "
" " dollar "	.....	632 "

SILVER.

From one standard-dollar ingot	.....	33 pieces.
" " half-dollar "	.....	60 "
" " quarter-dollar* "	.....	70 "
" " dime "	.....	354 "

The perforated strips, denominated "clippings," and the blanks, are sent to the cleaning-room for the purpose of removing all dirt and grease adhering to them from previous operations. The clippings are returned to the melter and refiner and remelted, and the planchets or blanks delivered to the adjusters.

A blank, or counterweight, adjusted to a small fraction exceeding the legal weight of the coin is furnished to each adjuster, with which the weight of all the blanks is tested, those heavier than the counterweight being carefully filed upon the edge until they are adjusted to a perfect counterpoise. The adjusted planchets are then returned to the forewoman, and under her supervision five of the most experienced adjusters prove the work, and if any planchet is found outside of the prescribed limit it is readjusted. Those of less weight than the counterweight are kept in separate pans and tested by a second counterweight, which is a slight fraction *below* the standard weight of the coin. In the case of gold coins, which are the standard of value and unlimited legal tender, each blank is adjusted by hand before being milled and stamped. The blanks for the dollar, which is a legal-tender coin, are also adjusted by hand, while those for the subsidiary or over-valued silver coin, the half dollar, quarter dollar, and dime, are not so adjusted, the drawbench being relied on to insure the necessary uniformity as to thickness and correspondence of the blanks to their respective legal weights. The law allows on all coins a



View of coining-press in position for work.

certain deviation from standard weight. (See *Tolerance*, below.) This deviation, however, is seldom reached, the coiner fixing a limit within the legal deviation, which is known as the "working tolerance." All pieces found below the "working tolerance" are designated "condemned lights," and returned to the melter and refiner. The remainder, known as "heavies," "lights," and "standards," are kept separate until they reach the weigh-room as *coin*, when they are united in proper proportions, and made up into drafts for delivery by the coiner to the superintendent, who is acting treasurer. The subsidiary silver coins, half dollar, quarter dollar, and dime, are weighed separately, and all above or below the legal tolerance rejected.

The adjusted blanks are now ready for the milling operation, which is done by a machine containing a circular plate, the outer edge being of steel; the plate revolves within a strong band of the same material. The revolution of the inner disk carries the blank through the intermediate space between the working disk and fixed band, and this, being somewhat less than the diameter of the piece, presses up the edge of the planchet as it revolves. One revolution carries the piece through the mill and completes the operation. The milled planchets, more or less oxidized, before being brought to the proper condition for blanching, must be entirely coated with oxide of copper. To insure this, they are annealed to a cherry-red heat, and when removed from the furnaces are placed in a colander, dipped for a few moments into a diluted solution of sulphuric acid, and thence into pure water, in order to rinse off the acid. This leaves the blanks thoroughly cleaned, and after being dried by shaking in a large iron sieve or revolving riddle filled with sawdust, they are ready for the stamping operation.

This last and most important operation is performed by the coining-press. As each blank descends to the bottom of the tube a pair of steel fingers seize it and carry it forward between the dies. While the dies are closing upon it and stamping both the obverse and reverse inscriptions simultaneously, the steel fingers return for another planchet, and, conveying it to the dies, push the coined piece into a box beneath the press. The coined pieces are collected from the presses and taken to the weigh-room, where they are made up in drafts for delivery to the superintendent. The speed of the coining-presses is estimated at from 75 to 120 pieces a minute, and the pressure exerted in stamping the coins ranges, according to their denomination, from 45 to 280 tons.

Tolerance.—The law allows a tolerance or deviation from the standard fineness of $\frac{1}{1000}$th in the gold coinage and $\frac{3}{1000}$ths in the silver. But in practice the assayer does not avail himself of even one-half the tolerance, as the aim is to have the coinage as near the exact standard as possible, which is not the practice followed by some foreign mints. The margin of fineness of gold coin in the British mint is placed at 2 parts in 1,000, though but a small part of this margin is actually used.

The following statement exhibits the standard weight of the gold and silver coins of the U. S., and the legal tolerance or deviation allowed on single pieces:

DENOMINATION.	Standard weight, grains.	Legal deviation, grains.
Gold.		
Double eagle	516	$\frac{1}{2}$
Eagle	258	$\frac{1}{2}$
Half eagle	129	$\frac{1}{2}$
Three dollar*	77·4	$\frac{1}{4}$
Quarter eagle	64·5	$\frac{1}{4}$
Dollar*	25·8	$\frac{1}{4}$
Silver.		
Half dollar	192·9	$1\frac{1}{2}$
Quarter dollar	96·45	$1\frac{1}{2}$
Twenty-cent piece*	77·16	$1\frac{1}{2}$
Dime	38·58	$1\frac{1}{2}$

* These coins have been abolished by act of Congress.

These deviations are intended for the protection of the mint officers, and are not taken advantage of in the preparation of the coins, which are made as close to the standard weight as practicable. In weighing a number of pieces together, when delivered by the coiner to the superintendent, and by the superintendent to the depositor, the law provides that the deviation from the standard weight shall not exceed in the case of gold coins $\frac{1}{100}$th of an ounce in $5,000 in double eagles, eagles, half eagles, or quarter eagles; while on silver the deviation is $\frac{2}{100}$ths of an ounce in 1,000 standard dollars, half dollars, or quarter dollars, and $\frac{1}{100}$th of an ounce in 1,000 dimes. The uniform practice at the mints is that each delivery of coin made by the coiner to the superintendent shall conform to the standard weight, no advantage being taken of the limit or tolerance allowed in weighing a large number of pieces together.

From each delivery of coins by the coiner to the superin-

* The quarter-dollar ingot is now made to yield a double row of blanks, or 140 pieces to the ingot.

tendent a certain number of pieces are indiscriminately taken, sealed up, and placed in the pyx, for the annual trial or test of the coinage, which is made in February of each year by a commission constituted by law for that purpose; and if it appears by such examination and test that the reserved coins do not differ from the standard fineness and weight by a greater quantity than is allowed by law, the trial is considered and reported as satisfactory; but if any greater deviation from the legal standard or weight appears, the fact is certified to the President of the U. S., and if on a view of the circumstance he shall so decide, the officer or officers implicated in the error are thenceforward disqualified from holding their respective offices.

Wastage.—In the various processes to which bullion is subjected at the mints more or less loss occurs, particularly by volatilization in melting and refining, and is accounted for under the term "wastage." The operative officers are charged and credited with all bullion delivered to and returned by them, and are allowed a credit for actual "wastage" incurred, provided it does not exceed the legal allowance, which in the case of the melter and refiner is $\frac{1}{1000}$th of the whole amount of gold, and one and a half thousandths of the whole amount of silver delivered to him since the last annual settlement; and in the case of the coiner, one-half of $\frac{1}{1000}$th of the whole amount of gold and $\frac{1}{1000}$th of the whole amount of silver delivered to him by the superintendent. The actual wastage is, on the average, much within the limit fixed by law.

Great care is taken to recover from time to time all the minute particles of bullion remaining in the residuum fluxes, flues, etc. These are mostly recovered in the form of "sweeps," which are sold to bullion-smelters at about 60 per cent. of the value of the bullion contained.

Mint Values.—Gold is valued in the coinage at the rate of $25\frac{8}{10}$ths grains troy, nine-tenths fine, or $23\frac{22}{100}$ths grains of pure metal to the dollar. For silver the valuation in the standard dollar is at the rate of $412\frac{1}{2}$ grains troy, nine-tenths fine, or 371·25 grains of pure metal to the dollar. In the subsidiary silver coins it is valued at the rate of $385\frac{8}{10}$ths grains troy, nine-tenths fine, or $347\frac{22}{100}$ths grains pure metal to the dollar.

Charges.—Charges which are estimated to equal but not exceed the average expense of each operation required to bring gold and silver bullion into a condition for coinage are fixed from time to time by the director of the mint with the approval of the Secretary of the Treasury. The subjects of charge are deposit melting, parting, toughening, refining, copper alloy, bar charge. In the charge for deposit melting exceptions are made for standard gold bullion, fine gold bars, U. S. gold coin of less than legal weight, foreign coin of U. S. standard or above to be converted into coin, fine silver bars over $997\frac{1}{2}$ fine, unless they contain gold, and mint or U. S. assay-office bars redeposited. Gold bullion, including foreign gold coin, is received at the mints at Philadelphia, San Francisco, and Carson City, and the assay-office, New York, for coin or bars. Silver bullion is received only for bars or by purchase for Government account, and all coinage of silver is for Government account. At the mint in Denver, operated as an assay-office, and the assay-offices at Boisé City and Charlotte, the identical bullion is returned to the depositor in the form of unparted bars bearing upon them the U. S. stamp of fineness, weight, and value.

Subsidiary Coins.—The subsidiary silver, as well as the minor or token coins (bronze one-cent and copper-nickel three and five cent pieces), are manufactured on Government account only, the public treasury purchasing the bullion and metals required therefor, defraying the expense of manufacture, wastage, and transfer to the various treasury-offices, and realizing the seigniorage or gain on such coinage. Gold coins are receivable at the Treasury of the U. S. at their denominational value, when not reduced in weight by natural abrasion after a circulation of twenty years as shown by the date of coinage, more than one-half of 1 per centum, and at a ratable proportion for any period less than twenty years. For the silver coins no legal limit of abrasion or wear is provided, but when mutilated or defaced, such coins are purchased at the mints at their bullion value when presented in sums of $3 and upward.

Under the title of "bullion fund" a part of the public moneys are placed at the different coinage mints and at the assay-office, New York, out of which depositors are paid for their bullion, in coin or bars, as soon as the value thereof has been ascertained by assay (generally three days thereafter), and on payment being made the bullion so deposited becomes the property of the U. S.

Revised by O. C. Bosbyshell.

Minu'cius Felix: See Felix, Marcus Minucius.

Miu'uet [from Fr. *menuet*, so called from the short steps taken in it, deriv. of *menuet*, smallish, pretty, dimin. of *menu*, small > Lat. *minu'tus*, whence Eng. *minute*]: in music, a species of dance-tune formerly in common use. Its movement was rather slow, graceful, and stately. The minuet was written in triple measure, and always began with a full bar. It consisted of two divisions or parts, each containing eight bars, and both divisions were repeated. Minuets also, not intended for dancing, and of considerable rapidity of movement, are now often found as constituent parts of overtures, symphonies, sonatas, and other formal pieces. In such cases the minuet generally comprises two strains of sixteen bars each, with repetitions. Another strain, called the "trio," follows directly, and after the trio the former part of the minuet is repeated.

Min'uit, or **Minnewit**, Peter: founder of New York; b. in Wesel, Rhenish Prussia, about 1580, belonged to a distinguished family, and had been deacon in the Walloon church at Wesel, but had resided some years in Holland when, Dec. 19, 1625, he was appointed by the Dutch West India Company first governor and director-general of New Netherlands. He landed on Manhattan Island May 4, 1626; purchased the island from the Indians for sixty guilders; built Fort Amsterdam, and governed the colony with energy and success until Aug., 1631, when he was recalled. Having put into the port of Plymouth, England, through stress of weather, on his homeward voyage, Apr., 1632, his ship was attached at the suit of the New England Council on an accusation of illegal trading, but was released in May. Minuit had lost favor with the West India Company, through a charge of having countenanced land monopoly, and after unsuccessful efforts to regain his position offered his services to the Swedish Government to found a colony in North America. The great chancellor Oxenstiern having patronized the project, a Swedish West India Company was formed, and Minuit sailed from Gothenburg, Sweden, in 1637, with a body of Swedes and Finns; ascended Chesapeake Bay, and in Mar., 1638, began to build Fort Christiana, 2 miles from the confluence of Minqua's Kill with the South river, near the present city of Wilmington, and called the country New Sweden. This was the first permanent European settlement on the Delaware, and the colony remained in the hands of Sweden until captured by the Dutch in 1655. D. at Fort Christiana in 1641.

Min'yas (in Gr. Μινύας): a rich mythical King of Orchomenos, in Bœotia, and the founder of the Minyan race. His genealogy is variously given. He was the first to build a beehive treasure-house, the ruins of which were excavated by Schliemann in 1880–81–86. The daughters of Minyas refused to take part in the worship of Dionysus when first it was being introduced into Bœotia, and they were finally punished by being changed into bats and owls. See Müller, *Orchomenos und die Minyer* (Breslau, 1844). J. R. S. S.

Miocene Period [*Miocene* is from Gr. μείων, less + καινός, recent]: the division of geologic time following the Eocene period and preceding the Pliocene. In the chronologic system adopted by the U. S. Geological Survey for the geologic atlas of the U. S., the Miocene and Pliocene periods of earlier classifications are included in the Neocene Period (*q. v.*).

Miquel, mē'kel', Johann: statesman; b. at Neuenhaus, Hanover, Feb. 21, 1828; studied law at Heidelberg and Göttingen 1846–49, and settled at Göttingen as an advocate. Enthusiastic for the unity of Germany, he worked with great energy for the national idea, but thereby, and by some papers on the financial condition of Hanover, incurred the enmity of the Government. He gained the confidence of the people, however. In 1864 he was elected a deputy from three different places, and in the second chamber of the Hanoverian Diet he occupied an influential position. He espoused the policy of Bennigsen. In 1865 the city of Osnabrück elected him burgomaster. After the annexation of Hanover to Prussia in 1866, he exerted himself zealously in order to strengthen the newly established connection, and it was in no slight degree due to his influence as a member of the North German Diet and the Prussian House of Deputies that the policy became liberal and the South German states entered into intimate relations with the

North German Confederation. His office of burgomaster he resigned in 1870, to accept that of director of the Diskontogesellschaft of Berlin; in 1876 he again became burgomaster of Osnabrück; in 1880 burgomaster of Frankfort-on-the-Main and a member of the House of Peers; in 1887 he entered the Reichstag; and in 1890 became Prussian Finance Minister.

Miquelon: an island S. of Newfoundland, belonging to France. See ST.-PIERRE.

Mirabeau', HONORÉ GABRIEL RIQUETTI, Count: revolutionist; b. at Bignon, near Nemours, in Provence, France, Mar. 9, 1749. His father (b. Oct. 5, 1715; d. July 13, 1789) was one of the theoretical philanthropists of the eighteenth century, a propagandist of the physiocratic system, and the author of *L'Ami des Hommes* (1755), and of *La Philosophie rurale* (1763). He was hot-headed and tyrannical, and is said to have used fifty-four *lettres de cachet* in order to maintain peace in his family. Young Honoré, with his herculean body, ugly face, violent passions, and turbulent manners, was a special object of dislike to the father, in spite of the eminent power of intellect which he showed very early. He received a military education at Paris, and was a lieutenant of cavalry in his seventeenth year; but, although he pursued his military and mathematical studies with energy, his life was so wild that in 1768 his father had him shut up in the island of Ré for six months. After serving for some time in Corsica, he settled on one of the family estates in Limousin, where (June 22, 1772) he married the young Marie Émilie de Covet. He did not live happily with his wife, and after a period of semi-exile in the country, where he wrote his earliest extant work—the *Essai sur le Despotisme*—he was again imprisoned by his father (Sept., 1774), this time in the Château d'If, in the Bay of Marseilles, whence he was removed some time after to Fort Joux, near Pontarlier, in the Jura Mountains. From this place he eloped with the young Marquise Sophie de Monnier, the wife of a friend whose trust he betrayed. He fled first to Switzerland, then to Amsterdam, where he earned a living by doing hack-work for the booksellers. In May, 1777, he was arrested and confined in the dungeon of Vincennes till Dec. 13, 1780. While there he wrote *Essai sur les Lettres de Cachet* (Hamburg, 1782), a number of other works, and a multitude of passionate letters to Sophie, published at Paris in 1793. Nevertheless, as soon as he was liberated he quarreled with her, and he now tried by a law-suit to compel his wife to return to him. He pleaded his case himself, and, although he lost it, he made a deep impression by his powerful eloquence. During a residence in London he wrote in 1785 *Considérations sur l'Ordre de Cincinnatus*. On his return to France he attacked the financial system of Calonne. In 1786 he was sent on a secret mission to Berlin, the fruits of which were *De la Monarchie Prussienne sous Frédéric le Grand* and *Histoire Secrète de la Cour de Berlin*, but he proved himself unfit for the career of a diplomatist. As he failed to obtain any further diplomatic appointment he continued his attacks on the Government by his *Dénonciation de l'Agiotage* (1787) and *Suite de la Dénonciation* (1788), which by their violence prevented his election to an office he was seeking, and forced him to live for a time in retirement at Tongres. On the convocation of the States-General he first tried to be elected by the nobility, but was rejected, and afterward entered the Assembly as a member of the third estate. From this moment and up to his death he was the leading statesman of France. It was he who established the third estate as the dominant power in the States-General, and it was he who established the States-General as the dominant power in the government of France. Thus he started the Revolution, and when it became too violent he turned around and tried to stem its course, defending the royal prerogatives and the monarchical principle, but upholding, on the other hand, civil liberty and constitutional government. He was opposed alike by the obstinacy and timidity of the court and the fanaticism of the radicals. He wished to become minister, but was prevented by an act of the Assembly decreeing that no member of that body could enter the ministry. From May, 1790, he entered into close relations with the court, which paid his debts in reward for his services. His popularity waned, but he still swayed the Assembly by his eloquence. The activity which he developed as leader of the Assembly and president of the Jacobin Club was enormous, but the exertion, in connection with his reckless life, suddenly broke his strength. On Mar. 27, 1791, he spoke in the Assembly for the last time; on Apr. 2 he died. He was buried in St. Geneviève, the Pantheon, whence his corpse afterward was removed to his family estate, in order to give room for that of Marat. The most complete account of his life is found in *Mémoires biographiques, littéraires et politiques de Mirabeau* (8 vols., 1834), published by his natural son, Lucas de Montigny. The best edition of his works is that by Blanchard (1822, 10 vols.), but it does not contain his *Monarchie Prussienne*.

Revised by F. M. COLBY.

Miracle-plays, Mysteries, and Moralities: three forms of dramatized story that preceded the rise of the modern drama. The sources of the drama lie deep in the Church services of the Middle Ages. The liturgy of the early Christian Church was a symbolic drama, which laid especial emphasis upon the incidents of highest tragic value in the Christian story. When the doctrine of transubstantiation was accepted in the ninth century, the symbolic tragedy became a genuine tragedy, since Christ was believed to dwell as a real presence in the host, and the death of Christ became a tragic motive of the first importance.

The tragedy of the liturgy became the germ of the modern drama. Zealous priests sought by a concrete presentation of the crucifixion, burial, and resurrection to bring the story home to the multitude. Very soon, as introductory to the crucifixion, plays of the arrest and trial were acted on the days preceding Good Friday. Thus arose, within the services and in intimate connection with the liturgy itself, a minor cycle of mysteries—i. e. plays pertaining to the mystery of redemption.

The Christmas Cycle.—There soon appeared another cycle dependent upon the many festival days that follow Dec. 25. Christmas, established about 350 A. D., drew to itself many heathen customs of Rome and of the Germanic tribes; these customs entered largely into the Christmas plays. The proximity of Christmas and Epiphany (Jan. 6) gave rise to two weeks of sacred holiday, and made possible another minor cycle of plays, *The Salutation by the Shepherds*, *The Adoration by the Magi*, *The Slaughter of the Innocents*.

The Creation Cycle.—These minor cycles readily formed a major cycle through the insertion of plays representing incidents of Christ's life. The play of *The Judgment* was added as an epilogue. A sermon attributed to St. Augustine was dramatized as the play of *The Prophets*, and became a fitting prologue. When this play of *The Prophets* was displaced by scenes from the Old Testament, beginning with the creation, the creation cycle was complete.

The earliest plays—of about the tenth century—were formed from the biblical dialogue as given in the Vulgate; they departed but slightly from the liturgy, and were practically the same in all countries of Roman Catholic faith. Artistic development was more rapid in the Latin nations. In Germany the Christmas plays developed late, and were curiously affected by Northern superstitions. In France they began early, but later, through fusion with the low comedy inherited from the Romans, gave rise to grave scandals; thus *The Feast of the Ass* sprang from the part played by Balaam in the play of *The Prophets of Christ*.

The Continuous Play.—As these plays were the favorite medium of literary expression, expansion followed, and the desire arose to combine the plays of several days into a continuous play; but such representation withdrew the plays from their dependence upon the liturgy, and established them as an independent drama. Extant plays of this intermediate kind date from the tenth to the fourteenth century. Together with the fusion of liturgical plays into a continuous drama came many other changes tending toward the secularization of the mystery. Slowly the vernacular superseded the Latin; first for the parts of the common people, then throughout the play. The continued play wearied the audience; diversion was supplied by devil-play and jest; thus, in the English cycles, Noah and his wife have a conjugal quarrel, and the shepherds jest about the singing of the angels. Each step of development carried the cyclic play further from the simple biblical dialogue of the liturgical play, and made its presence in the Church more objectionable.

The Stage.—The stage necessities of the play hastened its departure from the Church. At first no special platform was used. The cross with Christ was lifted up. Mary made her lamentations, of which many forms are still extant in German, and the priest explained the significance of the scene. Christ was placed in the sepulcher (which still exists in many old English churches) there to lie until

Easter morning. When the play grew in importance a platform was built in the nave. As scenes multiplied the platform lengthened, that each scene might have an independent station, until, in the minor cycle, hell was near the door, heaven in the sanctuary, and the nave was occupied by the incidents of earthly life. Clearly the play must move to the market-place for further expansion.

In fact many causes contributed to expel the cyclic play from the Church. The play had admitted many comic elements and popular superstitions; these called forth stern prohibitions in 1210 from Pope Innocent III., in 1225 from the Council of Treves, in 1252 from Alfonso X. of Aragon. Then also the audiences, as well as the stage, had outgrown the cathedral. The cyclic play moved to the market-place, but the simple liturgical play retained its place in the Church services until the time of the Reformation.

The Secular Mystery.—With the secularization of the mystery its national history begins. In Italy it became the care of the monasteries, which vied with each other in costly representations. In Spain it united with the pastoral drama, departing widely from the liturgical form and content. In Germany the mastersingers' guild wrote complicated plays for the artisan guilds. In France the mysteries passed to the care of the Puy, a species of literary society that spread throughout the north and west of France. The plays were patronized by the nobility, and finally became the property of the Confrérie de la Passion, which established the first theater in Paris in 1402 and played sacred dramas until forbidden in 1548. In all continental countries the immense stage, divided into many stations, was a common feature. Enormous crowds assembled—in Reims in 1490 16,000 persons—and the plays continued either three or eight days. The expense was great, and was met by donations, city appropriations, and sometimes by an admission fee.

In England the development of the cycle was unique, and greatly influenced by the royal entry and the Corpus Christi procession. As early as 1313 cities greeted a visiting monarch with stationary tableaux, representing incidents in the life of Christ. Similar tableaux, placed on floats, were carried by the representatives of the guilds in the Corpus Christi procession from its institution by Pope Urban IV. in 1264. In England the tableaux of the mute mystery were displaced by the spoken play. Each pageant wagon halted at designated stations, where the populace, seated in separated audiences, heard in succession each play of the cycle.

The Craft-guild Cycles.—Of the craft-guild cycles of English plays there are still extant the York cycle of forty-eight plays; the Woodkirk, of thirty-two plays; the Chester, of twenty-five plays; and two plays of the Coventry. The Beverley cycle is lost, as are probably a few others, of which, however, very little is known. A cycle of forty-eight plays, known as the Coventry, but probably the property of some company, has also been preserved, together with several single plays which probably were written for holiday occasions. The interrelations among the cycles have not been fully made out, but it would seem that there was an early York cycle and that this became the type which other cities followed, obtaining their plays sometimes from York, sometimes from neighboring cathedrals, or from independent sources. Later additions brought this early York cycle up to forty-eight plays.

The expense of the guild plays was borne by the guilds, each setting forth its play at its own expense, or as collaborator with one or more of the weaker guilds. If a guild were reluctant to incur expense, the city often compelled it to contribute, since the play was to the honor and profit of the city. The pageant wagon was a permanent structure, and often figured with its belongings as a considerable asset of the guild. It consisted of a platform on wheels, draped to the ground, and surmounted by a canopy. Possibly the platform was of two stories when both heaven and earth were represented. Hell-mouth led to the space beneath the platform, where the devils dwelt hard by the necessary stage machinery. Sometimes the action abandoned the wagon for the street. There are scanty evidences of scene-shifting in the plays, but the stage appliances were of the most rudimentary character.

The life of the craft mysteries of England extends, roughly speaking, from the latter part of the thirteenth to the middle of the sixteenth century. The Protestant Reformation condemned the mystery. In England the cyclic plays were easily put down, but stern laws were necessary to force the abandonment of Church plays. In Roman Catholic countries the mystery lingered in rural districts, though shorn of its former glory. Indeed, it still survives at Oberammergau, in the Bavarian highlands.

The Miracle-play.—Miracle-plays drew their material from the lives and legends of saints. They never formed true cycles, since they were independent of the liturgy, and possessed no continuity among themselves. The miracle-play was short—the French plays of about 1,500 lines—complete in itself, and was usually played by some lay association, school, or guild, in honor of its patron saint. In Germany the miracle-plays of the fourteenth century led to the German historical drama. In France the miracle-play, together with the mystery, was cultivated by secular literary associations, whose productions were called, without much distinction, mysteries or miracles; thus the *Miracles de Notre Dame*, forty in number.

In England the mysteries were known as miracle-plays. There are no true miracle-plays extant in English. Mention is made of a play of St. Catherine as early as the twelfth century; others mentioned are Fabian, Crispin and Crispian, St. George, etc., but tableaux and plays are often called indiscriminately pageants, so that it is not easy to determine what were spoken plays. The play of *The Lord's Prayer* (York), the play of *The Sacrament* (Croxton)—both of the fourteenth century—and *The Creed* play (York) of the first half of the fifteenth century, may be classed as plays akin to miracles.

The miracle-play fell, with the mystery, under the ban of the Reformation, but is still occasionally acted in Catholic lands.

The Morality.—The morality arose from the desire to express abstract conceptions dramatically for purposes of moral instruction. The morality was the outcome of an attempt to use the drama as a vehicle of allegory. In what country moralities were first written is unknown. In France they abounded in the fifteenth century, and lent themselves easily to the satire of society, even touching occasionally the foibles of Church and state. Their usual length was about 1,500 lines, but one, *The Just Man and the Worldling*, contained 36,000 lines.

Early English Moralities.—The earliest English moralities, *The Castell of Perseverence*, of about 3,500 lines, *Mind, Will, and Understanding*, and *Mankind*, are of the first half of the fifteenth century. The general structure of these earliest moralities is the same. They trace the life of man from birth to death. As a youth he follows evil counselors; as an old man he sorrows for the sins of his youth, and through confession is reconciled to God.

Other types of the morality and of the allegorical play existed. The so-called Coventry cycle of mysteries introduced as personages Pity, Justice, and Peace. In the fifteenth century the interludes were composed on mystery themes, but in the sixteenth century became moralities. These later moralities often contained comic elements. The "Vice" was introduced as a companion to the devil. From the popular Vice the Elizabethan clowns have, it is supposed, their origin. Another variety of the morality might be called the didactic morality; of such are the *Interlude of the Four Elements*, and the interlude in praise of learning called *Wyt and Science*.

Summary for England.—The progress of dramatic development in England can be summed up as follows: First, the liturgical mystery, with the development of the cyclic play within a century after the establishment of the Corpus Christi procession. Co-ordinate with the mystery is the rise of the occasional miracle-play. Second, allegory, which had been dominant in poetry since the thirteenth century, fashioned the morality in the fifteenth century. Third, the court introduced the pastoral and farce of France, and supported companies of professional players. The universities and inns of court produced plays of Latin models. With the suppression of the mystery by law the play-loving populace sought permissible material for plays from other sources. The morality flourished apace. The chronicle history arose. Traveling companies, under the patronage of noble lords, cultivated sedulously every species of drama that met the popular taste. Such a company built the first theater in London before 1576. The subject is more fully discussed in the writer's *Studies in the English Mystery Plays* (Yale doctoral thesis, 1892). The most important collections of plays are:

English.—Chester Mysteries (2 vols., Shakspeare Society, 1843–47); *Ludus Coventriæ* (Shaks. Soc., 1841); *The Towne-*

ley Mysteries (Surtees Society, 1836); *York Plays* (Oxford, 1885); *Digby Mysteries* (New Shaks. Soc., 1882); Marriott, *A Collection of English Miracle-plays and Mysteries* (Basel, 1838); Sharp, *A Dissertation on the Pageants or Dramatic Mysteries anciently performed at Coventry* (Coventry, 1825); *The Presentation in the Temple* (Abbotsford Club, 1836); Smith, *The Book of Brome* (Norwich, 1886); *Hawkins's English Drama* (3 vols., Oxford, 1773); Bale, *Scriptorum Illustrium Maioris Brytanniæ Catalogus* (Basel, 1557–59); Pollard, *English Miracle-plays* (Oxford, 1890).

French.—*Miracles de Notre Dame* (6 vols., Société des Anciens Textes Français); *Le Mistère du Viel Testament* (Soc. des Anciens Textes Français); Jubinal, *Mystères inédits du XV^e^ siècte* (2 vols., Paris, 1837); Gaston Paris and Gaston Raynaud, *Le Mystère de la Passion d'Arnoul Greban* (Paris, 1878); Monmerqué and Michel, *Théâtre français au moyen âge* (Paris, 1839); Luzarch, *Adam, drame anglo-normand du XII^e^ siècle* (Tours, 1854); Arnoul and Simon Greban, *Les Actes des Apôtres* (3 vols., Paris, 1541).

German.—Hoffman von Fallersleben, *Fundgruben für Geschichte deutscher Sprache und Literatur* (Breslau, 1837); Mone, *Schauspiele des Mittelalters* (Carlsruhe, 1846); Grein, *Alsfelder Passionspiet* (Cassel, 1874); *Oberammergauer Passionspiel* (Leipzig, 1880); Weinhold, *Weihnachtsspiele und Lieder aus Süddeutschland und Schlesien* (Gratz, 1853).

Liturgical.—Méril, *Origines latines du théâtre moderne* (Paris, 1849); Milchsack, *Die Oster- und Passionspiele* (Wolfenbüttel, 1880); Wright, *Early Mysteries and Latin Poems of the Twelfth and Thirteenth Centuries* (London, 1838); Sepet, *Les Prophètes du Christ* (Bibliothèque de l'École des Chartes); Halliwell, *Reliquiæ Antiquæ* (2 vols., 1843); Coussemaker, *Drames titurgiques du moyen âge* (Paris, 1861); Sepet, *Le Drame chrétien au moyen âge* (Paris, 1878).

Miscellaneous.—A. d'Ancona, *Sacre rappresentazione dei secoli 14–16* (3 vols., Florence, 1872); *Autos sacramentates desde su origen hasta fines del siglo XVII.* (Madrid, 1884, 8vo) in *Biblioteca de Autores españoles* (vol. lviii.).

CHARLES DAVIDSON.

Miracles [viâ O. Fr. from Lat. *mira'culum*, wonderful work, miracle, neut. dimin. of *mi'rus*, wonderful. Cf. *mira'ri*, wonder at]: the general designation for the "signs," "wonders," and "mighty deeds" recorded in the Scriptures of the Old and New Testaments as wrought by God in connection with the revelation of his will and the establishment of Christianity. Their nature and relations to Christianity have formed a subject of profound interest and much discussion, especially in modern theology.

1. *Definition.*—A miracle may, in general, be said to be an unusual event in physical nature wrought by direct action of God working for a moral end. More accurately, it is defined as "an event in the physical world wrought by God independently of the sequences through which he ordinarily works." It is the production, by the exercise of God's power, of a definite effect which could not otherwise have taken place. This definition assumes the reality of the distinction between nature and the supernatural. It is based in the theistic conception of the world. While it views the universe as the work of God, it does not conceive of his power and efficiency as all transferred to the forces and laws of nature or as restricted to its established uniformities. There must be neither a pantheistic confounding of God with nature nor a deistic separation of him from it. It does not move on as an independent and inflexible mechanism. While God is above nature as its Creator, he is also immanent in its forces and order, which rest in and on his abiding and omnific will. God and nature do not stand to each other in merely external relation, but he is in ever-living communication with it. "He upholds all things by the word of his power." "He is above all and through all and in all." "In him we live and move and have our being." Physical nature can be rationally viewed only as subordinate to the life and moral welfare of man, whose creation in the image of God and with given dominion alone explains and justifies the material system. The physical world is not for itself, but for the higher designs of the divine administration. This is the conception which the Scriptures themselves give of God's relation to the world and the interests for which he has adjusted its system and guides its history. The miracle can be fairly defined and interpreted only under this conception.

Miracles are not to be thought of, as often represented in older statements, as "violations or suspensions of the laws of nature." Hume and others have under this view sought to discredit their possibility and place them beyond proof. They are in no such antagonism to nature, and do not clash with its proper order. They are due to a special and direct exertion of the divine will-power, without annulling any natural force or its sequences of cause and effect. God inserts his direct power for its own effect. The reality may be fairly illustrated in the operation of human will-power. When this, through science and skill, inserts its directive touch in nature's ongoings and turns water or electricity into driving forces for industry or commerce, or shapes the transparent glass into lenses for bringing the distant stars into view, no law of nature is violated. The new result is accomplished by special free causation. When this free power lifts a hand or casts a stone into the air, the law of gravitation is not infringed or suspended—every particle of matter in hand or stone still gravitating as before. When the sons of the prophets cut down a stick and cast it into the water and the ax-head swam (2 Kings vi. 6), neither the specific gravities of the water or iron were altered, nor was the law of gravitation annulled.

2. *The Place of Miracles.*—This can be rightly seen only in the light of the teleological principle. God has a purpose in the world, and miracles manifestly have their place with respect to this in connection with the moral good of mankind, and especially in connection with the redemptive economy with which the Scriptures associate them. They are no part of the natural system with which science deals, and belong not to any necessity for the order or completion of the physical cosmos; hence no objection can be raised against them as derogatory to God in implying such a failure in his creative wisdom and power as to require the help or correction of after-intervention. It is only when we recall the great truth that through the aggregate natural world God is aiming at a moral product in the free life of man, and, further, that there is such a thing as *sin* which has disturbed the true life, order, and happiness of humanity and created a need of God's coming forth for relief and help, that we see the true position and import of miraculous action. It is part of the supernatural administration in a redemptive economy and in conducting the world on to its true design. It centers in Christ, marking and manifesting his work. All the miracles of the Old Testament stood in this relation, belonging to the preparatory mediatorial history which opened the way for the advent of the Messiah. Those of Christ himself were the appropriate manifestations of his supernatural person. Those of the apostles were from the same source. Special periods in this unfolding redemption were particularly marked with them. In the Mosaic period, when the authority and supremacy of Jehovah needed assertion and display, and again in the days of Elijah and Elisha, when the truth of monotheism required vindication against the encroachment of idolatry, they appear in striking prominence. Around the person and ministry of Jesus Christ, the eternal Word made flesh as the Saviour of men, the full presence and action of miraculous power culminated and accomplished its work. When the full provisions of redemption were wrought out and the new kingdom of grace was certified by miraculous activities, the miracle as a special extraordinary event ceased and disappeared in the regularly constituted supernatural action of established grace through the Word of the Gospel under the power of the Holy Spirit. The miracle is never to be considered as something isolated, apart from the supreme divine purpose with respect to humanity. It can be understood only as associated with the work of God as Redeemer.

3. *Their Credibility.*—The same degree of credibility must attach to miracles as attaches to the idea of the superiority of moral order and spiritual good over the mere mechanism of nature. If there is no invincible improbability that God as Holy Love should give to man information as to his duties and the conditions of his welfare beyond that which may be gathered by reason, and, further, should make known a way of forgiveness of sin and redemption from its bondage and misery, concerning which nature is silent, there can surely be no insuperable improbability of supernatural revelation. Such revelation is itself intrinsically miraculous. As history and ethnology unquestionably show that men, outside the circle of special revelation, have striven for more light as to human duty and destiny and salvation from the woe of moral evil, there is plainly no antecedent incredibility that such instruction and help should be given by an almighty and loving Crea-

tor. Whether miraculous revelation has been given is a question of fact. As such its proper proof is simply adequate testimony. Hume's claim, so often refuted, that no amount of testimony can prove a miracle, is sophistical and unreasonable.

4. *The Possibility of a Miracle.*—Evidently the writers of the Old and New Testaments felt no trouble on this point. Their reason and piety never doubted that if God, acting in his eternal freedom, love, and sovereignty in his own world, wished to teach or help his servants, bringing them salvation in emergencies, he could do it. This was the deep innermost faith of their souls, and their whole view of the world was in harmony with this. Of an order of nature obstructing God's will or power they never dreamed; but in modern and recent times much objection on this ground has been made to the possibility of a miracle. Though the objection is variously shaped, all its forms amount to this one contention, that the uniformity of nature's system is so fixed and inflexible under the reign of physical force and law as to allow no room for such an occurrence; but nature is utterly misrepresented when its ongoing of cause and effect is said to exclude free-will causation for divine miracles. Undoubtedly there is law in nature, but such law as opens nature to the easy entrance of will-power into its movements. It is not a system of unyielding mechanism in unbending rigidity, foreclosed forever against all the power of freedom, both human and divine, but one, in fact, infinitely elastic and plastic to the touch and handling of will-force for effects which the system, if left alone, could never produce. Such the world must be, in order to be man's fit dwelling-place and to serve the interests of his life. It is placed under his dominion and submitted to his use; and there is not an hour in which the human will is not turning nature into new forms and events which millenniums of ages of untouched nature could never produce. Nowhere is this better known than under the full light of science, in whose name this objection is so often falsely made. Human free will is changing the face of the earth. Steam vessels and railways and telegraphs and telephones and phonographs, in which the mightiest as well as the most subtle forces are used as servants, are some of the "physical miracles" of the *human* will—wrought, too, upon the *basis* of the very uniformities and laws which are, in the objection, said to bar off the will-power of God from miraculous action.

5. *The Proof of Miracles.*—If proved at all, they must be proved, like other facts, by the testimony of proper witnesses. The accounts of these "signs," "wonders," and "mighty deeds" are woven in with the very warp and woof of the history of the Christian redemption. They are of a piece with the revelation idea which runs in transparent clearness through it all. The biblical history is found, in fact, to yield to no history in the world in the clearness and accuracy of its statements. No historico-critical investigation has ever been able to impeach the credibility of the testimonies to the miracles without discrediting the entire history in which they form an integral part. They were given with a calmness and veracity that remained unshaken in the face of danger, persecution, and death. If such testimony is worth nothing, no testimony on earth is of valid force, and may be arbitrarily set aside; but objection is made that the witnesses were uncritical and disposed toward the marvelous, or that, at best, though they reported honestly the external events as they appeared, they could not, as spectators, see behind the phenomena and trace them up to the direct hand of God. As to the first part of the objection, it is in point to say that they were ready to accept miracles only as they were to accept the reasonable truth that God is present in supreme power in the world, and at hand with the help for his people which great moral emergencies required. As to the second, if mere spectators could give only their *opinion* as to the cause of the wonder, the suggestion is inapplicable to the testimony which Christ gave to the miracles which he himself wrought, whose knowledge could connect them infallibly with the divine power. Moreover, is it possible to repudiate the miracles as false perceptions or misinterpreted phenomena, or legends or myths of the religious temper of those far-away times, and still hold to the generic supernaturalism of the whole redemptive idea, the divine call of Israel, the inspiration of prophecy, the incarnation of the Son of God, the aggregate "wonder" of his life and teaching, or the crowning miracle of the resurrection and the living Christ of history since? The subordinate supernaturalism of the miracle-records is so integral a part of the whole redemptory revelation that they inevitably stand or fall together. To repudiate the possibility or reality of the incidental phenomena logically carries with it a repudiation of the entire supernaturalism of Christianity, as is constantly illustrated in the case of deniers of the Gospel miracles; but as long as Bible Christianity stands, belief in miracles must form a part of Christian faith.

6. *The Evidential Value of Miracles.*—This has been differently estimated at different times. In the early Church, Middle Ages, and early Protestant theology, apologetics made large use of them as proof of the divine authority of Christianity; but since the rise of modern pantheistic and deistic philosophies, and the recent development of physical science with its emphasis on the conservation of force and the reign of law in nature, energetic and persistent assault has been made upon the biblical miracles, and the appeal to them has been less used—not because not valid but as less available. Opponents of Christianity have represented them as not the triumphant proof of its truth, but the greatest impediments to its reception. Hence apologetics have tended to rest the proof more on other forms of evidence. They are thus often thrown into the background, as tenable indeed *by* faith, but not its support or warrant; but this persistent and many-sided assault and depreciation have stimulated Christian thought to deeper study and led to profounder views of the real import and significance of miracles and of their position in the redemptory economy. The change not only corrects the false forms of statement which long allowed them to be thrust into untrue antagonism to nature, but holds them in closer and more living relation to the whole divine activity for the spiritual regeneration of man, and especially emphasizes their indissoluble union with the very life and work of the Mediator as God manifest in the flesh. In evidential value they are thus entirely separated from the useless prodigies of pagan superstitions which presented no moral or divine reason for their occurrence, and they stand out clearly as called for by the grandest necessities and interests of humanity. The miracles of Christ—and all the Christian miracles are parts of the redemptive activity of which he was the center—are not simply credentials externally attached to his ministry for authentication of his mission and the truth of his teaching, but are the normal or natural manifestations of his supernatural person, the incarnate Son of God acting in the presence of men. They are distinctively redemptive in relation and character. They exhibit him *at* his redeeming work, testifying to him in the relation in which he presents himself as the Saviour of men, the Light and Life of the world. They are parables of his person, types of his work. They are thus the true "signs" of a Saviour, and the fitting witnesses to the divine character of Christianity. While these may not convince those who do not believe in the supernatural, they are yet just the crowning evidences for the confidence of those who do believe. While men may stumble at these miracles, no one could be satisfied to accept a Saviour who does not have these very tokens of supernatural power and office about him.

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M. Valentine.

Mira de Mescua, mec'raă-dā-mās'kwaă, or **Amescua**, Antonio: poet and playwright; b. at Guadix, Spain, about

1570. He became archdeacon of the Church in Guadix, but subsequently was patronized by the famous Conde de Lémus, who as viceroy in Naples (1610) had Mira de Mescua and other notable writers with him, to give distinction to his court. Returning to Spain, the poet became a court chaplain at Granada, and subsequently chaplain-of-honor to Philip IV. in Madrid. D. in Madrid in 1635. He was much admired by his contemporaries both for his lyrics and his plays, and he obtained the somewhat peculiar honor of having his works largely pillaged by more famous writers. Among these were Calderón and the French Corneille, the latter of whom in the *Héraclius* used our author's *Rueda de la fortuna*, and in the *Don Sanche d'Aragon* his *Palacio Confuso*, attributing it wrongly, however, to Lope de Vega. The works of Mira de Mescua have never been collected and are hard to get at. A few of his lyrics are printed in vol. xlii. of Rivadeneyra's *Biblioteca de Autores Españoles* (Madrid, 1857), and five of his plays are to be found in vol. xlv. of the same collection. Eighteen of his plays are printed in the now very rare *Comedias escogidas de los mejores ingenios* (1652–1704). A. R. Marsh.

Miraflores, mē̆e-rä̆a-flō′rāz: a village of Peru, near the seashore; 6 miles S. of Lima, between that city and Chorrillos (*q. v.*). Previous to the Chilian invasion it was the residence of many wealthy Peruvians. After their defeat at Chorrillos (Jan. 13, 1881) the Peruvians formed a second line of defense at Miraflores; it was attacked by 13,000 Chilians, Jan. 15, and carried after a bloody battle, thus opening the way to Lima. It was burned by the Chilians. H. H. S.

Miraflo′res, Manuel de Pando, Marquis of, and Count of Villapaterna: statesman; b. in Madrid, Spain, Dec. 24, 1792; was educated for the public service, in which he spent more than fifty years; was ambassador at London 1834, at Paris 1838–40, and at Vienna 1860; seven times president of the senate, often a cabinet minister, and Premier in 1846 and 1863. In 1868 retired to private life. D. in Madrid, Mar. 17, 1872. The marquis was decorated with nearly all the grand orders of merit in Europe, and was an active member of the Spanish Academy of History. He wrote several treatises in favor of Isabella's right of succession to the throne, a biography of Louis Philippe (1851), valuable *Memoirs* of his own life, and a *History of the First Seven Years of the Reign of Isabella II.* (2 vols., 1843–44), and published numerous speeches and fugitive writings.

Mirage, mē̆e-rä̆azh′ [Fr., deriv. of *mirer*, look at (in the reflexive form), *se mirer*, look at one's self in a glass, be reflected, reflect < Mod. Lat. *mira're*, look at]: a term including those aërial and marine reflections generally known as mirage, looming, and Fata Morgana. These are all analogous phenomena, due to the refraction of light, to its total reflection, or to a combination of both. These are—(1) mirage of the desert; (2) mirage at sea; (3) looming; (4) a combination of ordinary mirage at sea and looming; (5) Fata Morgana. The first, mirage of the desert, presents the appearance of reflection in a smooth surface of water, the inverted image of trees, etc., being seen beneath the real objects. It is due to the refraction, and finally to the total reflection, of the rays of irregularly reflected light, sent back to the eye from the object. The heated sand of the desert rarefies the lower strata of air, while the upper strata are condensed by the chilling due to the radiation of its heat. The strata of different densities mingle slowly in consequence of the stillness of the air. Fig. 1, *a b c d e f*

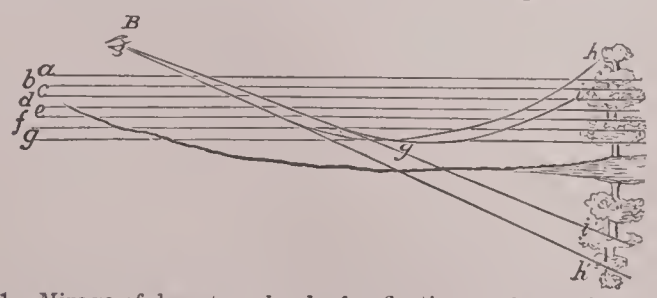


Fig. 1.—Mirage of desert: *a b c d e f*, reflecting surfaces where strata of air touch; *g*, angle of total reflection; B, eye of observer; *h i*, pencils of rays from object; *h′ i′*, points where pencils focus in reflection.

g, represents the boundaries of strata of air, which decrease in density from above downward. Every point of the tree sends out divergent rays of irregularly reflected light, by means of which it is visible. The direct rays from the tree to B make it visible to the eye at B. The ray *h*, which under ordinary circumstances would never reach the point B, meets in its downward course strata of continually decreasing density, and becomes less and less inclined to the parallel layers of air, till at *g* the angle of total reflection is reached and the rays are bent upward (see Reflection of Light), and enter the eye in the direction of *h′*B; and so with *i* and all other rays. An object is always seen in the direction by which the rays sent from it enter the eye; an inverted image is therefore formed by the portion of each pencil of rays proceeding from the tree, which is bent back to the eye as by a mirror. Second, mirage at sea is explained in exactly the same way, except that the conditions are reversed. The lower strata of air are chilled by the waters of the ocean, and increase in density from above downward; the rays which produce the image curve convexly, or in the opposite direction. (Fig. 2.) Third, looming is due to refraction alone; a portion of the pencil of rays which proceed from the point *h* (Fig. 3) reaches the

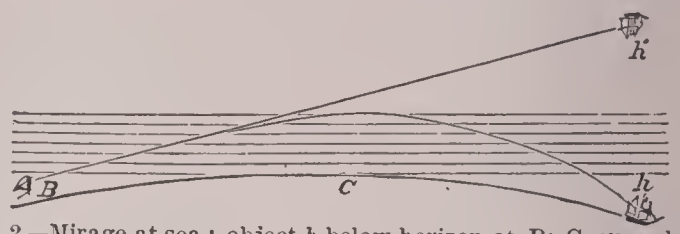


Fig. 2.—Mirage at sea; object *h* below horizon at B; C, curved surface of the earth.

Fig. 3.

eye direct, and produces the image of the real object, while another portion is refracted, and produces an erect image above the real one. Fourth, a real, inverted, and erect picture of the same object is sometimes projected upon the retina of the eye at the same time a portion of each pencil of rays proceeding from the body reaches the eye direct, producing the image of the real object; another portion is simply refracted, as in Fig. 3, producing an erect image; while a third portion is first refracted and then totally reflected, forming an inverted image. In 1822 Capt. Scoresby recognized the ship Fame by her inverted image in the air, though she was 17′ below the horizon. The whole of Dover Castle has been seen as if lifted over an intervening hill by the refraction of the rays of light from its surface, and in this case the image from the looming was so vivid as to obscure the hill which really lay between the castle and the observer's eye. Lateral images are sometimes formed by reflection of the rays from vertical columns of air having different densities. Two boats, one real, the other a reflection, have been seen side by side upon the Lake of Geneva at the same moment. Mirage is most common when there is a marked difference between the temperature of air and water; it is most frequent in the morning or in summer and autumn, when the air is laden with mist. It is seen oftener by an eye placed close to the surface of the water, less perfectly at a height of 6 or 8 feet, and almost never at 24 feet or more above the level of the sea. Dr. Wollaston obtained three images of an object seen through a square glass vessel containing successive layers of sirup, water, and spirit. Fifth, the phenomenon called Fata Morgana, or castles of the fairy Morgana, is occasionally seen upon the Calabrian coast while looking westward toward the Straits of Messina. (See Fata Morgana.) On still mornings, when the sun, rising behind the Calabrian Mountains, strikes upon the sea at an angle of 45°, the air is rapidly heated; the strata slowly intermingle, and present a series of reflecting surfaces which multiply images on the opposite Sicilian shore. The water is supposed at the same time, by the action of the tides, to possess a slight convexity. There are three forms of this mirage—the marine Morgana, where each object is reflected again and again in an inverted position and at different angles on the surface of the water; the aërial Morgana, when they are thus reflected in the air; and a third form, in which the aërial images are fringed with prismatic hues. Gigantic reflections of men and animals are sometimes observed to flit over the scene. The Calabrians hail the appearance of this beautiful but short-lived spectacle with delighted cries of "Morgana!

Morgana!" This phenomenon is not confined to the Calabrian coast, though the meteorological conditions, the topography of the ground, and the conformation of the coast in this place render its appearance more frequent and more beautiful than elsewhere. In all these reflections there is apt to be a wavering in the defining lines, and sometimes the whole image is tremulous like an object seen through a current of heated air.

Miramichi, mir-a-me-shee', **River**: a large river of New Brunswick, discharging its waters by a deep estuary into Miramichi Bay, an arm of the Gulf of St. Lawrence. The river is navigable to Newcastle by large ships, and higher up by smaller vessels. Salmon and many other valuable fish are taken here in great quantities.

Miramions: See GENEVIÈVE, DAUGHTERS OF ST.

Miramon', MIGUEL: soldier; b. in Mexico city, Sept. 29, 1832. He was the son of a distinguished officer of French descent; entered the military school of Chapultepec in 1846; served as a volunteer against Scott, and was taken prisoner; was commissioned in the army 1852, and as captain and colonel fought against Alvarez 1854–55, until the triumph of the latter. He served for a time under Alvarez and Comonfort, but his sympathies were with the reactionists. In Dec., 1855, he deserted with his regiment, and took a leading part in the revolt at Puebla Jan.–Mar., 1856. When Comonfort captured the city, Miramon was degraded to the ranks. In October of that year he headed another revolt at Puebla, and with a few hundred men defended the city during a siege of forty-three days against 4,000 troops, finally escaping before the surrender. Subsequently he took Cuernavaca, and in Jan., 1858, joined Zuloaga, who had revolted at Mexico, and assisted in driving Comonfort from the city. For this he was made brigadier-general. The reactionists were now in the ascendency, but Juarez maintained a constitutional government at Vera Cruz. Miramon, at the head of Zuloaga's forces, gained several victories in the central states, occupied San Luis Potosí, and was promoted to the rank of major-general (1858). The electoral junta chose him for president in the place of Zuloaga Jan. 2, 1859. He declined at first, but Zuloaga eventually resigned after appointing him successor *ad interim* (Feb. 2). The new president made an unsuccessful attempt against Vera Cruz, which was still occupied by Juarez. During his absence Degollado, at the head of a constitutionalist force, attacked Mexico, but was defeated at Tacubaya by Marquez (Apr. 11, 1859). Miramon, who had returned to the capital on the same day, issued a written order to shoot all the prisoners of the rank of officers, a command which was executed by Marquez. This "massacre of Tacubaya" horrified the nation and greatly weakened Miramon's influence. Juarez gained correspondingly, and in April his government was recognized by the U. S. During 1859 the reactionists were generally successful in the central and northern states, and in Feb., 1860, Miramon again laid siege to Vera Cruz, but abandoned it Mar. 21. In May he defeated Uraga at Guadalajara; but thereafter the Juarists gained ground. Miramon was defeated in Guanajuato in August, shut in at Mexico, and finally routed by Ortega at the battle of Colpulalpam Dec. 22, 1860. Two days after he abandoned the capital, which soon surrendered, reached the coast after several narrow escapes, and took refuge on a French ship. He proceeded to Europe, where he had an interview with Napoleon III., and probably entered into his plans for a French invasion of Mexico. Early in 1862 he appeared at Vera Cruz, which was then held by the forces of the Triple Alliance; but the British admiral refused to let him land. Later he adhered to Maximilian, who gave him the rank of grand-marshal and made him minister to Berlin. In 1866, after the French had withdrawn, he returned and was given high command, and with Maximilian himself undertook the defense of Querétaro. At the fall of that city he was captured, and was shot with the ex-emperor June 19, 1867. H. H. SMITH.

Miranda, or **Guzman Blanco**: a state of Venezuela; bounded N. by the Caribbean Sea, E. by Bermudez, S. by Bolivar, and W. by Zamora and Carabobo; area, 72,499 sq. miles; pop. (1891) 526,633. The northern third is mountainous, and contains many fertile valleys, the richest agricultural regions of the republic. The remainder lies in the LLANOS (*q. v.*), and supports immense herds of cattle. The Orinoco and its branch, the Apure, form the southern boundary, and are the principal outlets of the pastoral zone. Miranda is the richest and most populous state of Venezuela, and contains the oldest settlements. The most important exports are hides, tallow, live cattle, coffee, tobacco, cacao, and goatskins. Capital and largest town, Ciudad de Cura. The island of MARGARITA (*q. v.*), with the neighboring islets, is included in this state. HERBERT H. SMITH.

Miranda, mĕe-raan'daă, FRANCISCO ANTONIO GABRIEL: revolutionist; b. at Caracas, Venezuela, June 9, 1756. He served as captain and licutenant-colonel in the Spanish army in Spain, Guatemala, Florida, and the West Indies, and about 1782 was expelled for alleged contraband trading. Subsequently he fought with the French auxiliaries against the English in North America, and after 1785 was in St. Petersburg, where the favors which he received from Catharine II. gave rise to scandalous but unproved stories. In 1790 he joined the French republican army, was general of division and held high commands on the Rhine and in Germany. About this time he began to scheme for the independence of Spanish South America. To this end he founded in London a secret society, the Gran Reunión Americana, all the members of which were pledged to work for the independence of Spanish America. Bolivar, San Martin, the Carreras, Caro, Madarriaga, O'Higgins, and others, who were afterward prominent in the South American revolution, were initiated, and the effects of the organization were very great and far-reaching. Aided by funds from private sources, he went to New York, where he organized a small expedition, and made a descent on the Venezuelan coast in Aug., 1806; but few Venezuelans joined him, and after part of his men had been captured he was driven to take refuge in Trinidad, whence he returned to England. After the breaking out of the Venezuelan revolution he returned to that country with Bolivar (Dec., 1810), was received with enthusiasm, and soon after was given command of the patriot army. His operations were generally successful, and at the beginning of 1812 the revolution in Venezuela seemed assured. Serious reverses, however, followed the disastrous earthquakes of Mar. 26–May 1, and Miranda was made dictator. For a time he held the royalist leader, Monteverde, in check, but the fall of Puerto Cabello convinced him that further resistance was hopeless, and on July 25 he signed a capitulation. Miranda himself fled to La Guayra with the intention of leaving the country, but on July 31 he was arrested there by Bolivar and others and—treacherously as some charge, unavoidably as others claim—was delivered over to the Spaniards. In violation of the treaty they sent him a prisoner to Spain, where he died in captivity at Cadiz, July 14, 1816. See Briggs, *History of Don F. Miranda's Attempt* (1809); Baralt, *Historia de Venezuela*. vol. ii. (1841); Mitre, *The Emancipation of South America* (translation of Pilling, 1893). H. H. SMITH.

Mirdites: a peculiar and primitive people of Albania; a sort of military aristocracy, occupying a tract about 40 miles square, included between 40°–41° N. lat. and 17°–18° E. lon., nearly surrounded by the Drin. Orosch, a mountain fastness, is the residence of their prince. They never intermarry, but capture their wives from their Mussulman neighbors and give their own daughters to other Christian tribes. They number about 20,000, are nominally Roman Catholics, and are brave, faithful, and hospitable. See Tozer's *Highlands of Turkey*, vol. i. E. A. GROSVENOR.

Mir'iam [from Heb. *Miryām*, liter., rebellion, whence Gr. Μαριάμ, Μαρία, whence Eng. *Mary*]: the sister of Moses, according to Josephus, the wife of Hur and the grandmother of Bezaleel, who built the tabernacle. She led the chorus of women triumphing over the Egyptian discomfiture (Ex. xv. 20, 21); joined her brother Aaron in murmuring against the divine exaltation of Moses, and showed her jealousy and dislike of Moses's Ethiopian wife, for which conduct she was punished with temporary leprosy (Num. xii.). She died at Kadesh (Num. xx. 1). In the Arabic traditions she is often confounded with the Virgin Mary.

Revised by S. M. JACKSON.

Miri Lake: See LAGOA DOS PATOS.

Mirkhond', or, more fully, **Muhammad bin Khavandshāh bin Mahmūd**: historian: b. at Nishapur, Persia, in 1433; d. at Herat in July, 1498. His great work, the *Rauzat-ussafa, or The Garden of Purity, containing the Histories of Prophets, Kings, and Khalifs*, as it is fantastically entitled, was begun about the year 1474. It gives the history of the world from the creation nearly to his own times, and comprises seven volumes. Many manuscripts of this work are found in the libraries of London, Paris, Berlin, and Vienna. Portions of it have been edited by Jaubert,

Jenisch, Mitscherlich, Wilken, and Vullers; it was translated into French by Silvestre de Saey, Jourdain, Langlès, and Defrémery; into Latin and German by numerous authors; and into English by David Shea (1832), W. H. Morley (1848), Rehatsek and Arbuthnot (1892, etc.).

Revised by A. V. Williams Jackson.

Mirrors [M. Eng. *mirour*, from O. Fr. *mireor* > Fr. *miroir*, deriv. of *se mirer*, be reflected. See Mirage]: solids, usually in the form of plates having a smooth surface, capable of reflecting light. They have been a part of the furniture of the toilet from a period of very high antiquity. The earliest mirrors were formed of polished mineral substances or of metals, but after the invention of glass that substance naturally superseded most others in the construction of mirrors. The backs of glass mirrors were sometimes coated with lead, but about three centuries ago the process of covering glass with an amalgam of mercury and tin came into use in Venice, and has been since employed. The process, substantially the same now as when first introduced, consists in spreading out upon a solid horizontal table a sheet of tinfoil, which is first rubbed and afterward covered to a sensible depth with mercury, so that the superior surface may remain liquid. The mercury is prevented from flowing by means of slight ledges placed around the sheet. After having been scrupulously cleaned on its lower surface the glass to be coated is advanced horizontally along the layer of mercury, its lower edge being depressed below the surface, so as to exclude air and to remove impurities. When in proper position it is left resting on the mercury, and by tilting the table the superfluous fluid is allowed to flow off, being caught in a trough provided for the purpose at the margin of the table. A uniform pressure is then applied to the glass, and it is allowed to remain for some time in this condition, after which it is carefully lifted, the amalgam adhering to it, and is placed with the amalgamated surface uppermost. Some weeks' rest is required to allow the amalgam to harden, and sometimes a mirror will not "dry" for months.

The preparation of mirrors by quicksilver is objectionable on many accounts, the principal of which is the injurious effect of the vapors on the health of the workmen. Quicksilvered mirrors are also liable to various faults, such as a flowing of the mercury in drops, carrying the amalgam with it, forming streaks (known as worms); also a crystallizing of the amalgam when exposed to light (called blindness). These disadvantages of the quicksilvering process have turned the attention of manufacturers to the use of pure silver for backing mirrors. Von Liebig in 1836 was the first to notice that aldehyde would reduce silver from ammoniacal solutions, depositing it upon glass or porcelain in a continuous film. Subsequently, other chemists proposed other reducing agents. The first application of the process on a large scale was made by Drayton, who patented it at Brighton, England, Nov. 25, 1843. He used different essential oils as reducing agents, but his glasses were used only for a short time; they soon became spotted. The next attempt was made by Petitjean, who obtained a patent in 1855; and this seems to have been more successful, his process, with slight modifications, being still in use. The materials and proportions required by one of the various modifications of Petitjean's process, used on large plates, are as follows: (1) 1 lb. crystallized nitrate of silver to be treated, while stirring, with 12 liquid ounces of ammonia 26° B. After cooling and crystallization, 6½ pints distilled water are to be added, and the solution filtered. This solution will keep for any length of time. (2) The reducing solution is to consist of pure crystallized tartaric acid dissolved in four parts of water; and this is said to improve with age.

The advantages claimed for the silver over the quicksilver process are: (1) Harmlessness to the workmen; (2) facility and expedition, the whole operation being completed in a few hours; (3) possibility of repairing damaged parts; and (4) superior power of reflection. A silver mirror reflects about 20 per cent. more light than one of quicksilver, and reflects objects more truly in their natural colors. The durability of silver mirrors is still an open question. They are all liable, after a time, to become spotted, and unless this difficulty be overcome it is hardly probable that the silver process will ever completely supersede the quicksilver. For the optical properties of mirrors, see the article Reflection of Light.

Mirut: city and division of Northwest Provinces, British India. See Meerut.

Mirzapur': town; Benares division, Northwest Provinces of British India; the capital of a district of the same name, on the right bank of the Ganges (see map of North India, ref. 7–G). The district of Mirzapur, comprising an area of 5,224 sq. miles, extends along the Ganges and the Sone between lats. 23° 50′ and 25° 30′ N., and between lons. 82° 11′ and 83° 39′ E. The city of Mirzapur is a very busy and lively place, the most important cotton-market of India, with an extensive industry in cottons, woolens, and silks. From the river it looks very magnificent with its flights of marble steps leading from the temples down to the waters, but the interior consists mostly of mud huts. There are, however, many fine European residences. About 4,000 persons are employed in the manufacture of shell-lac. Brassware and carpets of a very fine description are also made. Pop. (1891) 84,130. Revised by M. W. Harrington.

Misdemeanor: See Crime, Felony, and Infamous Crimes.

Mishawaka: town; St. Joseph co., Ind. (for location of county, see map of Indiana, ref. 1–E); on the St. Joseph river, and the Chi. and Gr. Trunk, the Elkhart and West., and the Lake Sh. and Mich. S. railways; 4 miles E. of South Bend, 90 miles E. by S. of Chicago. It is one of the oldest towns in Northern Indiana, the first dam on the St. Joseph river and the first iron-furnaces being erected here; has excellent water-power, water-works, electric lights, electric street-railway, and a monthly and two weekly newspapers; and is noted as a manufacturing point, especially for the production of windmills, wagons, plows, and other farm implements, furniture, pulleys, transmission systems, wool and felt boots, horse-collars, church organs, church altars and carvings, paper, wood-pulp, flour, beer, etc. Pop. (1880) 2,640; (1890) 3,371; (1900) 5,560.

Editor of "Enterprise."

Mishna: See Talmud.

Misiones, mĕĕ-si-ō′nās: a territory forming the extreme northeastern portion of the Argentine Republic; bounded N. E. and S. E. by Brazil, S. W. by the province of Corrientes, and N. W. by Paraguay. The area actually held by Argentina is about 22,000 sq. miles. In addition to this the Argentine Government claims an easterly extension of the same region, comprising about 15,500 sq. miles, now held by Brazil (state of Santa Catharina), and known as Upper or Brazilian Misiones. The disputed region is (1894) the subject of arbitration by the President of the U. S. Misiones lies between the upper Paraná, with its tributary, the Yguassú, and the upper Uruguay. The surface is much varied, but without high mountains; there are large tracts of forest and others of open lands adapted for pasturage. Cattle-raising, the gathering of mate or Paraguay tea, and timber-cutting are the principal industries. Misiones was included in the region formerly called Guayrá. From 1633 to 1767 it was the site of large and flourishing Jesuit missions, said to have contained a population of 130,000 in 1735. After the expulsion of the missionaries they fell to decay; in 1817 the villages were ravaged and burned by the Portuguese, and the country was almost depopulated. Ruins of the Jesuit buildings still exist, half covered with forest. Pop. of the Argentine portion, 11,000; of the disputed territory, 5,000. Chief town, Posadas. H. H. Smith.

Misisagas: See Algonquian Indians.

Misrepresentation: in law, an untruth, by statement or conduct, which induces the formation of a contract. Fraudulent misrepresentation having been dealt with under the head of Fraud (*q. v.*), the present article will be confined to innocent misrepresentation. This sort of misstatement can never be made actionable as a tort, and it is the general policy of English common law to exclude it from affecting a contract with which it is connected, unless the parties have made it a term thereof. Special classes of contracts, like those of Insurance (*q. v.*), are exceptions to this rule. Any material representation, however innocent, renders them voidable.

In the sale of chattels, however, a misrepresentation which is not a term must strike at the very root of the contract in order to avoid it at law—that is, there must be a complete difference in substance between the subject-matter of the contract as it was represented and as it was. For instance, if the purchase of a horse is induced by an honest misrepresentation as to its soundness, the buyer will have no relief, though both vendor and purchaser erroneously thought they were dealing about a sound horse, unless the

representation was a warranty. Accordingly, a person who began examining a horse which was to be sold at auction the next day without warranty, and upon being told by the owner, "You have nothing to look for; I assure you he is perfectly sound in every respect," desisted from the examination, saying "If you say so, I am satisfied," and later bid off the horse at auction, was held bound to take and pay for him, although he was in fact unsound, no bad faith on the part of the vendor being charged. (*Hopkins* vs. *Tangueray*, 15 Common Bench Reports 130.) For the effect of a misrepresentation which amounts to a WARRANTY, see the article under that head. An innocent misrepresentation may be introduced into the contract as a condition, in which case its untruth will entitle the party to whom it is made to a discharge from the agreement. The following is an example: The owner of a ship agreed with the owner of coal that she was then in the port of Amsterdam, and would proceed to Newport and load, and carry a cargo of the coal to Hongkong. It turned out that the ship was not then in Amsterdam, and this innocent misstatement, being a condition of the contract, entitled the owner of the coal to be discharged from all liability thereon. *Behn* vs. *Burness*, 3 Best and Smith 750.

In equity, however, a contract obtained by a material false representation can be set aside at the instance of the party to whom it was made, although it was made innocently, or he can successfully resist an action for the specific performance of such a contract, on the ground that no man ought to take advantage of his own false statements. Pollock *On Contracts*, chs. ix. and x.

FRANCIS M. BURDICK.

Mis'sal [from Late Lat. *missa'le* (also *li'ber missa'lis*, mass-book), liter., neut. of *missa'lis*, pertaining to the Mass, deriv. of *mis'sa*, mass. See MASS]: the service-book of the Roman Catholic Church, a volume containing the prayers, hymns, etc., used in the performance of the Mass. There are several missals in use. Each of the Eastern rites has one or more peculiar liturgical services, and in the Latin rite, up to the time of the Council of Trent, there were many variations in the celebration of the Mass; but the council fixed the present Roman missal as the standard liturgy, permitting, however, a few local liturgies to be retained, but at present the Roman missal is almost universally employed. The earliest specimens of this kind of books were the so-called *Libri Sacramentorum*, or *Sacramentaria*, which date back to the time of Gelasius I. The missal, such as it was finally fixed for the Roman Catholic Church by the Council of Trent, is nothing but a revision of those *Libri Sacramentorum*. Editions of the missal in the original Latin have often been printed; as, for instance, in Paris, 1739, and Berlin, 1841. See LITURGICS.

Mission Indians: See SHOSHONEAN INDIANS; also YUMAN INDIANS.

Missions [from Lat. *mis'sio*, a sending, deriv. of *mit'tere*, send]: organized work for the propagation of religious doctrines, especially of the doctrines of Christianity. Islam and Buddhism have both made use of missions for the propagation of their tenets. With the former, however, force has been so prominent a feature that the essential element of all true mission work—persuasion by preaching and teaching—has been largely lost sight of. Buddhist missions have more nearly corresponded to Christian missions. See BUDDHISM and MOHAMMEDANISM.

I. HISTORY OF CHRISTIAN MISSIONS.—This may be divided into three periods: apostolic and early Christian, mediæval, and modern or post-Reformation. The mediæval missions are both Roman Catholic and Eastern; the modern are Roman Catholic, Protestant, and Greek Orthodox.

1. *Apostolic and Early Christian Missions.*—These cover the period of the spread of Christianity from the time of Christ until about 500 A. D. This period belongs more distinctively to Church history, and covers a style of work essentially different in character from that of the present day. It was chiefly the work of individuals, and was the development of the type first given by the apostle Paul in his journeys. During it the Gospel was spread throughout the whole of Southern Europe, Great Britain, Northern Africa and Ethiopia, and as far east as Persia, and perhaps even China.

2. *Mediæval Missions.*—These cover the period of about 1,000 years, from 500 A. D. until the Reformation. They approach more nearly to the modern conception of missions, in which the Church in its different branches undertakes the work as a whole, employing individuals. The chief place in it belongs to the Roman Catholic Church, although this is the period of the work carried on by the Nestorian Church, when its missionaries carried the Gospel throughout Central Asia to India, founding there the Syrian Church of Malabar, and into China. The Roman Catholic Church missions of the Middle Ages took their start from Ireland, and included in their scope England, Scotland, and Northern Europe. Still the effects of the early methods were seen in the predominating influence of individuals, as Columba of Iona, Columban, who established his monastery in 590 among the Vosges Mountains in Eastern Gaul; St. Ansgar, the apostle of Scandinavia; St. Cyril and St. Methodius among the Slavs; and St. Adalbert of Prague among the Magyars. Monte Corvino penetrated to China, and Raymond Lull preached in North Africa. The work of these men partook largely of the nature of a proselytizing crusade rather than of an organized work of missions, as the term is used now.

3. *Modern or Post-Reformation Missions.*—(*a*) *Roman Catholic.*—The immediate effect of the Protestant Reformation was to stimulate the activity of the Roman Catholic Church, and the next century and a half witnessed some of the most romantic and adventurous mission enterprises ever known. What the Church was losing in Europe she sought to gain elsewhere; and the discovery of America and the voyages of the Portuguese in the East offered a free field. Mexico was entered in 1522 by the Franciscans, followed by the Dominicans and Jesuits. The West Indies were occupied, and South America was secured by the conquest of Peru in 1533. In 1586 came the famous Jesuit mission to Paraguay, when indefatigable workers sought first to reconvert the Spaniards as a necessary means to reaching the Indians. The first mission to Canada was started by the Jesuits in 1608 at the mouth of the St. Croix. Then came the Recollects or Reformed Franciscans, and until the French and English wars resulted in the establishment of English power, the work extended chiefly among the Abnakis (Abenaquis) and Hurons, with many thrilling experiences of devoted self-sacrifice. It was in the East, however, that the greatest achievements of Roman Catholic missions appeared. As early as 1510, following the lead of Vasco da Gama, missionaries penetrated to India, and the first bishopric was established at Goa. In 1542 Francis Xavier began from that place a series of journeys and missions whose story is one of the most fascinating in the annals of missionary enterprise. Xavier was followed by Robert de Nobili, who lacked his predecessor's Christian simplicity, and filled with zeal for baptisms countenanced accommodations to heathen ideas and customs which proved disastrous. China's first missionary of this period was Barreto, who stopped at Canton in 1555 on his way to Japan. The first baptism was in 1584, and the success of these Jesuits, especially under the lead of Ricci, was phenomenal, until in 1664 there were nearly 270,000 Christians. Persecution followed, and by the middle of the eighteenth century Christian life was almost extinct, though Christian families remained. Japan showed more of success. As early as 1582 there were 200,000 Christians and 250 churches. The seventeenth century opened with persecution, in which was manifested the most resolute heroism of martyrdom, closing with the massacre of 37,000 at Simbara, the Mount of Martyrs, and here, as in China, active life died, though many concealed Christians remained. The remaining field, made notable by the work of the Roman Catholics, was Africa, where in the Portuguese possessions, especially near the mouth of the Congo, the converts were numbered by the ten thousands. Under the influence of the Portuguese rule, however, everything was lost.

During the nineteenth century the Roman Catholic Church has continued to extend its work, taking up in some instances the lines that were broken by persecution. Its missionaries have also labored with varying success among the other Christian Churches of Western Asia to bring them back to allegiance to the pope. Work among distinctively heathen peoples has been pushed in Africa, notably Uganda, Madagascar, China, Japan, and the East Indies. In no one of these sections have they met with anything like the success of the early Roman Catholic missionaries. Statistics of their missions are vague and unsatisfactory.

(*b*) *Greek Orthodox Church of Russia.*—This is the only branch of the Christian Church, aside from the Roman Catholic and Protestant, that has undertaken any aggressive missionary work, and this has confined its efforts to Japan. Its missionaries began operations in Northern Japan in 1870,

and have steadily pushed their work until in 1893 they reported 164 churches, 19 native pastors and 159 evangelists, 21,239 church members, and 1,182 baptisms during the year.

(c) *Protestant Missions.*—The Reformation brought at first little of interest in foreign work to the evangelical churches. The previous influence of Huss and Wycliffe had been for home rather than foreign development, and the same principles were carried out by Luther and his successors. It is true that Erasmus dwelt upon the necessity of providing the Turks with the Scriptures, and Luther thought that they ought to be prayed for, but beyond that there seemed no hope of successful work. Under the influence of Calvin, Admiral Coligny, about the middle of the sixteenth century, inaugurated a Reformation enterprise in Brazil, and at about the same time Gustavus Vasa sent a mission to the Lapps of Europe. None of these, however, amounted to much. In the latter part of the seventeenth century Hans Egede, a Norwegian pastor, opened up work in Greenland, and about the same time Ziegenbalg and Plütschau went as the first Protestant missionaries to India under the auspices of what was known as the Danish-Halle Mission. At about the same time the Unitas Fratrum, formed 200 years before by the union of the followers of Huss, some Waldenses, and Moravians, were led by the influence of Count Zinzendorf to commence their great work, which has continued in the van of mission enterprise. In 1732 Dober and Nitschmann set out for St. Thomas in the West Indies, and in 1749 David Zeisberger became the apostle of the Delawares. Prior to this the settlement of New England called the attention of the English people to the needs of the Indians, and King James, announcing that zeal for the extension of the Gospel was a special motive for colonizing, was followed by Cromwell in 1649 with the creation of the first missionary society, the Corporation for the Propagation of the Gospel in New England. The first missionary of this new work was John Eliot, followed by Mayhew and the Brainerds. The charter of the East India Company, granted by King William III. in 1698, contained provisions for a missionary and educational as well as ecclesiastical establishment. In 1701 the Society for the Propagation of the Gospel in Foreign Parts was organized, but rather as a colonial than a foreign missionary society, though it did some work among the natives of the various English colonies. Thus the evangelical churches were waking up to the demands upon them, and it needed only the genius and consecration of some man to start a general work. That man was Carey, a Baptist shoemaker and minister, who began his work by the publication of an *Inquiry into the Obligations of Christians to use Means for the Conversion of the Heathens.* In 1793 came the beginning of the little Baptist Missionary Society, and in November of that year Carey landed at Calcutta.

Modern Protestant foreign missions may fairly be said to have begun with the work of Carey. The influence of his preaching and example was felt all over England, Scotland, and America, and extended to the continent of Europe. One after another the different branches of the Church entered upon the work, until before twenty-five years had passed all the leading ones had missionaries in every quarter of the globe.

The first field to attract attention was the islands of the Pacific. The difficulty of reaching them and the opening up of India led Carey thither. The London Missionary Society, however, carried out the idea, and the first mission to those islands started in 1800. The progress both of interest in the Churches and of occupation of territory can, in the space allowed, be best set forth in chronological tables.

1. The order of establishment of the most important societies, together with the fields occupied by them, also in chronological order:

1649. New England Company (England): Indians of North America.
1691. Christian Faith Society (England): Aid to Christian workers, especially in India and Mauritius.
1698. Society for the Promotion of Christian Knowledge (England): Publication and colporteur work in many lands.
1701. Society for the Propagation of the Gospel (England): British colonies—India, Africa, East Indies, Japan.
1721. Danish Missionary Society (the successor of the Danish-Halle Mission): India, Greenland. (Home mission to the Santals, Loventhal's, and Red Karen missions, branches from this.)
1732. Unitas Fratrum, or Moravians (Germany): West Indies, Greenland, South America, Africa (South and Central), Central America, Australia, Central Asia, Labrador, Alaska.
1792. Baptist Missionary Society (England): India, Africa, Congo, China, Japan, Palestine.
1795. London Missionary Society (England, Congregational): South Sea islands, Tahiti, etc.; Africa (East and South), West Indies, Madagascar, China, New Guinea.
1797. Netherlands Missionary Society: East Indies.
1799. Church Missionary Society (Church of England): Africa (East and West), India, New Zealand, Palestine, China, Persia, Japan.
1799. Religious Tract Society (England): Publication and colporteur work all over the world.
1804. British and Foreign Bible Society: Publication and distribution of Scriptures all over the world.
1809. London Society for Promoting Christianity among the Jews: Europe, Asia, and Africa.
1810. American Board of Commissioners for Foreign Missions (U. S.): At first undenominational, now practically Congregational; India, Hawaiian islands, Turkey, China, Persia, Africa (East and West), Micronesia, Japan, Mexico, Spain, and Austria.
1814. American Baptist Missionary Union (U. S.): Burma, India, Africa, Congo, China, Japan.
1814. Wesleyan Methodists (England): India, Africa (South), West Indies, New Zealand, South Seas, China.
1815. Basel Missionary Society (Germany): Africa (South), India, China.
1816. American Bible Society: Publication and distribution of Scriptures all over the world.
1816. General Baptists (England): India.
1819. Methodist Episcopal Church (U. S.): Africa (West), South America, India, China, Bulgaria, Europe and Mexico, Japan, Korea, Malaysia.
1819. Leipzig Missionary Society (Germany): India.
1822. Paris Evangelical Missionary Society (France): Africa (South and West), Polynesia.
1824. Methodist Church of Canada: Japan.
1824. Berlin Missionary Society (Germany): Africa (South), China.
1826. American Tract Society: Publication and general colporteur work in all lands.
1829. Established Church of Scotland (Presbyterian): India, Africa (East), China.
1829. Rhenish Missionary Society (Germany): Africa (South), Dutch East Indies, China.
1835. Swedish Missionary Societies (four in number): Africa (South), India, Russia, Alaska.
1835. Protestant Episcopal Church (U. S.): Africa (West), Greece, China, Japan, Haiti.
1836. North German Missionary Society (Germany): Africa (West).
1836. Gossner Missionary Society (Germany): India.
1836. Reformed Church (German, U. S.): Japan.
1836. Free Baptists (U. S.): India.
1836. Reformed Presbyterians, General Synod (U. S.): India.
1837. Presbyterian Church (U. S., at first connected with American Board 1810): Syria, Persia, Africa (West), India, Siam, China, Japan, South America, Mexico, Guatemala, Korea.
1839. Lutheran General Synod (U. S.): India, Africa.
1840. Edinburgh Medical Missionary Society (Scotland): Trains physicians for other boards, and employs missionaries in Japan and Syria.
1840. Presbyterian Church of Ireland: India, China.
1840. St. Chrischona Pilgrim Mission (Germany): Started a mission in the Sudan, which was broken up; now educates men for other boards.
1841. Welsh Calvinistic Methodists: India.
1842. Reformed Presbyterian Church (Scotland): Syria.
1842. A number of English and Scotch societies for work among the Jews.
1842. Norwegian Missionary Society: Africa (South), Madagascar.
1843. Free Church of Scotland: India, Africa (East and South), New Hebrides, Syria, Arabia.
1844. African Methodist Episcopal Church (U. S.), Africa, West Indies.
1844. Presbyterian Church of Canada: New Hebrides, Trinidad, China, India.
1844. South American Missionary Society (England): Terra del Fuego and cities of both coasts.

1845. Methodist Episcopal Church South (U. S.): China, Mexico, Brazil, Japan.
1845. Methodist Protestant Church (U. S.): Japan.
1845. Southern Baptist Convention (U. S.): Africa (West), China, South America, Mexico, Japan, Italy.
1845. Wesleyan Methodists' Connection (U. S.): Africa (West).
1846. Ermelo Society (Holland): East Indies.
1847. Seventh-day Baptists (U. S.): China.
1847. Presbyterian Church of England: China, India.
1847. United Presbyterian Church of Scotland: West Indies, Africa (West and South), India, China, Japan.
1849. Foreign Christian Missionary Society (Disciples, U. S.): Turkey, India, Japan, China.
1849. American and Foreign Christian Union (U. S.): Commenced work in Roman Catholic countries, which was handed over to the American Board. Gives aid.
1849. Herrmansburg Society: Africa (East and South), India, Australia, New Zealand.
1849. Mennonites (Holland): East Indies.
1850. Melanesian Mission (England): Southern Pacific.
1853. United Brethren in Christ (U. S.): Africa (West).
1853. Hawaiian Evangelical Association: Micronesia.
1856. Java Comité (Holland): Java.
1858. Reformed Church (Dutch, U. S.; at first connected with American Board): China, India, Japan.
1858. United Presbyterian Church (U. S.): Egypt, India.
1858. United Methodist Free Churches (England): Australia and New Zealand, Africa (East and West), China.
1858. Christian Literature Society (England): India.
1858. Dutch Missionary Society (Holland): Java.
1859. Reformed Presbyterian Church (U. S.): Turkey.
1859. Methodist New Connexion (England): China.
1859. Utrecht Missionary Society (Holland): Java.
1859. Dutch Reformed (Holland): Java.
1859. Finland Missionary Society: Africa (South).
1860. Universities Mission (England): Africa (East).
1861. Strict Baptists (England): India.
1861. Woman's Union Missionary Society (U. S.): India, Japan.
1862. Presbyterian Church (South, U. S.): China, Brazil, Mexico, Greece, Japan, Africa, Congo.
1865. China Inland Mission (England): China.
1867. Friends (England): India, Madagascar, China, Turkey.
1868. Woman's Board (U. S.), connected with American Board. This was the pioneer of the numerous woman's boards connected more or less closely with almost all the general boards.
1869. Lutheran General Council (U. S.): India.
1870. Primitive Methodist Church (England): Australia and New Zealand, Africa (West and South).
1871. United Original Secession Church (Scotland): India.
1874. Free Churches of French Switzerland: Africa (South).
1875. Associate Reformed Synod of the South (U. S.): Mexico.
1876. Cumberland Presbyterian Church (U. S.): Japan, Mexico.
1878. Evangelical Association (U. S.): Japan.
1880. Salvation Army: India.
1881. Congregational Churches of Canada: Africa (West).
1881. German Baptist Brethren (U. S.): Scandinavia, India.
1881. International Medical Missionary Society (U. S.): Trains medical missionaries.
1881. North Africa Mission (England): Barbary States of North Africa.
1882. Breklum Missionary Society (Germany): India.
1884–86. Several Baptist (colored) societies for work in Africa.
1885. Bible Christians (England): Australia and New Zealand, China.
1886. American Christian Convention (U. S.): Japan.
1886. Baptist Churches of Canada: India.
1889. Seventh-day Adventists (U. S): Africa, Pacific islands, Europe.
1889. German Evangelical Synod (U. S.): India.
1890. Universalist Convention (U. S.): Japan.

This list is by no means complete. It is, however, sufficiently so to give a correct idea of the spread of missionary interest in Christian countries. There are a large number of other bodies, more or less fully organized, employing some missionaries. The Unitarian Association supports two missionaries, and does some publishing in Japan, and has some work in India. There are several individual enterprises, like F. S. Arnot's work in Garenganzi in Central Africa, and P. Z. Easton's work in Persia. There are also a number of aid societies, and a large number of Bible societies and publication societies.

2. Turning to the opening of foreign fields, the following list gives the order in which the principal countries of the world have been occupied:

1649. North America: The New England Company, organized by royal charter for work among the Indians.
1705. India: The Danish-Halle Mission of the Lutheran State Church, later the Danish Mission Society. Also the Baptist Missionary Society of England, founded by Carey in 1792.
1721. Greenland: Danish Mission Society.
1733. West Indies: Moravians.
1735. South America: Moravians (north coast).
1737. Africa (South): Moravians.
1797. South Sea islands: London Missionary Society.
1804. Africa (West): Church Missionary Society.
1807. China: London Missionary Society.
1807. Burma: English Baptists.
1811. Persia: Henry Martyn. 1834, American Board.
1812. Java: Netherlands Missionary Society.
1812. Ceylon: English Baptists.
1814. New Zealand: London Missionary Society.
1818. Madagascar: London Missionary Society.
1819. Syria and the Levant: American Board.
1819. Egypt: Church Missionary Society.
1819. Hawaiian islands: American Board.
1823. Argentine: American Board.
1824. New Hebrides: London Missionary Society.
1825. Australia: London Missionary Society.
1828. Siam: Netherlands Missionary Society and London Missionary Society.
1828. Greece: Protestant Episcopal Church (U. S.).
1830. Abyssinia: Church Missionary Society.
1834. Fiji, Samoa, etc.: Wesleyan Methodists of England.
1836. Brazil: Methodist Episcopal Church (U. S.).
1836. Assam: American Baptist Missionary Union.
1843. Palestine: Church Missionary Society.
1844. Africa (East): Church Missionary Society.
1852. Micronesia: American Board.
1859. Japan: May, Protestant Episcopal Church; October, Presbyterian; November, Reformed (Dutch)—all U. S.
1861. Chili: American and Foreign Christian Union.
1872. Mexico: Presbyterian Church (North). Work had been done by the American Bible Society and Mr. Riley.
1877. Africa (Central, Tanganyika): London Missionary Society.
1881. Africa (Barbary States): North Africa Mission (England).
1884. Korea: Presbyterian Church (North) and Methodist Episcopal Church (U. S.).
1885. Arabia: Church Missionary Society.

There have been numerous efforts to enter Tibet, Afghanistan, and Nepal, in Central Asia, and there are portions of Africa yet closed to missionaries, but in 1894, with these exceptions, there is no section of the world where missionary enterprise has not penetrated. These various enterprises have met with very different success. In almost every case the opposition was intense. In the South Seas missionary after missionary lost his life. In India the hostility of the people was strengthened by the opposition of the East India Company. In Burma imprisonment and suffering attended the first efforts. Africa seemed to offer an almost impenetrable barrier; for a long time little more was accomplished than the establishment of a few churches on the coast, and when an entrance was effected the climate proved deadly. The Mohammedan lands of the East met the first missionaries with all the force of Moslem bigotry. There were, however, exceptions, as in the Hawaiian islands; and in some of the South Sea islands and in Burma the bitter opposition at the beginning resulted in wonderful progress. So of later years, long continued labor has been followed by special success among some of the lower castes of India, especially the Telugus and Sweepers.

II. Methods of Missions.—The methods of missions from the time of the apostles to the close of the eighteenth century were very simple: The preaching of the Gospel, the

gathering of converts into churches, and the placing of these churches under the care of foreign educated preachers. There was little or no effort to develop local Christian life into self-direction. There was instruction, but very little education. With the entrance upon the work of the English and German churches, especially the former, a new idea was brought in. They realized that it was utterly beyond their power to reach the countless millions of heathendom themselves, and that they must look to the natives of the different fields to do what they could not do. They realized, too, that a Christian church to be strong must be self-propagating, and in order to that it must be independent. The result was that other duties took rank almost equally with preaching, viz., translation of the Scriptures, education, medical work, woman's work, and organization.

Translation of the Scriptures.—It was the experience of the early missionaries in every field that the great mass of the people were grossly ignorant. In the Pacific, in Africa, and in parts of India many of the languages were not even reduced to writing. Accordingly, the first thing to be done after getting a colloquial use was to find some way of expressing the sounds by signs. The achievements in this line have bordered on the marvelous. A brief summary may be found in the article BIBLE. Even when these languages already had a written form, or the form had been provided, it was no easy task to perfect a translation. What word should be used as the name of God, how indicate spirit, grace, sin, salvation, to races who had never had any adequate idea, or even any idea at all, of them? An illustration of the difficulty is found in the fact that up to 1894 it is not decided just what term to use for God in the Chinese versions. In other cases translations already existed, but in archaic and incomplete form. These must be put into modern language.

Education.—Wherever missions have gone schools have been established whose prime object was to enable converts to read and understand the Bible. With the development of Christian churches other needs have come in. Preachers and teachers must be trained to do work that is beyond the power of the missionary. For this a better, more thorough, and complete education is necessary, and high schools and theological seminaries were established. Community life brought still other needs. Persecution cut off some converts from their employments. To support them was to pauperize them. They must be trained to some means of gaining a living. In most lands life is very circumscribed, labor is degrading, and, except in the most simple forms, employment not easily found. Many of the trades do not exist at all, and what there are, are of the most primitive sort. The entrance of Christian thought and life creates not so much a distaste for existing methods of work and life as a reaching out after something better. To fail to satisfy this is to crush out hope and ambition, without which there can be no genuine growth. Thus there has been developed in the early history of every mission field, in greater or less degree, a complete system of education, including primary, intermediate, and high schools, colleges, and theological seminaries. These have mostly been on the same general plan as schools in the U. S. and Europe, and there has been a marked development in industrial education, especially in Africa. This development of education has given rise to the sharpest controversies in regard to mission methods. Some have maintained that the original idea of limiting missionary education to the most elementary topics, except for the training of preachers and teachers, should be preserved; others, claiming that mission work contemplates Christian communities and social and civil life, as well as the conversion of souls, have advocated a much broader plan.

Medical Work.—No one department probably has been more aggressive or has opened more fields hitherto closed than this. It developed into a distinct feature with the establishment of the Edinburgh Medical Missionary Society in 1840. Since then the advance has been rapid, and in 1893 there was a large force of medical missionaries in every field. Their work has been especially valuable in China, Africa, Persia, and Turkey. In most cases they work in connection with the regular societies, very few being employed by medical societies.

Woman's Work.—The conception of special work for the women of heathen lands to be carried on by women practically originated with Mrs. Doremus, of New York, the founder of the Woman's Union Missionary Society. In 1891 there were between sixty and seventy regularly organized societies. A few work independently, but most work in connection with some one of the general boards. They pay special attention to education for girls and women, house to house (zenana) work among the women, and medical work.

Organization.—(A) *At Home.*—The management of the entire work is committed to boards or societies, chartered by the State to hold property and, in general, conduct the financial affairs involved. These boards are of three kinds: (1) directly connected with some denomination or church, and under its control; (2) indirectly so connected and only morally bound to consult them; (3) absolutely independent of all ecclesiastical relations. The Presbyterian boards belong to the first; the Church Missionary Society to the second; the American Board and the German societies to the third. These boards sometimes act directly, sometimes through executive committees, and employ a force of paid officials. Their work includes the collection of funds and their apportionment to the foreign fields; the selection of missionaries; the furnishing of information to the churches; the holding of property, and the decision of questions of policy on the field. They are composed of prominent men of the different professions and in business well qualified to conduct large affairs. Their financial standing is of the highest.

(B) *On the Field.*—This is both missionary and native.

(*a*) *Missionary.*—The missionaries in a given section of country are generally formed into a mission. This mission meets periodically for the discussion of plans of work, the preparation of estimates, the apportionment of receipts from the board, the assignment of missionaries, and any other business that may come up. The mission is again subdivided into stations (large places where one or more missionaries reside) and out-stations or sub-stations (places of less importance where mission work is carried on, generally through native agents). With the exception of the sum total of expenditures in a single year, and the establishment of general principles, the decision of the mission in its annual meeting is generally final. It ordinarily decides the location of a missionary. The salary he is to receive is decided by the board on the basis of information from the mission, and in accordance with the general principle that he shall receive enough so as to live moderately, but comfortably, without expecting to lay by for future use.

(*b*) *Native.*—As soon as a number of converts are gathered in any place they are usually formed into a church or congregation. Their ecclesiastical position is in most cases regulated by that of the missionaries, though with many there is considerable freedom allowed. As the community grows there are organized Sunday-schools, general schools, and the various forms of community life. As a rule, natives are not members of the mission proper, but are consulted by the missions in the general conduct of the work. There are cases, chiefly in Episcopal missions, where they are members of the missions. In some sections circumstances have arisen which necessitated the formation of civil communities. This has been especially the case in Moslem countries, owing to the peculiar laws. In several communities there have been formed native societies for the conduct of mission work in remote sections—e. g. the Hawaiian Evangelical Society, Home Missionary Societies in Japan, etc. The question of the ecclesiastical relation of native churches on mission fields to the churches supporting the mission has been generally recognized as a very difficult one. In many cases, notably Japan, there is a great desire to break away from all organic connection with what are to them foreign churches. The idea of national churches in Japan, India, China, and elsewhere has gained a strong hold upon the communities. In Turkey the situation is peculiar. The missionaries, debarred from work among the Moslems, turned to the Armenians, seeking to reform the old Church. The Armenian hierarchy sought to crush out the new ideas by persecution with the result of forming distinctively Protestant civil communities according to Turkish law. As the work has progressed the leaven of evangelical ideas has entered the old or Gregorian Church, and many look forward to a reunion of the two in the future.

With the development of the work and its fuller organization, missionaries become less evangelists, more educators and leaders in community and church life.

III. RESULTS.—Any estimate of the results of foreign missions must include many factors. 1. Statistics of converts, churches, native laborers, schools and scholars, copies of the Bible and religious books distributed. 2. Obstacles overcome to the acceptance of the Gospel. 3. The degree of Christian life developed.

MISSISSIPPI

Scale of Miles
10 5 0 10 20 30 40
County Towns ⊙ Railroads
This type indicates a population of 1,000 or over.

E 91 — 89 — H — 88

3 — 35 — 34 — 33 — 32 — 31 — 10

TENNESSEE

ARKANSAS

LOUISIANA

ALABAMA

GULF OF MEXICO

Tishomingo, Alcorn, Prentiss, Tippah, Tate, De Soto, Tunica, Coahoma, Quitman, Panola, Tallahatchie, Marshall, Benton, Union, Lafayette, Yalobusha, Grenada, Calhoun, Chickasaw, Monroe, Pontotoc, Lee, Itawamba, Clay, Webster, Montgomery, Carroll, Oktibbeha, Lowndes, Choctaw, Winston, Noxubee, Attala, Holmes, Humphreys, Sunflower, Washington, Leflore, Carroll, Yazoo, Madison, Hinds, Rankin, Scott, Newton, Leake, Neshoba, Kemper, Jasper, Clarke, Lauderdale, Claiborne, Jefferson, Adams, Wilkinson, Amite, Pike, Franklin, Lincoln, Lawrence, Jefferson Davis, Covington, Simpson, Smith, Jones, Wayne, Greene, Perry, Marion, Walthall, Pearl River, Hancock, Harrison, Jackson, George, Stone

Memphis, Tenn. · Corinth · Meridian · Columbus · West Point · Starkville · Tupelo · Aberdeen · Greenville · Vicksburg · Natchez · Jackson · Hattiesburg · Laurel · Gulfport · Biloxi · Pascagoula · Mobile · New Orleans · Baton Rouge · Lake Pontchartrain · Lake Maurepas · Mississippi River · Yazoo River · Pearl River · Tombigbee River · Mobile Bay · Sound · Ship I. · Cat I. · Horn I. · Petit Bois I. · Dauphine I.

Longitude F 90 West from 89 H Greenwich

1. *Statistics.*—Complete statistics are not at hand. There is no agreement among the societies as to how they shall be reported and a great diversity as to the completeness of the returns from the fields. Using, however, the best sources available, *The Missionary Review of the World*, the American Board *Almanac*, and the tables prepared by Dean Vahl, of Denmark, the following estimates may be considered as approximately correct for 1893:

Communicants, 1,250,000; adherents (persons identified with Christian churches, though not communicants), 2,500,000, exclusive of children.

There are no returns of churches. The number of organized congregations, based upon the number of stations and out-stations, is perhaps 20,000.

Native preachers and teachers, 55,000.

Schools (secular), 19,000; scholars, 790,000.

Sunday-schools, 25,000; scholars, 2,000,000.

Volumes of scriptures distributed in a single year, 3,000,000.

2. *Obstacles to the Acceptance of the Gospel Removed.*—Among these may be mentioned the opening up of China, Japan, and Korea; the discoveries in Africa; the abolishment of the death penalty in many countries; the breaking down of much of the power of caste in Southern Asia; the heavy blows to the slave-trade. In all of these there have been other influences as well, but missions have had a prominent place, due to the personal character of the missionaries and their influence with governments, to medical work, to relief rendered in times of famine and distress, as well as to the direct influence of preaching and teaching. There has been no appreciable effect upon Mohammedanism, unless the renewed activity of Islam be such. Confucianism remains unmoved in general. Buddhism and Hinduism have felt the results of missionary preaching most, as indicated by the development of the Brahmo Somaj and similar movements. The great apparent advance of missions has been among the more ignorant fetich and nature worshipers. There is, however, evidently a very decided weakening of the power of the great religions over thinking men, but whether they are turning to Christianity or to infidelity is as yet in most cases a problem. Often they throw off all religion, although most admit intellectually the superiority of Christianity.

3. *The Degree of Christian Life Developed in the Native Communities.*—This is after all the crucial test. Figures of converts, etc., amount to very little, except as they may be indicative of the character of the communities. A few points may be noted: (1) The growth in self-support. Wherever missions have been successful the native churches are increasing by assuming the entire expense of their church and educational life. Peculiar circumstances have delayed at times, but in general the progress in this particular has been most marked. (2) The position occupied among the surrounding communities. This no figures can show, and outside reports from travelers are very apt to be incorrect. Native Christian communities are not as a rule prominently located. We may, however, cite such travelers as Miss Bird (now Mrs. Bishop) and such officials as the governor-generals of India and the various American ambassadors and consuls, who almost without exception have borne witness to the high character of the Christian communities. Another indication is found in the demand for their members for places of responsibility. (3) The very general effort, even at much self-denial, to extend the work of giving the Gospel to others.

Literature.—The bibliography of foreign missions is very large. By far the most complete attempt in this line is the bibliography prepared by the Rev. Samuel Macauley Jackson, and published as an appendix to the *Encyclopædia of Missions* (New York, 89 pp. 8vo in solid nonpareil; it goes down to the close of 1890). A supplementary list to it was prepared by the Rev. James S. Dennis, D. D., and published in *Foreign Missions after a Century* (New York, 1893). Of minor importance are *Book Department of the Student Volunteer Movement for Foreign Missions* (Chicago) and *A Select Catalogue* (Presbyterian Board of Publication, Philadelphia). The most important books of general reference are *The Encyclopædia of Missions*, with maps, bibliography, and statistical tables, edited by Rev. Edwin Munsell Bliss (2 vols., New York, 1891); *Manual of Modern Missions*, J. T. Gracey, D. D. (New York, 1893); *Short History of Christian Missions*, George Smith, LL. D. (Edinburgh, 1890); *Outline of the History of Protestant Missions*, Dr. Gustav Warneck, translated from the German (Gemmell, Edinburgh, 1884); *Report of the Centenary Conference in London*, Rev. James Johnston (New York, 1888); *Oriental Religions and Christianity*, F. F. Ellinwood, D. D. (New York, 1892); *Medical Missions, their Place and Power*, John Lowe (London, 1890). There are also a large number of historics of special fields and of the different societies, biographies of eminent missionaries, books on the different religions, travels in mission lands, etc. E. M. Bliss.

Mississippi [named from Mississippi river]: one of the U. S. of North America (South Central group); the seventh State admitted into the Union.

Location and Area.—It is bounded on the N. by Tennessee, on the E. by Alabama, on the S. by the Gulf of Mexico (including all islands within 6 leagues of shoreline) for 78 miles westward to the mouth of Pearl river, and from a point about 75 miles above the mouth of that river by the 31st parallel of N. lat., and on the W. by Louisiana and Arkansas. Its extremes are between 30° 25′ and 35° N. lat., and 88° 12′ and 91° 36′ W. lon.; area, 46,810 sq. miles (29,958,400 acres), of which 470 square miles are water surface.

Seal of Mississippi.

Physical Features.—The small streams which fall into the Tennessee river in the northeast corner of the State are bordered by massive walls of limestone. W. of this the Cretaceous formations crop out. W. of these, Tertiary formations prevail. The bottom-lands of the Mississippi, Sunflower, and Yazoo rivers, and the tributaries of the latter, as well as the Gulf coast for about 30 miles back, belong to the Quaternary, or alluvial, era. To this era belongs the Orange sand, the most striking feature of the State's geology, for its presence on the surface is so general as to make its absence exceptional. It is chiefly made up of rounded, siliceous sand, colored, and more or less indurated, by the hydrated peroxide of iron. On the Pontotoc ridge it is either of a glaring deep red, as in Itawamba County, or of a dull iron-rust color; in the region of the long-leaf pine it is of a delicate rose tint, and sometimes of a bright yellow, crimson, or purple; elsewhere it becomes white, and even bluish. With a large increment of iron, in some places the tendency is to concrete into a ferruginous sandstone, occasionally in such masses and solidity as to afford good building material. These indurations are generally found capping hills and ridges, some of which rise in steep isolated hillocks from the level surrounding country as high as 150 feet, forming curious landmarks which indicate the former surface level. In some places these conglomerates are tubular, of singular regularity of dimensions and mold, with the appearance of newly made iron castings, often 4 to 5 feet in length, and with a bore from a quarter of an inch to 4 inches in diameter. Such hills are further crowned, generally, with clumps of short-leaved pine, not visible elsewhere in the same vicinity. The average thickness of this Orange sand stratum varies from 40 to 60 feet, but 100 is not at all infrequent, and it has been found as thick as 200 feet. The useful materials of this formation are the ferruginous sandstone, much of which can be used in rough masonry, and large beds of pipe-clay of great purity, and potter's and crucible clays. The Tertiary beds afford lignite, or brown coal, to some useful extent, mineral fertilizers of value and convenience, potter's and fire-brick clays, and limestone (rotten), chiefly for burning. The mineral deposits of Mississippi are relatively of small consideration, however, in the sum of its natural advantages. In nearly all sections of the State artesian wells may be found, varying in depth from 600 to 900 feet, and waters of decided mineral and medicinal character are of wide occurrence, such as alkaline and saline chalybeates, containing iron, lime, magnesia, and often soda. Among these medicinal waters, those of Cooper's Wells, Greenwood Springs, and Castalian Springs are of the highest repute.

The highest land in Mississippi lies in the northeast, and

from thence it slopes gradually to the Mississippi river and to the Gulf of Mexico. Running N. and S. through the center of the State is a broad low ridge, which divides the tributaries of the Mississippi river from those of the Pearl, Tombigbee, and Pascagoula rivers. This ridge terminates near Vicksburg in a high bluff. W. of this watershed the country is broken up by several narrow ridges and valleys of denudation which finally fall away into the Yazoo delta. E. of the central ridge are vast prairies of exceeding fertility. On the table-land constituting the ridge are immense forests and much cultivated land. In the pine-woods region in the southern portion of the State the land is rolling. Thus, while in Mississippi there are no high elevations, the land is generally rolling and much broken, and in some places the ridges rise to the height of 800 feet. The State is mainly drained by the Mississippi river and its tributaries, the Big Black, Homochitto, and the Yazoo with its affluents, the Sunflower and the Tallahatchie. The Tombigbee flows through the eastern portion of the State, while the Pearl with its tributaries, and the Pascagoula, with the Chickasawha, drain the southeast. In the extreme northeast the Tennessee river separates the State from Alabama for 15 miles. Portions of the Yazoo delta are subject to overflow at times of extreme high water.

The useful materials found in the different formations represented may be conveniently grouped in the natural order in which they occur. In the Carboniferous rocks which occupy the extreme northeastern portion of the State are found limestones, both common and hydraulic, sandstones, used for building purposes, and materials for glass. In the Cretaceous system marls, limestones, and building-stones occur. The Cenozoic occupies by far the greater portion of the State, if we except the Orange sand formation which is of almost universal occurrence, and in this formation are found isolated beds of lignite and several kinds of clay, used in the manufacture of pottery and fire-brick.

Soil and Productions.—The State has a great variety of soils, most of which in their virgin condition are very fertile, and there are still large areas of the cultivated lands that produce good crops without the aid of fertilizers. The most fertile land in the State is the Yazoo delta, an elliptical body of land in the extreme western portion of the State, extending north from Vicksburg. E. of this is a belt running N. and S. known as the bluff formation and brown-loam table-lands, that is nearly as fertile as the Yazoo delta. These are doubtless the most desirable lands in the State for general agricultural purposes. The yellow-loam lands, lying E. of these and N. of the central portion of the State, are among the less productive lands, though portions of this section are quite fertile. The northeastern prairie region, with its rich, black, calcareous soil, has always been noted for having many of the best farming lands of the State, and during the civil war was known as the "Egypt of the Confederacy." These lands are still rich in all the elements of plant-food, and their fertility is easily maintained by the growth of such leguminous crops as melilotus, red clover, alfalfa, Japan clover, and cow-peas. The lands in the extreme northeastern portion of the State are similar to the yellow-loam lands. Extending from Vicksburg across the State to the Alabama line is a belt, from 18 to 45 miles wide, with several kinds of soil, a large proportion being prairie. Most of the soils in this belt are fertile. The large body of land S. of the central prairie belt, known as the pine-woods region, is either sandy loam with clay subsoil or sandy subsoil, the former being the predominating soil in the northern and the western portions of the belt. The southern portion of this belt is almost entirely covered by its virgin growth of pine, while its northern and western portions furnish conditions favorable for cultivation and improvement; and on these lands are some of the finest truck-farms in the State. Except the pine lands in the extreme southern portions of the State and the yellow-loam lands in the north central portion, the soils are unusually rich in plant-food and may easily be kept in a high state of cultivation.

Mississippi has still a vast area covered by virgin forests. Over the Androzoic and the Cenozoic formations the oak is the most common deciduous tree. In the central and northern portions of the State the red oak, the scarlet, the black, the willow, the chestnut, and the water-oak are common on the lowlands. The rock-chestnut oak is found on the higher lands in the delta. Black jack is found on all poor lands in all portions of the State. Other deciduous trees are walnut, butternut, dogwood, black gum, sweet gum, beech, sycamore, cottonwood, magnolia (three species), red maple, ironwood, locust, black and white mulberry, alder, and hickory (four species). Among the evergreens are the long and short leaf pine, pitch pine, cypress, and live oak. Among the more common fruits are the grape, apple, peach, pear, plum, and apricot. Thousands of acres are used for the cultivation of strawberries and tomatoes along the line of the Illinois Central Railway S. of Durant, and large quantities of these fruits are also grown on the line of the Mobile and Ohio Railway between West Point and Booneville. In the southern counties figs, oranges, olives, and other semi-tropical fruits flourish. The land throughout the State is capable of producing almost every variety of farm crop. The Yazoo delta is renowned as the best cotton land in the world, and the State stands third in the Union in the production of this staple. The northeastern portion is especially adapted to the growing of cereals, grasses, clovers, and other forage crops; and the farmers of this section are largely engaged in stock-raising and dairying.

The animals of the chase now found in the State are the deer, black bear, raccoon, gray and black wolves, gray and red foxes, mink, weasel, muskrat, beaver, opossum, squirrel (seven kinds), and rabbit. Wild turkeys, quail, woodcocks, wild pigeons, ducks, and geese are plentiful. Paroquets are found as far N. as Natchez, while mocking-birds and other birds of song and beauty abound throughout the State. Gulls, hawks, vultures, and turkey buzzards are common. Alligators, lizards, and watersnakes inhabit the swamps and marshes, and rattlesnakes are found occasionally in the uplands. Fish are abundant along the Gulf coast and in the Mississippi river, the most important being the giant catfish, pickerel, black bass, buffalo, redfish, pompano, sea-trout, Spanish mackerel, and red snapper.

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	101,772	144,318	+41·8
Total acreage of farms	15,855,462	17,572,547	+10·8
Total value of farms, including buildings and fences	$92,844,915	$127,423,157	+37·2

The following table shows the acreage, yield, and value of the principal crops other than cotton in the year 1900:

CROPS.	Acreage.	Yield.	Value.
Corn	2,293,818	25,231,998 bush.	$14,634,559
Wheat	4,248	40,781 "	34,256
Oats	170,718	2,390,052 "	1,099,424
Potatoes	5,259	347,094 "	288,088
Hay	57,098	99,922 tons	994,224
Totals	3,031,141	.....	$17,050,551

On Jan. 1, 1900, the farm animals comprised 203,492 horses, value $8,903,707; 164,713 mules, value $9,743,925; 244,103 milch-cows, value $5,052,932; 273,706 oxen and other cattle, value $3,719,121; 215,748 sheep, value $335,490; and about 1,500,000 swine, value $5,500,000; total value $33,254,475.

Cotton Production and Manufacture.—Cotton is the largest and most valuable crop, the total area devoted to its cultivation in 1899 being 2,784,286 acres, which produced 1,203,739 bales. The total value of this crop to the producers was $44,175,897, an average of $36.72 per bale, or $15.11 per acre. In 1890 nine establishments were engaged in the manufacture of cotton goods. They employed 1,184 persons, 1,352 looms, 57,004 spindles, and used 17,366 bales of cotton. The capital invested was $2,053,743, and the total value of the production was $1,333,398. In 1900 ten mills were reported in operation and seven building. There were 2,427 looms and 81,890 spindles. The manufacture of cotton-seed oil and meal also employs many factories.

Climate.—The summer season is long and hot, but generally healthful, except in the Yazoo delta region in the western part of the State. The temperature rarely reaches 98°, the normal mean temperature for the summer months being 80·1°. The winters, comparatively short, are damp and somewhat colder than in the corresponding latitude on the Atlantic coast. A minimum temperature of 9° is rare in the northern part of the State, while along the Gulf coast the temperature seldom falls below 28°. The average rainfall for the State at large is about 56 inches, with a fall of 62 inches near the southern coast, and a little less than 54 inches in the northern portion. It is distributed throughout the year in a most favorable manner for the agriculture

of the State. The following table gives a summary of the temperature and rainfall:

MONTHS.	Mean temp.	Mean maximum temp.	Mean minimum temp.	Maximum.	Minimum.	Rainfall, in inches.
January	45·8°	70·7°	19·8°	76°	9°	5·5
February	50·5	73·4	25·2	78	15	5·31
March	56·4	79·6	23·8	83	19	6·15
April	64·7	85·8	39·2	88	30	6·43
May	72·3	90·4	47·2	91	40	4·15
June	79·1	95·2	56·6	97	43	4·25
July	81·3	94·4	64·6	99	60	3·84
August	80·0	93·2	59·4	95	56	3·96
September	74·4	90·0	51·2	93	43	3·81
October	65·2	85·4	36·6	88	34	2·82
November	53·7	78·2	25·2	80	19	4·64
December	47·5	73·2	24·0	77	13	5·13

Divisions.—For administrative purposes Mississippi is divided into seventy-five counties, as follows:

COUNTIES.	*Ref.	Pop. 1890.	Pop. 1900.	COUNTY-TOWNS.	Pop. 1900.
Adams	8-E	26,031	30,111	Natchez	12,210
Alcorn	3-H	13,115	14,987	Corinth	3,661
Amite	9-E	18,198	20,708	Liberty	392
Attala	6-G	22,213	26,248	Kosciusko	2,078
Benton	3-G	10,585	10,510	Ashland	162
Bolivar	5-E	29,980	35,427	Rosedale	622
Calhoun	5-G	14,688	16,512	Pittsboro	254
Carroll	5-F	18,773	22,116	Carrollton	540
Chickasaw	5-H	19,891	19,892	Houston	677
Choctaw	6-G	10,847	13,036	Chester	132
Claiborne	8-E	14,516	20,787	Port Gibson	2,113
Clarke	7-H	15,826	17,741	Quitman	498
Clay	5-H	18,607	19,563	West Point	3,193
Coahoma	4-F	18,342	26,293	Friar's Point	750
Copiah	8-F	30,233	34,395	Hazlehurst	1,579
Covington	8-G	8,299	13,076	Williamsburg	.....
De Soto	3-F	24,183	24,751	Hernando	563
Franklin	8-E	10,424	13,678	Meadville	.....
Greene	9-H	3,906	6,795	Leakesville	1,358
Grenada	5-G	14,974	14,112	Grenada	2,568
Hancock	10-G	8,318	11,886	Bay St. Louis	2,872
Harrison	9-H	12,481	21,002	Mississippi City	.....
Hinds	7-F	39,279	52,577	Raymond	483
Holmes	6-F	30,970	36,828	Lexington	1,516
Issaquena	6-E	12,318	10,400	Mayersville	250
Itawamba	4-H	11,708	13,544	Fulton	171
Jackson	9-H	11,251	16,513	Scranton	2,025
Jasper	7-H	14,785	15,394	Paulding	.....
Jefferson	8-E	18,947	21,292	Fayette	604
Jones	8-G	8,333	17,846	Ellisville	1,899
Kemper	6-H	17,961	20,492	De Kalb	.....
La Fayette	4-G	20,553	22,110	Oxford	1,825
Lauderdale	7-H	29,661	38,150	Meridian	14,050
Lawrence	8-F	12,318	15,103	Monticello	.....
Leake	6-G	14,803	17,360	Carthage	416
Lee	4-H	20,040	21,956	Tupelo	2,118
Le Flore	5-F	16,869	23,834	Greenwood	3,026
Lincoln	8-F	17,912	21,552	Brookhaven	2,678
Lowndes	5-H	27,047	29,095	Columbus	6,484
Madison	6-F	27,321	32,493	Canton	3,404
Marion	9-G	9,532	13,501	Columbia	507
Marshall	3-G	26,043	27,674	Holly Springs	2,815
Monroe	5-H	30,730	31,216	Aberdeen	3,434
Montgomery	5-G	14,459	16,536	Winona	2,455
Neshoba	6-H	11,146	12,726	Philadelphia	.....
Newton	7-G	16,625	19,708	Decatur	.....
Noxubee	6-H	27,338	30,846	Macon	2,057
Oktibbeha	5-H	17,694	20,183	Starkville	1,986
Panola	4-F	26,977	29,027	Sardis	1,002
Pearl River	9-G	2,957	6,697	Poplarville	990
Perry	9-H	6,494	14,682	Augusta	.....
Pike	9-F	21,203	27,545	Magnolia	1,038
Pontotoc	4-G	14,940	18,274	Pontotoc	1,010
Prentiss	3-H	13,679	15,788	Booneville	1,050
Quitman	4-F	3,286	5,435	Belen	177
Rankin	7-F	17,922	20,955	Brandon	775
Scott	7-G	11,740	14,316	Forest	761
Sharkey	6-E	8,382	12,178	Rolling Fork	.....
Simpson	8-G	10,138	12,800	Westville	.....
Smith	7-G	10,635	13,055	Raleigh	.....
Sun Flower	5-F	9,384	16,084	Indianola	249
Tallahatchie	5-F	14,361	19,600	Charleston	480
Tate	3-F	19,253	20,618	Senatobia	1,156
Tippah	3-H	12,951	12,983	Ripley	653
Tishomingo	3-H	9,302	10,124	Iuka	882
Tunica	4-F	12,158	16,479	Tunica	485
Union	4-G	15,606	16,522	New Albany	1,033
Warren	7-E	33,164	40,912	Vicksburg	14,834
Washington	6-E	40,414	49,216	Greenville	7,642
Wayne	8-H	9,817	12,539	Waynesborough	436
Webster	5-G	12,060	13,619	Walthall	170
Wilkinson	9-E	17,592	21,453	Woodville	1,043
Winston	6-H	12,089	14,124	Louisville	505
Yalobusha	5-G	16,629	19,742	Coffeeville	467
Yazoo	6-F	36,394	43,948	Yazoo City	4,944
Totals		1,289,600	1,551,270		

* Reference for location of counties, see map of Mississippi.

Principal Cities and Towns, with Population for 1900.—Vicksburg, 14,834; Meridian, 14,050; Natchez, 12,210; Jackson, 7,816; Greenville, 7,642; Columbus, 6,484; Biloxi, 5,467; Yazoo, 4,944; McComb, 4,477; Hattiesburg, 4,175; Water Valley, 3,813; Aberdeen, 3,434; Canton, 3,404; Wessen, 3,279; West Point, 3,193; Laurel, 3,193; Greenwood, 3,026.

Population and Races.—In 1860, 791,305; 1870, 827,922; 1880, 1,131,597; 1890, 1,289,600 (native, 1,281,648; foreign, 7,952; males, 649,687; females, 639,913; white, 544,851; colored, 744,749, of whom 742,559 were persons of African descent, 147 Chinese; 7 Japanese, and 2,036 civilized Indians); in 1900, 1,551,270.

Finance.—The assessed valuation of taxable property in 1900 was $188,716,159; of this $57,400,336 was on personal property. The total State debt on Oct. 1, 1900, was $2,903,088.41. The revenue for the year ending Sept. 30, 1900, was $1,916,491.70; cash balance, Oct. 1, 1899, $333,765.80; available funds, $2,250,257.50; the expenditure was $1,627,855.57; cash balance Oct. 1, 1900, $622,401.93.

Banking.—On Sept. 5, 1900, there were 12 national banks with aggregate capital of $980,000, deposits of $3,878,626.52, and surplus and profits of $663,788.47; and on June 30, 1900, the State banks numbered 101 and had an aggregate capital of $4,279,496, deposits of $12,547,103, and surplus and profits of $1,351,872.

Means of Communication.—On June 30, 1899, there were fifteen lines of railways, aggregating 2,714·73 miles. The total valuation of railroad, express, and telegraph property was $26,338,476, on which the taxes were $171,200.35. Of these railways, the Illinois Central, the Mobile and Ohio, and the Yazoo and Mississippi Valley traverse the State from N. to S.; and the Memphis and Charleston, the Kansas City, Memphis and Birmingham, the Alabama and Vicksburg, and the New Orleans, Mobile and Texas cross it from E. to W. On the western border of the State the Mississippi river, for a distance of more than 500 miles, affords facilities for an immense shipping interest. In addition to this, the State has five or six small rivers, which aggregate more than 700 miles of navigable waters, that give facilities for shipping in a limited way. Mississippi also has about 100 miles of Gulf coast, and at Ship Island, opposite Biloxi, there is the best and most important deep-water harbor on the Gulf.

Churches.—The census of 1890 gave the following statistics concerning the principal religious bodies:

DENOMINATIONS.	Organizations.	Churches and halls.	Members.	Value of church property.
Baptist, colored	1,385	1,391	136,647	$682,541
Baptist South	1,125	1,126	82,315	689,451
Methodist Episcopal South	903	884	74,785	903,563
Methodist Episcopal	398	395	31,142	245,624
African Methodist Episcopal	122	256	25,439	226,242
Colored Methodist Episcopal	293	292	20,107	230,290
Roman Catholic	67	67	11,348	321,525
Presbyterians in the U. S.	208	184	11,055	415,315
African Methodist Episcopal, Zion	64	64	8,519	22,975
Cumberland Presbyterians	135	119	6,353	108,650
Disciples of Christ	111	109	5,729	55,422
Protestant Episcopal	68	63	3,560	322,960
Methodist Protestant	75	75	3,147	16,175

Schools.—The report of the State to the U. S. Commissioner of Education for the year 1896–97 showed: Number of children of school age (five to twenty), 552,467; enrolled in the public schools, 367,579; average daily attendance, 223,900; number of public schools, 6,510; teachers, 7,903—male, 3,649; female, 4,254; average monthly salaries, male, $32.18; female, $26.69; revenue for public schools, $1,214,630; expenditures, $1,165,840; value of school property, $1,636,055. The higher institutions of learning supported by the State are the State University, Agricultural and Mechanical College, Industrial Institute and College (for white girls), Alcorn University and Agricultural and Mechanical College (colored), and State Normal School (colored). The appropriations to these institutions added to the cost of public schools made a total expenditure by the State for education of about $1,300,000. A comparison of statistics shows that Mississippi ranks first among the Southern States and eighth in the U. S. in the amount expended for education in proportion to the valuation of property, and second in the Union in the per cent. of population enrolled in the public schools. In addition to the public schools, there are in the State 233 high schools, academies, and colleges under private or denominational control, with 22,859 pupils. Tougaloo and Rust Universities for colored youth, Mississippi College (Baptist), and Millsaps College (Methodist) are the principal denominational institutions in the State. Whitworth College, organized in 1859, has for many

years been the largest college for women in the State under private or denominational control.

Libraries.—According to a U. S. Government report on public libraries of 1,000 volumes and upward each in 1891, Mississippi had 31 libraries, which contained 130,314 bound volumes and 16,125 pamphlets. The libraries were classified as follows: General, 3; school, 7; college, 10; college society, 2; law, 1; public institution, 1; State, 1; scientific, 1; society, 3; and not reported, 2.

Post-offices and Periodicals.—In Jan., 1901, there were 1,988 post-offices, of which 49 were presidential (8 second-class, 41 third-class) and 1,936 fourth-class. There were 409 money-order offices. There were 14 daily, 1 tri-weekly, 5 semi-weekly, 181 weekly, 1 tri-monthly, 11 semi-monthly, and 11 monthly publications; total, 224.

Charitable, Reformatory, and Penal Institutions.—The following institutions are supported wholly or in part by the State: Institute for the Instruction of the Blind, at Jackson, established in 1848. Literary studies, music, and industrial arts are taught. Among the latter are sewing, knitting, and bead-work to the girls, and mattress, broom, and chair making to the boys. Only white pupils admitted. Institution for the Education of the Deaf and Dumb, at Jackson, established in 1853, for whites and colored. Pupils are instructed by both the sign and the oral method. Literary and industrial branches are taught. State Lunatic Asylum, at Jackson, established in 1853. East Mississippi Insane Asylum, at Meridian, established in 1882, for whites. Two public hospitals, one at Vicksburg and the other at Natchez, are supported jointly by the State and by the county and city in which they are respectively located. The Protestant Orphan Asylum was founded in 1816. It has since been managed by women, and is now under the auspices of ladies of the Protestant and Hebrew congregations of Natchez. In this asylum about fifty children are sheltered and educated. Benevolent orders, schools, and charitably disposed persons throughout the State contribute to its support. Each county has its jail and poorhouse, and some have convict farms, to the owners of which the able-bodied prisoners are leased and thus made to support themselves. The chief penal institution of the State is the penitentiary at Jackson. In it a leasing system similar to that adopted in the counties has prevailed for years, and has caused the penitentiary to be a source of revenue instead of expense to the State. By the constitution of 1890 this system was abolished. About 125 convicts, unable to labor on farms, railways, or levees, are confined within the walls and kept at work manufacturing furniture, wagons, clothing, shoes, and other articles.

Political Organization.—The constitution of 1890 provides that the Governor shall be chosen in the following manner: On the first Tuesday after the first Monday of Nov., 1895, and on the first Tuesday after the first Monday of November in every fourth year thereafter, an election shall be held in the several counties and districts created for the election of members of the House of Representatives, and the person receiving the highest number of votes cast in any such district shall be holden to have received as many electoral votes as the district is entitled to members in the House of Representatives. The election commissioners transmit the returns of said election to the Secretary of State who must deliver them to the Speaker of the House within one day after he shall have been elected. The Speaker opens and publishes them in the presence of the House of Representatives, and said House ascertains and counts the vote of each electoral district and decides any contest that may be made concerning the same. The person found to have received a majority of all the electoral votes and also a majority of the popular vote is declared elected. If no person shall receive such majorities, then the House of Representatives shall choose the Governor from the persons who shall have received the highest number of popular votes, the vote to be recorded in such a manner as to show for whom each member voted. All other State officers are elected in a similar way. The Governor is ineligible as his immediate successor in office, and the treasurer and auditor of public accounts are ineligible to immediately succeed themselves or each other. The House of Representatives is composed of 133 members chosen every four years by the qualified electors of the several counties and districts. The Senate is made up of forty-five members chosen at the same time and in the same manner as the Representatives. All male inhabitants, except idiots, insane persons, and Indians not taxed, who are citizens of the U. S., twenty-one years old and upward, who have resided in the State two years and in the election district or in the incorporated city or town, in which he offers to vote, one year, and who have never been convicted of bribery, burglary, theft, arson, obtaining money or goods under false pretenses, perjury, forgery, embezzlement, or bigamy, and who have paid on or before the first day of February of the year in which they shall offer to vote all taxes which may have been legally required of them, and which they have had an opportunity of paying according to law, for the two preceding years, are declared to be qualified electors. In addition to the foregoing qualifications, an elector must be able to read any section of the constitution of the State; or be able to understand the same when read to him, or give a reasonable interpretation thereof.

History.—Hernando De Soto, a daring Spanish adventurer and explorer, was the first European to enter the limits of the present State. Crossing the eastern boundary near the present city of Columbus, he proceeded in a northwesterly direction to the Chickasaw Bluffs on which the city of Memphis is built. There, in May, 1541, he reaped the only lasting fruit of his wanderings in the fame which he acquired as the discoverer of the Mississippi river. A year or so later his body was sunk to rest beneath its waters. In honor of his memory the State has given his name to the county and the county-seat in it nearest to the point at which he made his great discovery. Marquette and Joliet, French explorers, passed down the river to the mouth of the Arkansas in 1673, and La Salle, another indomitable French explorer, floated down the Mississippi to the Gulf of Mexico, and claimed all the country drained by it and its tributaries for the King of France under the name of Louisiana (in 1682). The first colony in the State was established by M. d'Iberville in Feb., 1699, at Biloxi, and settlements were soon made at several other points. Until 1712 the Louisiana colony was a royal province, with Bienville, the brother of d'Iberville, as its governor. Crozat, a wealthy French merchant, was then granted the proprietorship, but gladly relinquished it to the West India Company in 1717, which in turn relinquished it to the crown in 1732. From that time till ceded to the English in 1763 it was again a royal province. Among the most important events of the period of French possession were the massacre of the garrison at Fort Rosalie and the consequent extermination of the Natchez tribe of Indians. In two campaigns against the Chickasaws the French were themselves signally defeated.

Negro slaves were first imported in 1720. Owing to misrule, the thriftlessness of the settlers, and other causes, the colony never prospered; and after sixty-four years of French rule there were but 500 settlers, white and black, in all the province. Under the English better government was established, favorable treaties with the Indians were made, and liberal land grants were offered. Immigration of a better class of settlers at once set in, and the colony, then called British West Florida, flourished until 1780, when it was subjugated by Galvez, the Spanish Governor of Louisiana. By the treaty of 1783 the independence of the U. S. was recognized, and the 31st degree of north latitude was made its southern boundary. West Florida was given to Spain, and 32° 28′ was claimed as its northern boundary until by special treaty in 1795 with the U. S. the 31st parallel was established as the dividing line. Under Spanish rule the colony continued to prosper with Natchez as the capital. Tobacco, indigo, and cotton were the exports. In 1798 the section of country between 31° and 32° 28′ from the Chattahoochee river to the Mississippi river was organized as the Mississippi Territory, with the capital at Natchez; but in 1802 the capital was moved to Washington, 6 miles E. of Natchez. Georgia still claimed all this territory, and for a while there was much confusion in land titles; but in 1800 by act of Congress the Georgia claim was adjusted, and Mississippi raised to the second grade of territorial government, entitled to a representative in Congress. Its population then was about 10,000. In 1804 the boundary was moved northward to the Tennessee line, and in 1812 the strip of coast S. of the 31st parallel, between the Pearl river and the Perdido river, was added to the territory. Great excitement prevailed in the territory during the Creek war and that of 1812, and its development was much retarded for a few years, as cotton could not be exported on account of the British blockade. On Dec. 10, 1817, Mississippi was admitted as a State, and Alabama Territory was organized out of what was supposed to be the eastern half of the Mississippi territory. Fourteen counties lying S. of the railway which now connects

Meridian and Vicksburg then comprised the State, for the Choctaws and Chickasaws still owned all the land N. of that line. By treaties with the Choctaws in 1820 and 1830 they were induced to move to the Indian Territory, and in 1832 a similar treaty was made with the Chickasaws. The site for the new capital, named Jackson, in honor of Gen. Andrew Jackson, was chosen in 1821. In 1832 a new constitution was adopted. The State had increased rapidly in wealth and population from its admission. Railways and telegraph lines were introduced, and the cotton crop in 1834 netted $15,000,000; but the loose banking system then prevalent culminated there, as in other States, in the financial panic of 1837. From this heavy reverse the people of the State rapidly recovered, and continued to prosper till the outbreak of the civil war. Mississippi heartily favored the annexation of Texas and the war with Mexico; and no troops won greater honor in that war than did the First Mississippi Regiment under Col. Jefferson Davis. The ordinance of secession was adopted Jan. 9, 1861, and one month later Jefferson Davis, of Mississippi, was elected president of the Southern Confederacy, established at Montgomery, Ala. In the war which followed Mississippi contributed her quota of men and means to uphold the Confederacy. In or on her borders were fought the fierce battles of Shiloh, Iuka, Corinth, Chickasaw Bayou, Port Gibson. Champion Hills, Vicksburg, Harrisburg or Tupelo, and Brice's Cross Roads, and much of her best territory was devastated by the Union armies. On May 22, 1865, Gov. Clarke was sent a prisoner to Fort Pulaski, and on June 13 Judge W. L. Sharkey was appointed provisional governor of the State. On Oct. 2 following delegates to Congress were elected, but were refused admission to that body. By the Reconstruction Act of 1867 Mississippi and Arkansas were united in the fourth military district. In Jan., 1868, a constitutional convention, composed of delegates elected under the Federal Registration Act, was assembled; but the constitution prepared was defeated at a general election in June, and B. G. Humphreys was re-elected Governor. On June 15 he was expelled by military force from his office, and Adelbert Ames appointed in his stead. On Nov. 30, 1869, the constitution of 1868, with the obnoxious clause disqualifying Confederate soldiers from holding office stricken out, was resubmitted to the people, and almost unanimously adopted. Members to Congress from the State were admitted to their seats Feb. 24, 1870. The election in 1873 of Adelbert Ames as Governor was very objectionable to the white people of the State. Taxes had become exorbitant, while property had ruinously depreciated. Under his administration race conflicts also became frequent. A convention of taxpayers assembled in Jackson in 1875 to institute measures of reform, but their petitions to the Legislature were unheeded, and bills introduced for the correction of evils were defeated by the Negro members. Gov. Ames intensified race prejudices by attempting to organize a body of Negro militia to preserve the peace. The November elections of 1875 resulted in the return of a white majority to the Legislature; and in Mar., 1876, articles of impeachment were drawn up against Gov. Ames. He resigned his office on condition that the articles be withdrawn. A. K. Davis, Lieutenant-Governor, and T. W. Cordozo, State superintendent of education, both colored, were also impeached, but were permitted to resign. John M. Stone became Governor, and the State rapidly regained prosperity. In 1890 a new constitution was adopted.

GOVERNORS OF MISSISSIPPI.

Territorial.	
Winthrop Sargent	1798–1802
Wm. C. C. Claiborne	1802–05
Robert Williams	1805–09
David Holmes	1809–17
State.	
David Holmes	1817–19
George Poindexter	1819–21
Walter Leake	1821–25
David Holmes	1825–27
Gerard C. Brandon	1827–31
Abraham M. Scott	1831–33
Hiram G. Runnels	1833–35
Charles Lynch	1835–37
Alexander G. McNutt	1837–41
Tilghman M. Tucker	1841–43
Albert G. Brown	1843–48
Joseph W. Matthews	1848–50
John A. Quitman	1850–51
John J. Guion (acting)	1851
James Whitfield	1851–52
Henry S. Foote	1852–54
John J. McRae	1854–58
William McWillie	1858–60
John J. Pettus	1860–62
Jacob Thompson	1862–64
Charles Clarke	1864–65
W. L. Sharkey (prov'l)	1865–66
Benj. G. Humphreys	1866–70
James L. Alcorn	1870–71
Ridgley C. Powers	1871–74
Adelbert Ames	1874–76
John M. Stone	1876–82
Robert Lowry	1882–90
John M. Stone	1890–96
Anselm J. McLaurin	1896–1900
A. H. Longino	1900–

AUTHORITIES.—History: Gayarre, *History of Louisiana*; Monette, *History of the Valley of the Mississippi*; Claiborne, *Mississippi as a Province, Territory, and State*; Lowry and McCardle, *History of Mississippi*; Duval, *History of Mississippi*. Geology: Wailes's *Geology of Mississippi*; Harper's *Geology of Mississippi*; Hilgard's *Geology of Mississippi*. Resources and productions: Bulletins and other publications of the Mississippi experiment station; U. S. census for 1890; the *Tenth Census Report of Cotton Production in Mississippi* (vol. v.). Institutions of the State: Reports of the institutions; Report of the State Superintendent of Education for 1892–93; Governor's Message (Jan., 1894); and other official State reports.

S. D. LEE.

Mississippi River [Indian, Algonkin, *Missi Sepe*, Great River; first spelled by the discoverers Mesasippi]: the great river of North America; popularly called the Father of Waters. It was discovered by De Soto in 1541. It drains a territory of 1,246,000 sq. miles, which is inhabited by a population of over 30,000,000 (1890). The mean annual rainfall over the whole basin is 30⅘ inches. Taken in connection with its principal tributary, the Missouri (which should have been considered the extension of the parent stream), it is one of the longest rivers in the world, the distance from the headwaters of the Missouri to the mouth of the Mississippi being 4,200 miles. The Mississippi has its source in the numerous lakes in the northern part of the State of Minnesota, the stream having been traced to its origin in Lake Itasca in lat. 47° 14′ N. and lon. 95° 15′ W. Its length is 2,800 miles, although the direct line distance from its source to its mouth is but about 1,660 miles, where it empties into the Gulf of Mexico in lat. 29° N. and lon. 89° 10′ W.

Slope.—The fall or slope of the river in the navigable portion above the mouth of the Ohio is about 6 inches per mile except at the Des Moines and the Rock Island Rapids, where the total fall is 24 feet and 22 feet respectively. The Falls of St. Anthony, 78 feet (including the rapids above and below), at Minneapolis marks the head of navigation. A canal has been constructed for passing the Des Moines Rapids, but boats are able to pass the Rock Island Rapids, as they extend over a distance of 14 miles of river. Below the mouth of the Ohio river the high and low water slopes are as follows:

SLOPE OF MISSISSIPPI RIVER, CAIRO TO NEW ORLEANS.

STRETCH.	Distance in miles.	Fall at high water.	Fall at low water.	SLOPE IN INCHES PER MILE.	
				High water.	Low water.
		Feet.	Feet.	Inches.	Inches.
Cairo to Memphis	230	100	88	5¼	4⅓
Memphis to Helena	76	30	42	4⅘	6⅘
Helena to Lake Providence	236	79	72	4	3⅝
Lake Providence to Vicksburg	57	15½	26	3½	5½
Vicksburg to mouth of Red river	166	42¼	39½	3	2⅞
Mouth of Red river to New Orleans	192	35½	4½	2¼	¼

Width.—The width of the river is greatest in its middle portion. Above the mouth of the Missouri there are many islands, and the total width of the Mississippi is about a mile as high up as Lake Pepin. This is an expansion to the width of 2 to 3 miles for a distance of about 20 miles, not far below the head of navigation. Below the mouth of the Missouri the width reduces to from half a mile to a mile, an average retained as far down as Red river; but occasionally the river widens out as much as a mile and a half. From Red river to the mouth the width averages but little over half a mile, and is quite uniform.

Stability of Banks.—Above the mouth of the Ohio the Mississippi river is similar to other inland streams. It flows in a tolerably stable bed; the variations in depth are not extraordinary; the changes in width are not excessive; and the banks are fairly stable. Below that point, however, the deposits which form its banks are composed of alternate layers of sand and mud or clay (the sand having been deposited by running water, and the mud having been deposited in comparatively still water); and the sand layers are readily washed out, thus causing the banks to cave off rapidly whenever the current sets against them. The slope is also great enough to create high velocities, and the result is a very unstable channel, constantly shifting laterally, and causing the river to develop into a serpentine form, one bend following

another continuously almost all the way from Cairo to New Orleans. Below the mouth of the Red river, however, the slope is reduced, and the banks become tolerably stable. The banks cave off along the outer sides of these great curves or bends, causing them to develop more and more until finally two adjacent bends meet and a "cut off" is made. This concentrates a fall which had been distributed over some 15 miles upon a much shorter distance, and thus the river here is given an abnormal velocity and energy together with new directions of flow, so that the old *régime* of the river is disturbed for many miles above and below. The convex bank in a bend is built up with sand deposits as rapidly as the concave bank caves off, so that the river does not usually become any wider in the bends on account of the caving. The wide places in this part of the river are generally on the stretches intervening between the bends, and are called crossings, because steamboats must cross over here from the deep water on one side of the river to the deep water upon the other in the next bend, the deepest water always being next to the concave or wasting bank.

Depth.—In those parts of the river where the bends are fully developed the variation in depth is enormous. If the water could all be drawn off from the channel it would be seen to be composed here of a series of crescent-shaped trenches in the bends, with almost perpendicular sides at the outer banks, but with very low slopes toward the inner side. These successive horseshoe-shaped depressions would always be turned with the horns pointing toward each other, alternately curved in opposite directions. Intervening between these horns would be sand-ridges, some 50 feet or more in height, which are the principal obstructions to navigation, and which it is the object of the improvement of the river to remove to some degree. Below the mouth of Red river the depth is always sufficient for navigation, but above that point there is more or less trouble at low stages. As the river narrows in the lower part of its course it becomes correspondingly deeper, its depth being in many places over 100 feet at ordinary stages.

Sediment.—Below the mouth of the Missouri the river is always very highly charged with sediment of a yellowish appearance. A large proportion by weight of this sediment is very fine sand. From daily measurements of volume of water and proportion of sedimentary matter passing New Orleans in the year 1880 (*Report* Miss. Riv. Com. 1882), it appears that for that year the total discharge of the river was 18,400,000,000,000 cubic feet. The average proportion of sediment by weight was $\frac{1}{1600}$. There was no high water during this year, therefore it is probable that the mean annual discharge of the river is about 21,000,000,000,000 of cubic feet, or sufficient to cover the whole Mississippi basin to a depth of 7½ inches; in other words, one-fourth of the rainfall over the basin passes off to the Gulf at the mouth of the river. If account is taken of what passes off through the Atchafalaya, 10 to 15 per cent. must be added to this. The average annual amount of solid matter delivered into the Gulf is therefore about 400,000,000 tons, or a volume a mile square and 360 feet high. This is spread by the Gulf currents over a very large area, and accumulates very slowly at the South Pass, which is the navigable outlet. A very much smaller amount of sediment (not over 2 per cent.), composed of coarser sand, is rolled or pushed along upon the bed of the river. This material is moved intermittently in the form of "sand-waves." These waves are strongly developed, being from 1 to 10 feet high and about 100 to 300 feet from crest to crest. The slope is very gentle on the up-stream side and very steep on the down-stream side. A given particle of sand is rolled or pushed up the low slope on the upper side and falls over and assists in building up the lower side. In this way these waves move gradually down stream at the rate of from 10 to 50 feet a day. They are only developed in the main channels where there is a decided current, but are found in both shoal and deep water. The most significant movement of sediment, however, is a discontinuous one of particles of sand in suspension. On account of the widely varying areas of cross-section the velocity of the water varies greatly. Where the velocity is more rapid, sand is taken from the bed and banks, thus increasing the size of this section, and deposited in the next enlarged section below, where the current is slack, reducing its area.

There is no such condition of the water as was formerly spoken of as "surcharged with sediment." The more rapid the flow and the more violent the vertical movements in the "boils" and "eddies" which result from the flow over the sand-ridges at the bottom, the greater is the proportion of sediment carried, the variable element being composed almost wholly of sand.

Velocity.—The mean velocity of the flow is from 1 to 6 miles per hour for different stages and sections. For any given stage, the same volume passing all sections, the mean velocity must vary inversely as the areas of the cross-sections. At low stages the large areas are in the narrow bends where the water is deep, and the small sections are in the wide crossings where the water is very shallow. The greatest velocity at low stages, therefore, is found on the sandbars, the slope also being concentrated at these points. The river is now washing off the crests of these bars in its effort to attain to a uniform cross-section and uniform velocity. At high stages the direct reverse is the case, the river then being engaged in cutting out the engorged sections in the bends and filling up the wide reaches where the sandbars lie. Evidently, if any given stage should continue long enough, a channel of nearly uniform sectional area would be created. To facilitate this desirable result the wide reaches are artificially narrowed, so that the river may have a tendency to exert a continual scouring action upon the bottom.

The Alluvial Basin.—Above the mouth of the Ohio the river flows through a chasm in limestone formations, from 1 to 10 miles wide, cut out by a monstrous glacial and preglacial river, which drained all the northern part of the continent. The limestone bluffs are from 200 to 300 feet above the low-water stage, but the intervening bottom-lands are largely subject to overflow. Those above overflows are sandy plains formed as great sandbars by the once gigantic stream. Those now subject to overflow have been formed by the later alluvial deposits, and are very fertile. Below the mouth of the Ohio the river flows through a region wholly formed by its own deposits. Numerous borings made for this purpose have established the fact that the alluvial basin below Cairo was once an estuary, or arm of the Gulf, and that it has been raised, along with the entire southern portion of the continent, about 100 feet, and then filled to its present height by the sediment carried down by the river itself. The width of this alluvial region varies from about 20 to about 70 miles. It is divided into three great basins, called respectively the St. Francis Basin, on the W., the Yazoo Basin, on the E., and the Tensas Basin, on the W. When not confined to the channel by levees, the natural course of a great flood is to spread so as to cover entirely all these basins. They then act as great reservoirs and storage grounds, although there is a slow movement of the water through them. They greatly delay the high-water stages on the lower portion of the river and lengthen out the period of the flood by fully four weeks at New Orleans. The Yazoo and Tensas basins have been closed against the entrance of floods by levees; the St. Francis Basin is open (1894), but is in process of being closed.

Great Floods.—On the upper river (above the mouth of the Ohio) the greatest floods come in April, May, or June. On the lower river they come in February, March, or April, and come mostly from the Ohio river. The following table gives the more prominent flood data for different points on the river:

LOCALITY.	Maximum rise in feet.	Low-water discharge in cub. ft. per second.	Ordinary high-water discharge in cub. ft. per second.	Extreme high-water discharge in cub. ft. per second.	Ratio of ordinary high to low water discharge.
St. Louis.....	41	40,000	600,000	1,000,000	15
Cairo	52	100,000	1,200,000	1,600,000	12
Memphis.....	37	100,000	1,100,000	1,200,000	11
Helena.	48	120,000	1,200,000	1,560,000	10
Lake Providence ..	41	160,000	1,100,000	1,200,000	8
Vicksburg	53	200,000	1,200,000	1,500,000	6
Mouth of Red river.	48	220,000	1,300,000	1,600,000	6
New Orleans.....	18	250,000	1,000,000	1,200,000	4

Very important deductions can be made from the figures in this table. It will be seen that the increase of stage at high water is much less at Memphis and Lake Providence than at points above and below. These localities are opposite the great basins of the St. Francis and the Yazoo, respectively. The St. Francis Basin always takes off a large portion of the water in time of flood and transports it through the swamps, it not yet having been leveed out. The Yazoo Basin is fully leveed, and in 1892 resisted a moderate flood without any breaks, for the first time, although this basin has been leveed for a quarter of a century. The flood

made large crevasses on the west side, however, opposite this basin, and thus obtained relief. When both of these basins and also the Tensas Basin have been efficiently leveed, the flood stage along their fronts will approximate closely to that at the junction points Cairo, Helena, and Vicksburg, but at these points the maximum stages given in the table are not for a great flood, as no great flood has ever been so confined to the channel. The lower end of the river has never carried in the channel more than 1,200,000 cubic feet per second. In several recent floods about 1,600,000 cubic feet per second has passed the mouth of the Red river in the channel. To enable it to escape down the river, crevasses in the levees have always occurred. To enable this amount of water to pass New Orleans in the river, a great enlargement of the channel must be effected. Temporarily, at least, this increased area of cross-section must be provided at the surface, which means levees very much higher on this portion of the river than have ever yet been built. See LEVEES.

The Atchafalaya Problem.—The Atchafalaya river was formerly the lower end of the Red river, and such it has again come to be. The Mississippi developed a bend toward the W., the Red river became a tributary to the Mississippi, its former channel silted up, finally becoming choked with "rack-heaps." These were cleared out many years ago to improve this stream for navigation, and it immediately began to enlarge its channel. It may be seen that the distance to sea-level is much shorter by this route, and hence the slope is correspondingly greater. It has now developed into a large river, carrying in time of flood in 1890 over 450,000 cubic feet per second. It is feared that since there is still a high-water connection between the Red-Atchafalaya river and the Mississippi, their channel may enlarge sufficiently to carry the whole river, thus leaving New Orleans on an arm of the sea. Another evil effect of this enlargement has been to drown out the plantations in Western Louisiana, which were the finest in the State, but are now entirely abandoned. The further enlargement of the Atchafalaya is now (1894) being provided against by building artificial sills in its bed near the junction with the Red river, and by means of a dam to force Red river to find its outlet again in the Mississippi. This would make the Red a tributary and the Atchafalaya an outlet of the Mississippi, as was formerly the case. At low stages the Red-Atchafalaya river is now entirely severed from the Mississippi, and it has been found practically impossible to maintain an open channel between them by artificial means at extreme low water.

The Improvement of the River.—This work divides itself into three kinds: bank protection, levee building, and contraction works. The banks are protected from caving by first grading them down by water-jets to a suitable slope, and then covering these with mattresses composed of small trees of willow and cottonwood, woven together with wire. These mattresses reach from near high water to the bottom of the river, and often are supplemented with others in the bottom extending out from the bank, all of them being held in place by rock ballast and piles. They immediately fill up with silt, and are very efficient in preventing further caving.

The levees are built near the river banks because the land here is higher, and the most valuable land for cultivation is near the river. If they were placed farther back the waste land in front of them would be soon covered with cottonwood-trees and thick undergrowth, so that this area would be worthless for discharging flood waters; but because the levees are placed near the unprotected banks they often cave off, and others are built a little farther back. These levees are earthen embankments from 5 to 20 feet in height and low slopes on each side. They are sure to be washed away if the water runs over them, and this is the common cause of failure. The levees have mostly been built by a special levee-tax collected from the lands benefited, by commissioners of certain "levee districts" organized under special State enactments. For several years, however, Congress has appropriated money for this purpose, and this money has been allotted in such a way as to supplement and encourage the local assessments. Some $7,700,000 has now (1894) been spent by the U. S. Government in this way.

The contraction works consist of transverse spar and longitudinal training dikes made of wooden piles and porous aprons or wattlings of small willow-trees, so placed as to check the flow of the water somewhat, without wholly deflecting the current, thus causing the water to drop its heavier sediment where fills are desired. In this way the river can be made to build for itself new banks, and to narrow the wide reaches in its channel with great certainty and at a moderate expense. When so narrowed the low-water depth becomes sufficient for navigation from natural scour. These dikes do not reach to the high-water stage, so that at high water there is the original width for discharge. These artificially filled areas soon grow up in timber, however, and this effectually stops nearly all flow. The piles are driven by the aid of a water-jet, and they are protected from washing out by means of foot-mattresses weighted down with stones, as described for the bank protection. This work has all been done under the auspices of the Mississippi River Commission, which was appointed under act of Congress in 1879. It is composed of three members of the Engineer Corps of the U. S. army, one engineer from the U. S. Coast and Geodetic Survey, two civil engineers, and one lawyer. The headquarters of the commission are in St. Louis, and their annual reports are full of valuable detailed information of every possible phase of the work under their charge, well illustrated, and can be had on application. Nearly $14,000,000 have (1894) been spent on contraction works and bank protection. The results are very satisfactory and full of promise.

The jetties at the mouth of the South Pass were constructed by Capt. James B. Eads, under a special contract with the U. S. Government in 1874. They have proved a perfect success in every way, and provide now a navigable channel about 30 feet deep at all seasons. The predicted shoaling at their outlet has not occurred, most of the sediment brought down by the river being carried off by Gulf currents. See JETTIES.

Reservoirs and Equalization of Volume.—One of the greatest causes of sandbar construction is the great variation of volume. The river in time of flood builds up the wide reaches, since here the current is slackened at such stages. To add more volume to the river at these times is but to intensify the evil effects of such stages. It is very desirable, therefore, to reduce flood volumes and to increase low-water volumes. Reservoirs at the head-waters, which will store up flood water and deliver it back to the river at low stages, are therefore helpful. Their effect is quite inappreciable in reducing the flood stage, but they materially add to the dry-weather flow. The proposed enlargement of the Illinois and Michigan Canal, which will deliver a continuous flow from Lake Michigan, will also help out the scouring action of the low-water flow. The effect of reservoirs, several of which have now been built on the head-waters in Minnesota, is too small, however, to make their construction as a means of river improvement economical. Far more can be accomplished with the same money by contraction works.

Effect of Regularization and Improvement.—The effect of a perfected levee system would be to bring under cultivation a very large area of country now considered worthless. The uncertainty as to future flood volumes and the stages consequent upon a confined channel are so great, however, that great devastation from crevasses caused by the river overtopping the levees will continue for many years to come. The banks will never be fully protected from caving, and the channel will always be very unstable, and will shift more or less in position. The wide sections will be gradually reduced in width, and the intervening bars lowered by natural scour. The effect of the levees is to increase the height of the bars so long as the very unequal widths are uncorrected, for a confined river means higher flood stages, and the higher the stage the higher the bars are built up in the wide reaches. Therefore the regulation of the width and the protection of the banks should precede the building of levees. The popular demand for levees, however, has reversed this order, and the levees have been constructed far in advance of the other works.

The ultimate increase in low-water depths for navigation is much smaller than generally supposed. It is not probable that, after the river is fully regulated in accordance with what now seems the best standard width (3,000 feet), the navigable depths at the lower stages will exceed 12 feet up to Vicksburg, 10 feet to Memphis, 8 feet to Cairo, 6 feet to St. Louis, 5 feet to Keokuk, and 3 feet to St. Paul; yet if these moderate depths could be assured at all seasons, the commercial advantages to the country would more than repay for the cost of the work. See RIVERS, LEVEES, and FLOODS; also the *Annual Reports of the Mississippi River Commission*, 1879 to date; Humphrey and Abbot's *Physics*

and Hydraulics of the Mississippi River; Corthell's *History of the Mississippi River Jetties*; *Great Floods on the Lower Mississippi*; and also *Protection of the Lower Mississippi Valley from Overflow*, by the author of this article, in *Journal of the Association of Engineering Societies*, vols. ii. and iii. respectively. J. B. JOHNSON.

Mississippi Scheme: a banking and commercial scheme which ended in a wild speculation and collapse. It was started in Paris in 1717 by John Law (see LAW, JOHN) under the patronage of the regent. Its primary object was to relieve the French finances from the burdensome debt and disorder consequent on the expensive wars of Louis XIV. Law established a private bank, and managed its affairs so skilfully that its paper was soon accepted by the public with perfect confidence, and in 1718 it was transformed into a royal bank. Then a commercial company was chartered entitled "The West India Company," of which also Law was director-general. To this company the whole province of Louisiana, watered by the Mississippi and its branches, was granted. Subsequently it was intrusted with the collection of the taxes and of the king's revenues, and thus it had a monopoly of almost the entire commercial and financial operations of the nation. Meantime the bank issued its notes freely till the paper currency amounted to 2,700,000,000 livres, but these notes were kept from depreciation by accepting them at a premium over specie in payment for the shares of the company. This increase of currency, with a promise of large dividends, rapidly advanced the price of shares, and the whole nation was possessed with a frenzy of speculation. All classes, prince and peasant, clergy and laity, men and women, were affected alike. The rush of stock-jobbing business in the streets of Paris was enormous. The speculations culminated at the close of the year 1719, when the company's shares sold for thirty or forty times their original value, and money was so abundant that the bank loaned at 2 per cent. There was, however, a drain of specie from the bank, as the shrewd ones attempted to put their new-made fortunes into forms of fixed value. To check this drain ineffectual edicts were passed to restrict payments in coin, to limit the amount of specie which one might hold, and to fix the value of the notes. The royal bank was incorporated with the company in Mar., 1720, and on May 21 a Government edict was issued reducing the value of bank-notes and of company shares one-half. This burst the bubble at once, and universal bankruptcy and distress ensued. This scheme stands a striking illustration of the fallacies that a nation's debt can be paid or its prosperity increased by a mere increase of its money circulation, and that paper money can be made stable and safe on some general security without respect to its convertibility. The leaders of the scheme were probably deluded with the rest.
Revised by C. K. ADAMS.

Mississippi, University of: a collegiate institution in Lafayette co., Miss.; chartered in 1844; opened Nov. 6, 1848. It was founded on a grant by Congress to the State of one township of land in 1819, the proceeds of which amounted to over $544,000, on which the State pays to the university interest at 6 per cent.; Congress granted another township of land in 1894. The institution possesses twelve plain but commodious brick buildings. In 1900 there were 18 instructors, 270 students, and 1,520 alumni. Courses lead to the degrees of A. B., B. S., and Ph. B. The library contains 16,000 volumes. The presidents have been: George F. Holmes 1848–49; Aug. B. Longstreet 1849–56; F. A. P. Barnard 1856–61; John N. Waddel 1865–74; Alexander P. Stewart 1874–86; Edw. Mayes 1886–91; Robert B. Fulton, 1892–. R. B. FULTON.

Missolon'ghi, or **Mesolonghi**: the most important town of Western Greece; in the government of Ætolia, on the Gulf of Patras (see map of Greece, ref. 16–J). It is well fortified, and famous for the valor with which it twice met the besieging Turks during the war of independence, in 1822 and 1826. Lord Byron died here Apr. 19, 1824. Pop. 6,000.

Missoula: city; capital of Missoula co., Mont. (for location of county, see map of Montana, ref. 5–D); on Clark's fork of the Columbia river, and the N. Pac. Railroad; 145 miles W. of Helena, the State capital. It is in an agricultural, lumbering, and fruit-growing region; has extensive mines and rich grazing land in the vicinity; and contains a flour-mill, hospital, and 2 daily and 4 weekly newspapers. Pop. (1880) not in census; (1890) 3,426; (1900) 4,366.
EDITOR OF "MISSOULIAN."

Missouri [named from Missouri river]: one of the U. S. of North America (North Central group); the eleventh State admitted into the Union.

Location and Area.—It lies wholly W. of the Mississippi river, between lats. 36° and 40° 30′ N. and lons. 89° 2′ and 95° 44′ W. from Greenwich; is bounded N. by Iowa, E. by Illinois, Kentucky, and Tennessee, S. by Arkansas, and W. by Indian Territory, Kansas, and Nebraska; extreme breadth E. to W., 318 miles; average breadth, 244 miles; area, 69,415 sq. miles (44,425,600 acres), of which 680 sq. miles are water surface.

Seal of Missouri.

Physical Features.—The State is divided into two unequal portions by the Missouri river, which crosses it from W. to E., and forms also its northwestern boundary. The portion S. of the Missouri is of very varied surface, the southeastern portion being low and partially swampy; above this, on the Mississippi, the highland bluffs begin and extend to the mouth of the Missouri. In the southwestern portion of the State the Ozark Mountains—or rather hills—render the whole region exceedingly broken and hilly, the isolated peaks sometimes rising from 500 to 1,000 feet above their bases, and then sinking into very beautiful and sometimes fertile valleys. The numerous river-bottoms and valleys formed by the tributaries of the Osage and Missouri rivers are moderately fertile, but they are generally subject to overflow. Farther N., in the basin of the Osage and above it, the land is mostly rolling prairie, with occasional forests: the immediate valley of the Missouri has a rich alluvial soil, and abounds in large forest trees. The principal rivers are the Mississippi, which bounds the State on the E. and has a direct shore-line of 470 miles (with windings, about 500 miles), and the Missouri, which forms the western boundary of the State for nearly 200 miles, and, turning eastward at the mouth of the Kansas river, flows in an E. S. E. direction across the State, then, flowing N. E., enters the Mississippi 20 miles N. of St. Louis. The Little river, which crosses the southern boundary of the State before entering the Mississippi, and the Meramec, are the only considerable streams discharging their waters into the Mississippi S. of the Missouri. N. of that river Salt river is the largest of these tributaries, but the Cuivre or Copper river, Perruque or Wig creek, Dardenne creek, Fabius, Wyaconda, and Little Fork rivers are streams of moderate size. The Missouri receives numerous large affluents in the State: on the south side are Lamine river, Osage river, and its tributary the Little Osage, Sac river, Grand river, Pomme de Terre river, Big Niangua, Auglaize, Maries creek, and Gasconade river; on the north side, the Nishnabatona, Nodaway, Platte, Grand, Chariton, Roche Percé, Cedar, and Loutre rivers, and Yellow creek.

Geology and Mineralogy.—The geology of Missouri may be briefly summed up as follows: Quaternary deposits in the S. E., extending over a triangular tract from the point where the Current river crosses the southern boundary of the State to the Mississippi river, and comprising the counties along and near the river in the whole swamp region to a point near Benton; the same formation extends through the immediate valley or bottom lands of the Missouri to and beyond the point where it leaves South Dakota. There are no Tertiary, Cretaceous, Triassic, or Jurassic rocks in the State. The next is the Carboniferous or coal-measures, which either as Upper or Lower Carboniferous cover 23,100 sq. miles of the surface of the State, occupying in general the western, northwestern, and northern portions of the State. These include the four subdivisions of the Upper Carboniferous formation and six successive deposits of the Lower Carboniferous, comprising an unclassified sandstone, and the St. Louis, Keokuk, and Chouteau groups of limestones and sandstones, most of them rich in fossils. Adjoining these coal-measures are two considerable tracts


A 97
B 96
C 95
D
E 94
Long. F We
NEBRASKA
KANSAS
OKLA-
HOMA
TER.
Nebraska City
Crete
Tecumseh
Beatrice
Marysville
Washington
Manhattan
Junction City
Florence
Douglass
Howard
Winfield
Arkansas city
El Dorado
Eureka
Burlingame
Council Grove
Emporia
Madison
Burlington
Humboldt
Parsons
Cherryvale
Chetopa
Coffeyville
Independence
Iola
Garnett
Lawrence
Topeka
Kansas City
Leavenworth
Atchison
Troy
Hiawatha
Seneca
Valley Falls
Republican R.
Kansas R.
Missouri R.
Verdigris R.
Arkansas R.
Neosho R.
Marais des Cygnes R.
Osage R.
Pottawatomie
Doniphan
Brown
Nemaha
Jackson
Atchison
Holt
Andrew
Buchanan
Platte
Clay
Ray
Clinton
DeKalb
Caldwell
Carroll
Livingston
Grundy
Mercer
Harrison
Gentry
Worth
Nodaway
Johnson
Lafayette
Cass
Bates
Henry
St. Clair
Hickory
Vernon
Cedar
Polk
Dade
Barton
Jasper
Lawrence
Newton
McDonald
Barry
Stone
Christian
Greene
Wright
Dallas
Laclede
Pulaski
Phelps
Maries
Osage
Gasconade
Franklin
Crawford
Washington
St. Louis
Jefferson
Ste. Genevieve
St. Francois
Madison
Wayne
Bollinger
Cape Girardeau
Perry
Scott
Mississippi
New Madrid
Pemiscot
Dunklin
Stoddard
Butler
Ripley
Carter
Oregon
Holden
Savannah
St. Joseph
Maysville
Albany
Grant City
Princeton
Trenton
Gallatin
Chillicothe
Kingston
Plattsburg
Platte City
Liberty
Richmond
Carrollton
Lexington
Independence
Westport
Harrisonville
Butler
Osceola
Stockton
Bolivar
Lamar
Carthage
Joplin
Mt. Vernon
Neosho
Cassville
Pineville
Eureka Springs
Bentonville
Fayetteville
Wyman
Galena
Ozark
Forsyth
Hermitage
Warrensburg
Sedalia
Marshall
Fayette
Glasgow
Brunswick
Carrollton
Chillicothe
Trenton
Princeton
Bethany
Albany
Maysville
Stanberry
Gallatin
Kingston
Plattsburg
Platte City
Liberty
Richmond
Carrollton
Lexington
Independence
Harrisonville
Butler
Osceola
Stockton
Bolivar
Lamar
Carthage
Joplin
Mt. Vernon
Neosho
Cassville
Pineville
Eureka Springs
Bentonville
Fayetteville
Wyman
Galena
Ozark
Forsyth
Hermitage
Warrensburg
Sedalia
Marshall
Fayette
Glasgow
Brunswick
20 A
B 19
C 18
D
E 17
F Long


MISSOURI
Scale of Miles
5 10 30 50
from G Greenwich
92 H
I 91
J 90
K 89
from G Washington
15 H
I 14
J
13 K
1
40
2
3
39
4
5
38
6
7
37
8
36
Centreville
Fort Madison
LANCASTER
SCHUYLER
Queen City
Glenwood
MEMPHIS
Crawford Sta.
SCOTLAND
Athens
KAHOKA
CLARK
Keokuk
Carthage
Alexandria
Gregory Landing
Williamstown
Canton
Fairmont
Sublett
Kirksville
ADAIR
Novinger
KNOX
Forest Spring
EDINA
Knox City
La Belle
MONTICELLO
LEWIS
Lewiston
La Grange
Millard
La Plata
Novelty
Leonard
Bethel
Taylor
QUINCY
Atlanta
MACON
SHELBY
SHELBYVILLE
Clarence
Shelbina
MARION
PALMYRA
Woodland
Hannibal
Huntington
Callao
New Cambria
Bevier
College Mound
Monroe City
NEW LONDON
Clapper
RALLS
Ashburn
Cairo
Woodlawn
RANDOLPH
HUNTSVILLE
Madison
PARIS
MONROE
Frankford
Louisiana
Perry
Moberly
Renick
Santa Fé
BOWLING GREEN
Curryville
PIKE
Clarksville
Salisbury
Keytesville
Roanoke
Sturgeon
Vandalia
Laddonia
AUDRAIN
Farber
Eolia
Glasgow
HOWARD
Centralia
MEXICO
Middletown
Whiteside
Elsberry
FAYETTE
Hallsville
Martinsburg
Wellsville
Briscoe
LINCOLN
Winfield
Grafton
Boonsboro
Franklin
BOONE
COLUMBIA
Auxvasse
Montgomery City
MONTGOMERY
TROY
Alton
BOONVILLE
Mc Credie
DANVILLE
New Florence
Old Monroe
COOPER
New Palestine
Providence
CALLAWAY
High Hill
WARRENTON
St Peters
Bunceton
Wilton
FULTON
Wright City
ST CHARLES
Florissant
Otterville
Guthrie
Portland
WARREN
Central
Jamestown
Rhineland
Pinckney
MONITEAU
CALIFORNIA
Elston
Cedar City
HERMANN
CLAYTON
ST LOUIS
JEFFERSON CITY
Chamois
Gasconade
Augusta
Webster Groves
Carondelet
Belleville
Osage City
New Haven
Washington
Kirkwood
LINN
OSAGE
GASCONY
Bay
Labaddie
Jefferson Barracks
VERSAILLES
COLE
UNION
Pacific
Osage Bluff
Drake
Kaskaskia R.
MORGAN
Olean
ADE
FRANKLIN
JEFFERSON
Gravois Mills
Aurora Springs
Belle
Bland
St Clair
Tuscumbia
Dabbtown
Leavesville
Hillsboro
Festus
Crystal City
MILLER
Maries
VIENNA
Grove Dale
Bourbon
De Soto
Bagnell
MARIES
Vichy
Cuba Junc.
Pinckneyville
CAMDEN
Hancock
Weldon
St James
Steelville
Mineral Pt
Valles Mines
STE GENEVIEVE
Chauncey
Crocker
Swedeborg
Newburg
ROLLA
CRAWFORD
POTOSI
WASHINGTON
Bonne Terre
Chester
Richland
PHELPS
Beaver Mills
Sligo
Summit
Ste Genevieve
Rockwoods
Stoutland
WAYNESVILLE
Irondale
FARMINGTON
St Marys
PERRYVILLE
Sleeper
LEBANON
PULASKI
Lake Sp.
Sligo Furnace
Caledonia
Bismarck
Doe Run
Iron Mt.
Avon
PERRY
LACLEDE
SALEM
DENT
Graniteville
Pilot Knob
IRONTON
Mine La Motte
Wittenberg
Grand Tower
Conway
Riverside Mines
Sherrill
Greeley
Munger
FREDERICKTOWN
Competition
Einstein Silver Mine
MADISON
Neely's Landing
Marshfield
Mingsville
Niangua
Pleasant Ridge
CENTREVILLE
REYNOLDS
IRON
Glen Allen
MARBLE HILL
CAPE
JACKSON
GIRARDEAU
WEBSTER
WRIGHT
Odin
HOUSTON
Riverside
Round Spring
Annapolis
BOLLINGER
Cape Girardeau
Lutesville
Allenville
Delta
HARTVILLE
TEXAS
Summersville
SHANNON
Des Arc
Fordland
Seymour
Mountain Grove
Cabool
Cynthia
Piedmont
WAYNE
Zalma
Advance
Commerce
BENTON
EMINENCE
Mill Spring
GREENVILLE
Brownwood
Sturdivant
SCOTT
Marshfield
AVA
Norwood
Willow Springs
Jerome
VAN BUREN
Williamsville
Morley
Cairo
Ohio R.
DOUGLAS
Vera Cruz
Cord
Burnham
CARTER
Wappapello
Puxico
Hendrickson
BLOOMFIELD
Oehlstadt
CHARLESTON
Rome
Siloam Sps
Olden
HOWELL
Thomasville
Hunter
Lee
Grandin
POPLAR BLUFF
STODDARD
Sikeston
MISSISSIPPI
Columbus
Bradleyville
Rockbridge
WEST PLAINS
OREGON
ALTON
Pleasant Grove
BUTLER
Ash Hill
Dexter
Morehouse
Belmont
FORSYTH
TANEY
OZARK
Brandsville
Many Sps.
RIPLEY
DONIPHAN
Varner
Poplar
Neelyville
Paw Paw
NEW MADRID
Protem
GAINESVILLE
Somerset
Koshkonong
Thayer
Harfield
Malden
NEW MADRID
Hickman
KENTUCKY
Mammoth Spring
Campbell
Point Pleasant
Island No. 10
White R.
Pocahontas
Knobel
DUNKLIN
PEMISCOT
Stewart
Gayoso
ARKANSAS
Black R.
St Francis R.
KENNETT
CARUTHERSVILLE
Cottonwood
MISSISSIPPI R.
TENNESSEE
ILLINOIS
Illinois R.
MISSISSIPPI R.
MISSOURI R.
DES MOINES R.
Meramec R.
Gasconade R.
Current R.
Black R.
St Francis R.
Osage R.
Chariton R.

of Devonian rock, one in the southwest, the other in the northeast, portion of the State; a narrow belt of it also follows the eastern edge of the Carboniferous deposits in all their devious lines, and extends S. E. to the immediate vicinity of St. Louis. The Hamilton and the Onondaga groups, both mainly limestones, are the only strictly Devonian rocks in the State. The Upper and Lower Silurian formations come next, and occupy a tract almost 200 miles in width, and extending from the Missouri river to the southern line of the State, and also crop out in the immediate bottomlands of the Mississippi above the mouth of the Missouri. Four groups of the Upper Silurian are found here—viz., Oriskany sandstone, Lower Helderberg or Delthyris shale, Niagara group, and Cape Girardeau limestone. Of the Lower Silurian formation there are three groups, belonging to the Trenton period—viz., the Cincinnati group, represented mainly by Hudson river shale; the Galena group, receptaculite limestone; and the Trenton group, composed of Trenton, Black river, and Birdseye limestones. There are also three groups of the magnesian limestone series, consisting of magnesian limestones, saccharoidal and other sandstones, and Potsdam limestones, sandstones, and conglomerates. Below these, and around the head-waters of the affluents of the St. Francis and White rivers, there are frequent outcrops of Eozoic or archaic rocks—greenstone, porphyry, and granite. Much of the limestone of the coal-measures, as well as some of the other formations, is cavernous, and there are numerous caves of great extent and beauty in the central and western portions of the State.

During the year ending June 30, 1892, there were 1,144 mines of all kinds in operation, and the output showed a marked increase over that of the preceding year, but prices were lower. The production of lead and zinc was valued at $5,056,504; of coal, $3.825,828; and of iron, $234,606. In 1899 the Galena-Joplin district of southwestern Missouri and southeastern Kansas yielded 255,088 short tons of zinc, and 23,888 short tons of lead, the total value of the product being $10,715,307. The iron output, chiefly from the Iron Mountain in St. François County, was in 1899 22,720 long tons, valued at $42,203. The mineral output has decreased somewhat in recent years, but a distinct revival is taking place, especially in the older mining districts. The coal-area was estimated at 26,700 sq. miles, and yielded in 1899 3,025,814 short tons, valued at $3,591,945: of granite the most extensive quarries were at Graniteville, Iron County, and Granite Bend, Wayne County, and the product in 1899 was valued at $151,688. The sandstone output was valued at $57,662, and that of limestone at $977,399. There are rich deposits of refractory, potters', and sedimentary clays in St. Louis County, and valuable mineral springs in Pike, Saline, Cedar, Lawrence, Randolph, and Mercer Counties.

Soil and Productions.—The soil is divisible into five classes: (1) The alluvial deposits of the southeast part and of the bottoms of the Missouri river, which are exceedingly fertile; (2) the black-soil prairies of the northwest part; (3) the part prairie and part rolling land of the eastern part, N. of the Missouri river, which contains the best tobacco lands of the State; (4) a good fruit, wheat, and corn tract in the southwest part; (5) the extensive tract between the southwest part and the swampy lands in the southeast, which contains heavily timbered hills and some very rich valleys. Most of North and Northwestern Missouri is prairie, though with belts of timber along the streams. The bottoms are generally heavily timbered with cottonwood, hickory, black walnut, hackberry, burr, and red oak. W. of Howard County the Missouri river counties have heavy bodies of fine timber, interspersed with prairies. E. of Howard County there are belts of hardwood timber from 10 to 20 miles wide, including ash, oak, walnut, sugar-maple, hickory, elm, etc. Along the Osage river and in all the southern counties are heavy tracts of good timber, chiefly white, black, yellow, and post oak, black jack, black hickory, sassafras, dogwood, cedar, etc., and nearer the Arkansas border extensive tracts of pine. Yellow poplar, sweet gum, cypress, oak, catalpa, tupelo, black gum, and black walnut are the principal forest trees of the southeast.

The following summary of 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	215,575	238,043	+10·4
Total acreage of farms	27,879,276	30,780,290	+10·4
Total value of farms, including buildings and fences	$375,633,307	$625,858,361	+66·6

The following table shows the acreage, yield, and value of the principal crops in the calendar year 1900:

CROPS.	Acreage.	Yield.	Value.
Corn	6,453,943	180,710,404 bush.	$57,827,329
Wheat	1,507,737	18,846,713 "	11,873,429
Oats	901,291	24,695,373 "	5,679,936
Rye	9,607	134,498 "	68,594
Barley	713	14,830 "	6,674
Buckwheat	108,677	10,106,961 "	3,537,436
Tobacco	10,580	7,406,000 lb.	666,540
Potatoes	108,677	10,106,961 bush.	3,537,436
Hay	2,145,748	2,768,015 tons.	19,237,704
Totals	11,336,973		$91,435,078

On June 1, 1890, there were reported 25,191,788 poultry of all kinds, and the egg product of the census year was 53,147,418 dozen. The dairy product in the same period was: butter, 43,108,521 lb.; cheese, 288,620 lb.; and milk, 193,931,103 gal. The wool clip in 1890 was 4,040,084 lb., a little more than half of the clip of 1880. The production of beeswax in 1889–90 was 75,670 lb., and of honey, 4,492,178 lb., the latter being an increase of 3,771,098 lb. over the crop of 1879–80.

The farm animals on Jan. 1, 1900, comprised 724,597 horses, value $24,891,718; 165,026 mules, value $7,210,321; 659,731 milch cows, value $18,868,307; 1,387,615 oxen and other cattle, value $36,981,329; 597,619 sheep, value $1,854,711; and about 4,000,000 swine, value $20,000,000; total head, 7,534,588; total value, $109,806,386.

Climate.—The climate is generally healthful, excepting in the river-bottoms and the swampy districts of the southeast, but it is subject to great extremes. The summers are long and hot, and the winters very cold, with strong and piercing winds. The following is a summary of reports of observations, furnished by the U. S. agricultural experiment station at Columbia, showing the mean temperature and the average rainfall of the State during 1893:

MONTHS.	Mean temperature.	Average rainfall in inches.
January	25·5°	0·45
February	27·9	1·98
March	40·5	2·86
April	53·9	7·84
May	61·8	5·89
June	72·6	4·61
July	77·3	4·91
August	72·8	2·20
September	69·9	3·92
October	56·7	0·99
November	40·9	1·59
December	35·2	0·95

The highest temperature of the year was 107°, at New Hartford and Harrisonville on Sept. 14, and the lowest was −20°, at New Boston on Feb. 5. The precipitation ranged from 18·30 inches, at Lexington in July, to nothing, at Louisiana and West Plains in January, and at Conception and Tindall in October.

Divisions.—For administrative purposes the State is divided into 114 counties and one city (St. Louis) as follows:

COUNTIES AND COUNTY-TOWNS, WITH POPULATION.

COUNTIES.	* Ref.	Pop. 1890.	Pop. 1900.	COUNTY-TOWNS.	Pop. 1900.
Adair	1-G	17,417	21,728	Kirksville	5,966
Andrew	2-D	16,000	17,332	Savanuah	1,886
Atchison	1-C	15,533	16,501	Rockport	1,080
Audrain	3-H	22,074	21,160	Mexico	5,099
Barry	8-E	22,943	25,532	Cassville	702
Barton	6-D	18,504	18,253	Lamar	2,737
Bates	5-E	32,223	30,141	Butler	3,158
Benton	5-F	14,973	16,556	Warsaw	743
Bollinger	6-J	13,121	14,650	Marble Hill	295
Boone	4-G	26,043	28,642	Columbia	5,651
Buchanan	2-D	70,100	121,838	St. Joseph	102,979
Butler	8-J	10,164	16,769	Poplar Bluff	4,321
Caldwell	2-E	15,152	16,656	Kingston	655
Callaway	4-H	25,131	25,984	Fulton	4,883
Camden	5-G	10,040	13,113	Linu Creek	340
Cape Girardeau	6-K	22,060	24,315	Jackson	1,658
Carroll	3-F	25,742	26,455	Carrollton	3,854
Carter	7-I	4,659	6,706	Van Buren	....
Cass	4-D	23,301	23,636	Harrisonville	1,844
Cedar	6-E	15,620	16,923	Stockton	555
Chariton	3-F	26,254	26,826	Keytesville	1,127
Christian	7-F	14,017	16,939	Ozark	830
Clark	1-H	15,126	15,383	Kahoka	1,818
Clay	3-D	19,856	18,903	Liberty	2,407

* Reference for location of counties, see map of Missouri.

COUNTIES AND COUNTY-TOWNS—CONTINUED.

COUNTIES.	* Ref.	Pop. 1890.	Pop. 1900.	COUNTY-TOWNS.	Pop. 1900.
Clinton	2-D	17,138	17,363	Plattsburg	1,878
Cole	5-G	17,281	20,578	Jefferson City	9,664
Cooper	4-G	22,707	22,532	Boonville	4,377
Crawford	5-H	11,961	12,959	Steelville	686
Dade	6-E	17,526	18,125	Greenfield	1,406
Dallas	6-F	12,647	13,903	Buffalo	757
Daviess	2-E	20,456	21,325	Gallatin	1,780
De Kalb	2-D	14,539	14,418	Maysville	925
Dent	6-I	12,149	12,986	Salem	1,481
Douglas	7-G	14,111	16,802	Ava	.....
Dunklin	8-J	15,085	21,706	Kennett	1,509
Franklin	5-I	28,056	30,581	Union	744
Gasconade	5-H	11,706	12,298	Hermann	1,575
Gentry	1-D	19,018	20,554	Albany	2,025
Greene	7-F	48,616	52,713	Springfield	23,267
Grundy	2-F	17,876	17,832	Trenton	5,396
Harrison	1-E	21,033	24,398	Bethany	2,093
Henry	5-E	28,235	28,054	Clinton	5,061
Hickory	5-F	9,453	9,985	Hermitage	.....
Holt	2-C	15,469	17,083	Oregon	1,032
Howard	3-G	17,371	18,337	Fayette	2,716
Howell	8-H	18,618	21,834	West Plains	2,902
Iron	6-I	9,119	8,716	Ironton	797
Jackson	3-E	160,510	195,193	Independence	6,974
Jasper	7-D	50,500	84,018	Carthage	9,416
Jefferson	5-J	22,484	25,712	Hillsboro	254
Johnson	4-E	28,132	27,843	Warrensburg	4,724
Knox	1-H	13,501	13,479	Edina	1,605
Laclede	6-G	14,701	16,523	Lebanon	2,125
Lafayette	3-E	30,184	31,679	Lexington	4,190
Lawrence	7-E	26,228	31,662	Mt. Vernon	1,206
Lewis	1-H	15,935	16,724	Monticello	287
Lincoln	3-I	18,346	18,352	Troy	1,153
Linn	2-F	24,121	25,503	Linneus	878
Livingston	2-F	20,668	22,302	Chillicothe	6,905
McDonald	8-D	11,283	13,574	Pineville	.....
Macon	2-G	30,575	33,018	Macon	4,068
Madison	6-J	9,268	9,975	Fredericktown	1,577
Maries	5-H	8,500	9,616	Vienna	.....
Marion	2-H	26,233	26,331	Palmyra	2,323
Mercer	1-F	14,581	14,706	Princeton	1,575
Miller	5-G	14,162	15,187	Tuscumbia	225
Mississippi	7-K	10,134	11,837	Charleston	1,893
Moniteau	4-G	15,630	15,931	California	2,181
Monroe	3-H	20,790	19,716	Paris	1,397
Montgomery	4-I	16,850	16,571	Danville	174
Morgan	5-G	12,311	12,175	Versailles	1,240
New Madrid	7-K	9,317	11,280	New Madrid	1,489
Newton	7-D	22,108	27,001	Neosho	2,725
Nodaway	1-D	30,914	32,938	Maryville	4,577
Oregon	8-I	10,467	13,906	Alton	.....
Osage	4-H	13,080	14,096	Linn	491
Ozark	8-G	9,795	12,145	Gainesville	222
Pemiscot	8-K	5,975	12,115	Gayoso	118
Perry	6-K	13,237	15,134	Perryville	848
Pettis	4-F	31,151	32,438	Sedalia	15,231
Phelps	6-H	12,636	14,194	Rolla	1,600
Pike	3-I	26,321	25,744	Bowling Green	1,902
Platte	3-D	16,248	16,193	Platte City	744
Polk	6-F	20,339	23,255	Bolivar	1,869
Pulaski	6-G	9,387	10,394	Waynesville	.....
Putnam	1-F	15,365	16,688	Unionville	2,050
Ralls	3-H	12,294	12,287	New London	881
Randolph	3-G	24,893	24,442	Huntsville	1,805
Ray	3-E	24,215	24,805	Richmond	3,478
Reynolds	7-I	6,803	8,161	Centerville	.....
Ripley	8-I	8,512	13,186	Doniphan	1,508
St. Charles	4-I	22,977	24,474	St. Charles	7,982
St. Clair	5-E	16,747	17,907	Osceola	1,047
St. François	5-J	17,347	10,359	Farmington	1,778
Ste. Genevieve	5-J	9,883	24,051	Ste. Genevieve	1,707
St. Louis (city)	4-J	451,770	575,238	St. Louis	575,238
St. Louis	4-J	15,642	50,040	Clayton	.....
Saline	3-F	33,762	33,703	Marshall	5,086
Schuyler	1-G	11,249	10,840	Lancaster	980
Scotland	1-H	12,674	13,232	Memphis	2,195
Scott	7-K	11,228	13,092	Benton	234
Shannon	7-I	8,898	11,247	Eminence	.....
Shelby	2-H	15,642	16,167	Shelbyville	777
Stoddard	8-K	17,327	24,669	Bloomfield	1,475
Stone	8-F	7,090	9,892	Galena	.....
Sullivan	1-F	19,000	20,282	Milan	1,757
Taney	8-F	7,973	10,127	Forsyth	204
Texas	7-H	19,406	22,192	Houston	514
Vernon	5-E	31,505	31,619	Nevada	7,461
Warren	4-I	9,913	9,919	Warrenton	770
Washington	5-I	13,153	14,263	Potosi	638
Wayne	7-J	11,927	15,309	Greenville	1,051
Webster	7-G	15,177	16,640	Marshfield	964
Worth	1-D	8,738	9,832	Grant City	1,406
Wright	7-G	14,484	17,519	Hartville	445
Totals		2,679,184	3,106,665		

* Reference for location of counties, see map of Missouri.

Principal Cities and Towns, with Population in 1900.—St. Louis, 575,238; Kansas City, 163,752; St. Joseph, 102,979; Joplin, 26,023; Springfield, 23,267; Sedalia, 15,231; Hannibal, 12,780; Jefferson, 9,664; Carthage, 9,416; Webb, 9,201; Moberly, 8,012; St. Charles, 7,982; Nevada, 7,461; Independence, 6,974; Chillicothe, 6,905; Aurora, 6,191; Kirksville, 5,966; Columbia, 5,651; De Soto, 5,611; Brookfield, 5,484; Trenton, 5,396; Louisiana, 5,131; Mexico, 5,099; Marshall, 5,086; Clinton, 5,061.

Population and Races.—In 1860, 1,182,012; 1870, 1,721,295; 1880, 2,168,380; 1890, 2,679,184 (natives, 2,444,315; foreign, 234,869; males, 1,385,238; females, 1,293,946; whites, 2,528,458; colored, 150,726; comprising 150,184 of African descent, 409 Chinese, 6 Japanese, and 127 civilized Indians); 1900, 3,106,665.

Industries and Business Interests.—The census returns of 1890 showed that 14,045 manufacturing establishments reported. These had a combined capital of $189,236,422; employed 142,924 persons; paid $76,327,907 for wages; and had products valued at $323,897,688. Manufacturing was principally carried on in Kansas City, St. Joseph, St. Louis, and Springfield, which cities together reported 8,086 establishments, employing $159,564,369 capital and 113,256 persons, paying $65,261,837 for wages and $147,463,005 for materials, and receiving $274,367,662 for products. This summary showed an increase since 1880 of 4,761 establishments, $105,160,529 capital, 67,625 persons employed, $45,200,820 paid for wages and $65,149,242 paid for materials, and $148,508,021 in value of products. In 1890 the principal industries, according to the amount of capital employed, were the manufacture of malt liquors, $16,293,974; foundry and machine-shop products, $10,912,341; clothing, $5,701,009; saw and planing mill products, $5,694,929; tobacco, $4,681,840; paints, $3,498,107; slaughter-house products, $3,274,671; and flour and grist mill products, $1,401,760. During the fiscal year ending June 30, 1893, the collections of internal revenue in the State were: on the manufacture of distilled spirits, $3,207,444; tobacco, $3,556,943; fermented liquors, $2,122,201; oleomargarine, $64,854; and penalties, $23,146; total, $8,974,595.

Commerce.—Missouri has three interior ports to which foreign merchandise can be transported without appraisement at receiving ports, Kansas City, St. Joseph, and St. Louis; and during the year 1900 the aggregate value of foreign merchandise imported at these ports was $4,480,283.

Finance.—On Jan. 1, 1899, the State bonded debt was $3,642,000. Under the constitution the State must pay at least $250,000 of its debt annually. The actual valuation of taxable property was $2,397,902,945, and the assessed valuation was $1,093,091,204, of which $337,632,192 are credited to St. Louis. The railway and telegraph property in the State was assessed at $103,361,000.

Banking.—On Sept. 5, 1900, there were 67 national banks, with combined capital of $17,950,000; surplus and profits of $8,545,405.14; and deposits of $64,448,555.54. On June 30 there were 510 State banks, capital $18,592,225, and 90 private banks, capital $924,370, with deposits aggregating $88,660,622.

Means of Communication.—The first railway in the State was opened with 38 miles of track in 1852. On Dec. 31, 1892, there was an aggregate of 6,403 miles of single track and 7,970 miles of single, double, and siding tracks. Only six counties are without railway facilities. The cost of the road-beds and equipments was $288,180,000; the capital stock and funded debt amounted to $1,102,955,141; the earnings were $140,377,068; and the operating expenses $99,735,881. The total mileage in 1899 was 6,826·58. The earnings in 1900 were reported at $17,296,880. The Mississippi and Missouri rivers are spanned by several iron railway bridges, the former at Hannibal, La., St. Louis (2), and Cairo; the latter at St. Joseph, Atchison, Kansas City, Glasgow, Boonville, St. Charles, and Belle Fontaine.

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	442	437	162,864	$4,070,370
Baptist	1,636	1,607	121,985	2,386,898
Disciples of Christ	1,120	889	97,773	1,632,531
Methodist Episcopal South	1,230	1,141	86,466	2,046,389
Methodist Episcopal	905	876	58,285	1,835,840
German Evan. Synod of N. A.	124	124	25,676	575,560
Cumberland Presbyterian	393	333	23,990	571,362
Lutheran Synodical Conference	118	113	22,121	613,940
Baptist, colored	234	238	18,613	400,518
Presbyterian in the U. S. of A.	207	210	17,272	1,328,700
Presbyterian in the U. S.	143	120	10,363	753,490
African Methodist Episcopal	87	126	9,589	281,289
Protestant Episcopal	111	90	8,828	952,600
Congregational	80	79	7,617	650,344
Baptist, General	166	162	6,654	22,675
Baptist, Free-will	108	105	4,752	59,825
United Brethren in Christ	105	98	4,361	47,825

Schools.—In 1900 there were 981,722 children of school age (six to twenty years) in the State, of whom 668,018 were enrolled in the public schools, and 416,364 were in average daily attendance. There were 10,326 school buildings, 13,782 teachers—5,979 men, and 7,803 women—and school property of all kinds valued at $17,020,880. The public-school fund aggregated $6,734,315: the total expenditure of the year was $7,048,826. In 1890 there were 4 public normal schools, 13 commercial and business colleges, 64 endowed academies, seminaries, and other private secondary schools, 12 colleges for women, 27 universities and colleges, and 13 schools of medicine, 4 of theology, 2 of law, and 2 of pharmacy. The State University at Columbia includes an agricultural college and a school of mines. The main building, constructed in 1840–42, and containing recitation-rooms, chapel, etc., and library of 40,000 volumes, was destroyed by fire Jan. 9, 1892, but has been rebuilt and much enlarged.

Libraries.—According to a U. S. Government report on public libraries of 1,000 volumes and upward each in 1891, Missouri had 105 libraries, containing 561,905 bound volumes and 96,278 pamphlets. The libraries were classified as follows: General, 10; school, 34; college, 27; college society, 1; law, 2; theological, 3; medical, 2; State, 1; Y. M. C. A., 2; social, 12; scientific, 3; historical, 2; I. O. O. F., 2; Masonic, 1; mercantile, 1; and not reported, 2.

Post-offices and Periodicals.—In Jan., 1901, there were 2,993 post-offices, of which 158 were presidential (5 first-class, 24 second-class, 129 third class), and 2,835 fourth-class. There were 1,156 money-order offices, and 114 money-order stations. Of newspapers and periodicals there were 84 daily, 4 bi-weekly, 9 semi-weekly, 780 weekly, 13 semi-monthly, 143 monthly, 3 bi-monthly, and 9 of quarterly publication; total, 1,045.

Charitable, Reformatory, and Penal Institutions.—These comprise the State lunatic asylums at Fulton, opened 1851, at St. Joseph, opened 1874, and at Nevada, opened 1887; a county insane asylum at St. Louis; a State penitentiary at Jefferson City; State School for the Deaf and Dumb at Fulton, opened 1851; State School for the Blind at St. Louis, opened 1851; a day school for the deaf at St. Louis, opened 1879, and supported by the city; and many hospitals, orphanages, homes, refuges, and other institutions under the control of various religious organizations.

Political Organization.—The elective franchise is given to every male citizen of the U. S. and to every male person of foreign birth who has declared his intention to become a citizen of the U. S. not less than one year nor more than five years before he offers to vote, who is over the age of twenty-one years, and has resided in the State for one year and in the county, city, or town for at least sixty days immediately preceding the election at which he offers to vote. U. S. soldiers and marines, paupers, criminals convicted once until pardoned, felons, and violators of suffrage laws convicted a second time, are excluded from voting. The Governor is elected for four years, and is ineligible for re-election. The Senate consisted in 1894 of 34 members, chosen for four years, and the House of Representatives of 140 members, chosen for two years; the number of the latter varies with the changes in population and the decennial apportionments. All laws, excepting the general appropriation act, unless an emergency clause is incorporated in it, take effect ninety days after final adjournment. The Legislature holds biennial sessions, limited to seventy days. The judicial authority is vested in a Supreme Court, of five judges, elected by the people for ten years, one being elected every two years, and the oldest in commission being chief justice; a circuit court with one judge in each judicial circuit; county and probate courts with one judge for each; special circuit, criminal, and criminal correction courts in the city of St. Louis (which is coextensive with the county of St. Louis); and the usual minor courts and officers. The constitution provides that the State tax, exclusive of that necessary to pay the bonded debt, shall not exceed 20 cents per $100 of taxable property; that whenever the taxable property in the State shall amount to $900,000,000, the rate shall not exceed 15 cents; that no county, city, town, or other subdivision of the State shall become indebted to an amount exceeding in any one year the income provided for such year, without the assent of two-thirds of the voters thereof voting on the measure, nor in such cases shall an indebtedness be created to an amount, including existing indebtedness, exceeding 5 per cent. of the taxable property therein; and that there be set aside annually at least 25 per cent. of the State revenue, exclusive of the interest and sinking fund, for the support of the public schools.

History.—The present State of Missouri was known as Upper Louisiana. Under this name its lead mines began to be known as early as 1720, and settlements were made not long after at St. Louis, Cape Girardeau, and (probably about 1735) at Ste. Genevieve. In 1763 it was ceded to Spain with the rest of the Louisiana or Mississippi river country, while all E. of the river came into the possession of the English. In 1775 St. Louis (which was founded by Laclede, Feb. 15, 1764), had attained some reputation as a fur-dépôt and trading-station, and had about 800 inhabitants, and Ste. Genevieve about half as many. New Madrid had been founded some time before. In 1800 Spain ceded her provinces on the Mississippi to France, and the French Government sold them to the U. S. in 1803. The U. S. Government divided the purchased region into the Territory of Orleans and the district of Louisiana, the latter including most of Arkansas, Missouri, Iowa, Minnesota, and Dakota, and most of Kansas and Nebraska. On Mar. 10, 1804, Capt. Amos Stoddard, of the U. S. army, succeeded Delassus, Spanish commandant at St. Louis, and the authority of the U. S. in Missouri dates from that day; during the same year this region was erected into the Territory of Louisiana, and St. Louis made the capital. In 1810 the population of the territory was 20,845, of which all but 1,500 were in the present limits of Missouri. In 1812, Louisiana becoming a State, the name of the Territory was changed to Missouri Territory. In 1817 the Territorial Legislature applied to Congress for liberty to prepare a State constitution preliminary to admission into the Union. This application led to a protracted struggle in Congress on the question of the admission of Missouri as a slave State. It was finally settled by the MISSOURI COMPROMISE (*q. v.*). A convention met in St. Louis June 12, 1820, and agreed upon a constitution; the State was admitted to the Union by presidential proclamation Aug. 10, 1821. Its subsequent progress was very rapid. The people of the western portion of the State, in 1858–59, had taken sides in the Kansas troubles, and armed bodies of men, known as Missouri "border ruffians," had penetrated into Kansas and committed many outrages there. A convention was called in Missouri on Feb. 28, 1861, which decided in favor of remaining in the Union. Another constitutional convention met in St. Louis Jan. 6, 1865, and adopted a new constitution, providing for emancipation and the changes induced by it. This constitution was further modified in 1870, and a new one adopted Oct. 30, 1875.

GOVERNORS OF MISSOURI.

Alexander McNair	1820–24	Joseph W. McClurg	1869–71
Frederick Bates	1824–26	Benj. Gratz Brown	1871–73
John Miller	1826–32	Silas Woodson	1873–75
Daniel Dunklin	1832–36	Charles H. Hardin	1875–77
Lilburn W. Boggs	1836–40	John S. Phelps	1877–81
Thomas Reynolds	1840–44	Thomas T. Crittenden	1881–85
M. M. Marmaduke (acting)	1844	John S. Marmaduke	1885–87
John C. Edwards	1844–48	A. P. Morehouse (acting)	1887–89
Austin A. King	1848–53	David R. Francis	1889–93
Sterling Price	1853–57	William J. Stone	1893–97
Trusten Polk	1857	Lon V. Stephens	1897–1901
Hancock Jackson (acting)	1857	Alex. M. Dockery	1901–
Robert M. Stewart	1857–61		
Claiborne F. Jackson	1861		
Hamilton R. Gamble	1861–64		
Willard P. Hall	1864–65		
Thomas C. Fletcher	1865–69		

AUTHORITIES.—Description: Swallow, *Missouri Geological Survey* (1857); Parker, *Missouri Handbook* (1865); Campbell, *Gazetteer of Missouri* (1874); Campbell, *Atlas of Missouri* (1876); Asher and Adams, *Map and Guide of Missouri*; *Iron Ores of Missouri and Michigan* (3 vols., 1876). History: Biddle, *History of the Expedition under the Command of Lewis and Clarke to the Sources of the Missouri River* (original ed. 2 vols., 1814; revised, with additions by McVickar, 1843; new ed. by Biddle, 2 vols., 1845–47; ed. reprinted from the original one, with notes by Coues, 4 vols., 1893); Parker, *Missouri as it is in 1867* (1867); Ewing, *Historical Memoirs*; Leftwick, *Martyrdom in Missouri*; Roberts, *Report of a Reconnoissance of the Missouri River in 1872* (1875); Switzler's *History of Missouri from 1541 to 1877*; Davis and Durrie, *History of Missouri to 1876* (1876). Law: *Missouri Supreme Court Reports*; *Missouri Constitution, Annotated* (1875); McGary, *Pleading in Civil Actions*; Whittlesey, *Missouri Civil Practice*. Statistics: Reports of the U. S. census; Reports of the U. S. Department of Agriculture; *Mineral Resources of the United States*.

WILLIAM F. SWITZLER.

Missouri Compromise: a name given to a law of Congress which may be regarded as one of the principal landmarks of the history of the U. S. during the nineteenth century. Upon the introduction into Congress, in the session of 1818–19, of a bill providing for the admission of Missouri as a State, but prohibiting slavery therein, the opposition on the part of the Southern members became violent and menacing, and after long and brilliant debates a compromise was effected, chiefly by the influence of Henry Clay. Missouri was admitted as a slave State, and at the same time an ordinance was enacted (Feb. 28, 1821) that from all the territory W. of Missouri and N. of the parallel of 36° 30′ (the southern boundary of the new State) slavery should be forever excluded. This agreement subsisted until virtually repealed by the bills which established the Territories of Kansas and Nebraska in 1854, when the question, thus reopened, became the cause of civil war in Kansas between the partisans of liberty and slavery. This measure determined the formation of the Republican party (1854), precipitated the anti-slavery issue, and led to the civil war of 1861–65, by which the whole question was set at rest.

Missouri Indians: See SIOUAN INDIANS.

Missouri River [*Missouri* is from Indian words meaning "muddy water"]: the principal tributary of the MISSISSIPPI RIVER (*q. v.*). It is formed in Southwestern Montana by the union of the Jefferson, Madison, and Gallatin rivers; flows N. and E. through Montana; then in a southeasterly direction traverses North and South Dakota, and flows between Nebraska and Kansas on the W. and South Dakota, Iowa, and Missouri on the N. E. and E. until it reaches Kansas City, whence it flows E. through Missouri to its junction with the Mississippi, 20 miles above St. Louis, in lat. 38° 50′ 55″ N., lon. 90° 14′ 45″ W. Its length to the source of the Madison river, which rises in National Park, is about 3,000 miles. It is a turbid and swift stream, navigable in high water to Fort Benton, Montana, or even to the Great Falls, and in low water to the mouth of the Yellowstone, near the boundary between North Dakota and Montana. The Great Falls are 40 miles above Fort Benton. They consist of four cataracts separated by rapids, with a total fall of 357 feet in 16½ miles. About 145 miles above this point the river passes through the Gate of the Rocky Mountains, a gorge with perpendicular walls rising 1,200 feet directly from the edge of the stream, and extending thus for a distance of nearly 6 miles. In its lower course the river flows through a narrow alluvial valley of great fertility. Its chief tributaries are the Milk, Dakota, Big Sioux, Little Sioux, and Grand on the left, and the Yellowstone, Little Missouri, Cheyenne, White, Niobrara, Platte, Kansas, and Osage on the right.

Missouri, University of the State of: a non-sectarian institution of learning founded at Columbia, near the center of the State of Missouri, in 1839. Academic work began in 1841, a normal department was established in 1867, the College of Agriculture and Mechanic Arts and School of Mines and Metallurgy were added in 1870, the latter being located at Rolla; the department of law was added in 1872, medicine in 1873, engineering in 1877, and the experiment station in 1887. The experiment farm and the horticultural grounds are close to the campus.

The endowment bearing interest at 5 or 6 per cent. is $1,200,000. The buildings, equipment, and grounds (including farm and gardens) are worth $1,000,000. The Federal Government contributes yearly to the Morrill and experiment station funds. The endowment is held by the State, which pays interest and makes liberal appropriations. From Feb., 1891, to Mar., 1893, these amounted to $1,525,000, but this sum includes interest for four years and $650,000 of war tax refunded to Missouri and given by her as additional endowment to the university. There are sixteen buildings. All departments are open to women. The institution is the head of the public-school system of Missouri, and aids in helping forward the elementary and secondary schools. In 1899–1900 the university had 70 professors and other teachers, and 1,181 students. President, R. H. Jesse, LL. D.

R. H. JESSE.

Missouri Valley: town; Harrison co., Ia. (for location of county, see map of Iowa, ref. 5–D); on the Chi. and N. W., and the Sioux City and Pac. railways; 6 miles E. of the Missouri river, 20 miles N. of Council Bluffs. It contains 7 churches, 3 public schools, improved water-works, electric lights, district fair-grounds, and 2 daily and 2 weekly newspapers; and has flour-mills, brick and tile works, machine-shops, large railway repair-shops, carriage-factory, stove-foundry, and wood-working plants. Pop. (1880) 1,154; (1890) 2,797; (1900) 4,010.

EDITOR OF "NEWS."

Mist: See FOGS.

Mistake: in law, an unintentional act or omission having legal consequences (*mistake of fact*), or an intended act or omission having unintended legal consequences (*mistake of law*). It is true in law as it is in the other concerns of life that a person committing a mistake must generally bear the consequences of his error. The law does not undertake to rectify the mistakes of normal juristic persons (i. e. of persons having legal capacity), nor to avert from them or from others the consequences of their blunders. Thus one who goes upon the land of another, believing it to be a part of his own domain, is guilty of trespass equally with him who maliciously intrudes upon his neighbor's premises; and, on the other hand, the man who innocently incloses a part of his neighbor's land, believing it to be his own, acquires by lapse of time, even without his knowledge and against his own will, the same indefeasible title which an intentional wrongdoer would have gained by the same acts. This is only another way of saying that the law does not ordinarily look to the intention with which an act is done, but only at the act and its consequences. It is only in that limited class of cases in which the intent of the party or parties is an essential part of the transaction that the law will relieve from the consequences of a mistaken expression of such intent. The principal, if not the only, cases in which this occurs are those of contracts, of conveyancing, of the making and revocation of wills, of money paid under mistake, and of crimes.

Before entering upon a consideration of the topic of consent as related to these several classes of cases, it will be necessary to refer briefly to the different treatment which the law accords to mistakes of fact and of law respectively. The rule, as generally stated, declares that relief will be given against mistake of fact, but not against mistake of law. Neither branch of this statement is true without a good deal of qualification. We have already seen that in most transactions mistake, even of fact, is altogether without effect. On the other hand, there are many cases in which a mistake of law will have the effect attributed by the rule only to mistakes of fact. This occurs, for example, where the mistake is due to ignorance of particular private rights; or where two parties have made an agreement and instructed a third to put it in legal form, and the latter, owing to ignorance of law, fails to express the real intention of the former; or where the mistake is as to foreign law. It is true, however, that mistakes of law are generally remediless, and that it is only in exceptional cases that the law will afford relief from their consequences. This result is commonly attributed to the supposed existence of a legal presumption that every one knows the law; but this statement is as far from being an expression of a legal fact as it is from being an actual fact. There is, indeed, a rule of law that in certain cases ignorance of law excuses no one, but there is no rule that every one must be taken to be cognizant of the law. The nature of the distinction here referred to between mistakes of law and of fact will more clearly appear in connection with the several classes of cases in which mistake is a matter of legal recognition.

Contracts.—Mistake does not *of itself* affect the validity of contracts at all. It is an almost universal rule that a man is bound by an agreement to which he has expressed his assent in unequivocal terms; but mistake may be such as to prevent any real agreement from being formed, in which case the agreement is void both at law and in equity. The essence of contract is a mutual understanding and agreement as to the matters included in the transaction. Where this element is lacking, or where the agreement is only apparent and does not really exist, there is no contract.

Accordingly, it is only fundamental error, going to the very root of the transaction, which will have the effect of vitiating the agreement. Such error may be mistake (1) as to the nature of the transaction, (2) as to the person of the other party, or (3) as to the subject-matter of the agreement. The first of these kinds of mistake (which must be of very unusual occurrence) may be illustrated by the case of a person who, without negligence on his part, signs an obligation or document of one kind believing it to be an obligation or document of another kind. The court will in such cases allow the mistaken party to avoid the obligation unintentionally assumed by him. In the second place, every

person has a right, consciously and of his own free will, to choose the persons with whom he deals. If A addresses an order for goods to B, C can not, by filling the order, thrust himself into the position of a contracting party with A. Even though A has accepted the goods, under the mistaken belief that they were supplied by B, he does not become liable to C upon the contract. The third case, of mistake as to the subject-matter of the agreement, is of more frequent occurrence. It happens where the parties agree for the purchase and sale of an article, and there is a mutual mistake as to the article intended; or where the person or property to which the agreement relates is no longer in existence, but both parties are ignorant of that fact. This branch of the rule may be summed up in the statement that where both parties to an agreement are under a mistake as to a matter of fact essential to the agreement, the agreement is void.

In all cases in which mistake has the legal effect of avoiding the contract, the party seeking to escape the consequences of the mistake may invoke the aid of both the legal and the equitable tribunals. If the contract is still executory he may repudiate it, or if he have paid money under it he may sue and recover it. In equity he may resist specific performance, or may sue for a decree declaring the contract void.

There is another class of cases arising in contract, where the mistake does not go to the very existence of an agreement, as in the cases above considered, but where a genuine agreement of the parties has been perverted by a mistake in the form of expression adopted by them. In such cases there is no remedy at law, but where the mistake is mutual the courts of equity will rectify it, either negatively, by refusing to compel the party injured by the mistake to perform the contract, or positively, by reforming the contract so as to make it express the true intent of the parties. For this purpose the court will, if necessary, take parol evidence to guide it in arriving at this intent.

Deeds, etc.—Indeed it is by the exercise of this equity jurisdiction in the reformation of written instruments that the consequences of mistake have most generally been averted. This jurisdiction is even more frequently exercised in the case of deeds, mortgages, bonds, and sometimes even to reform, or rectify, negotiable instruments. In all of these cases equity will reform the careless or perverted expression of the written instrument so as to make it conform to the real intention at which the parties aimed but failed to express. In this class of cases, however, as in the case of the rectification of a written contract, above referred to, the mistake must be mutual in order to procure the reformation demanded.

It should be added that the equity tribunals make far less account of the distinction between mistakes of fact and of law than do the law courts, and that a mutual fundamental mistake of the parties as to the law will usually secure the intervention of equity.

Wills.—In the making and revocation of wills the question of intention is again, as in the case of contracts, fundamental. No writing can take effect as a testament unless the will of the alleged testator accompanies it. It is this *will*, or intention, which gives to the written instrument all its force and validity. Consequently, if this intention be wanting, as where a person executes the wrong paper as a will, or goes through the form of executing a will without intending that the paper so executed shall have the effect of a will, the probate courts will give relief by refusing to allow probate of the instrument. It will be observed that in the cases above supposed the testamentary *will* is entirely lacking. Where, however, a will has actually been made, although it bears manifest improprieties and errors in expression upon its face, there is ordinarily no direct and certain remedy. Equity can not *reform* a will as it reforms a deed or a contract. The same result is, however, often attained by the application by the court of the generous principles of interpretation and construction which prevail in the case of wills. (See INTERPRETATION.) So, on the other hand, the courts will admit to probate a will which has been destroyed by the testator, where it is made to appear that it was destroyed by mistake, or without the intention to revoke.

Money paid by Mistake.—This is perhaps the most frequent and familiar case of mistake against which the courts afford relief. They do this by permitting the party who made the mistaken payment to bring an action against the payee for the recovery of the money paid out. Though the action is in form an action in contract, and is usually so described, it is essentially an equitable remedy administered on equitable grounds by the courts of common law. (See QUASI-CONTRACT.) The theory on which a recovery is allowed is that it would be against conscience for the defendant to retain the money paid to him by mistake; but the mistake must be of a material fact, and it must be an unqualified error. Money paid with knowledge that the payee is not entitled thereto can not be recovered. The law will not permit one who knows or believes that a claim is not well founded to make the voluntary payment thereof a reason for shifting his position from that of defendant to that of plaintiff. However, where the party making the payment had had full knowledge of the facts but had forgotten them, he is entitled to bring his action. On the other hand, where the party making the payment received an equivalent, or, perhaps, any consideration for the payment, even a genuine mistake will not avoid the transaction.

It is the general rule in this class of cases that the remedy will be afforded even where the parties can no longer be put *in statu quo*, but this rule does not apply where the negligence of the plaintiff has rendered it impossible to restore the payee to the position occupied by him before the payment was made.

It may be added that it is the rule in England, and generally, though not universally, in the U. S., that money paid under a *mistake of law* can not be recovered. There seems to be no reasonable ground for this discrimination, which is probably based on the mistaken notion, above referred to, of the existence of a rule that all persons are presumed to know the law.

Crimes.—The rule which refuses to allow a person to escape the consequences of his legal errors finds a reasonable and proper application in the domain of criminal law. Here it would be in the highest degree dangerous to allow a wrongdoer to plead his ignorance of the law which he has violated. Such ignorance, accordingly, is in no case an excuse for the offense committed, though it may, under certain circumstances, be relevant to the question of the wrongdoer's intention or state of mind. Ignorance or mistake of fact, however, will usually be taken into account, and will relieve the wrongdoer from the consequences of his mistake in all cases where *knowledge* is of the essence of the crime charged. Thus if A, shooting at a person whom, upon reasonable grounds, he supposes to be a burglar, kills a person who is not a burglar, he is in the same situation as if he had killed a burglar. On the other hand, there are many statutory crimes where no provision is made for the element of innocent intention due to ignorance of a fundamental fact. Thus if A abducts B, a girl under fifteen years of age, from her father's house, believing in good faith and on reasonable grounds that B is eighteen years of age, A commits the offense of abduction, although if B had been eighteen years of age she would not have been within the statute.

For a fuller treatment of the whole subject, see Pollock *On Contracts*; for the special topics, see Anson *On Contracts*, Keener *On Quasi-contracts*, Story *On Equity Jurisprudence*, Jarman *On Wills*, and Stephen's *Digest of Criminal Law*.

GEORGE W. KIRCHWEY.

Mistassini [Cree, *Mista-ssini*, or Great Rock]; a lake of Labrador, in lat. 51° N., lon. 72° W., just N. of the "Height of Land" or watershed and on the Hudson Bay versant. It receives considerable drainage from the north, and empties, through Rupert river, 120 miles long, into James's Bay. It is of very irregular form, with many long islands running N. E. and S. W. Reports of its size vary much, but an exploring expedition in 1884 found it about 100 miles long and only 13 or 14 broad, while at some points it had great depth. A smaller lake lies parallel to it and not far eastward. This region has a rigorous winter, but it is picturesque, abounds in game and fish, and has a good soil with some agricultural possibilities. See Bell, *Information regarding Lake Mistassini* (Montreal, 1884). M. W. H.

Misteli, FRANZ JOSEF, Ph. D.: philologist; b. at Solothurn, in Switzerland, Mar. 11, 1841; was educated at the Universities of Zurich and Bonn; was a teacher in the gymnasiums of St. Gallen and Solothurn, and since 1874 has been Professor of Comparative Philology at Basel. He is a member of the Finnish-Ugrian Society of Helsingfors and of the Hungarian Academy of Budapest; is author of various articles on subjects relating to comparative philology and speech-philosophy in the Steinthal-Lazarus *Zeitschrift für Völkerpsychologie*; also of *Ueber griech. Betonung* (1875);

Erläuterungen zur allgemeinen Theorie der griech. Betonung (1875); reviser of the new edition of Steinthal's *Charakteristik der hauptsächlichsten Typen des Sprachbaues* (1860, 1893). BENJ. IDE WHEELER.

Mistletoe [O. Eng. *misteltān*, liter., mistletoe sprig; *mistel*, mistletoe + *tān*, twig]: a parasitic dicotyledonous shrub, of the family *Loranthaceæ*, with opposite leaves, reduced diœcious flowers, and a single inferior one-celled ovary. The mistletoe of the Old World is *Viscum album*, a common parasite upon apple-trees in England, rarely upon oaks. The yellowish-green foliage is in great demand for Christmas decoration. The American mistletoe resembles the foregoing, but belongs to the genus *Phoradendron*. One species (*P. flavescens*) is common from New Jersey to Southern Indiana, Missouri, and southward, upon many trees, forming pale-green clumps from 2 to 4 feet in diameter. This species is used for Christmas decorations in the U. S. Several other species occur southwestward and in California.
CHARLES E. BESSEY.

Mistral [Fr.; Provenç. *mistraou*; Ital. *maestro*, the master]: a norther or land wind on the southern shore of France, cold, dry, gusty, and sometimes violent, injurious to vegetation, and hard to endure. It is most frequent and violent in winter, and is felt along the coast from the mouth of the Ebro to the head of the Gulf of Genoa, but it extends inland and becomes most violent in Provence and Languedoc, especially over the delta of the Rhône. In the lower Rhône valley it occurs every two or three days, and at Marseilles it blows on the average 175 days in the year. It is so violent as sometimes to overturn railway trains. It resembles the Bora of Istria and the norther of Texas. M. W. H.

Mistral, mēēs'trăăl', FREDERIC: poet; b. at Maillane, Bouches-du Rhône, France, Sept. 8, 1830. After studying law at Avignon, he returned to his little native town, and set himself to writing in the dialect of Southern France, which in the hands of Jasmin had begun to recover its former prestige as a literary language. He speedily allied himself with other young men who were cherishing the same aims; and in 1854 he was one of the seven founders of the famous society of Felibrige. After numerous lesser efforts, he published in 1859 a work in the revived tongue that at once made him famous. This was the half-pastoral, half-mystic narrative poem *Mirèio*—full of the color and the sentiment of Provence. So great repute did this work give Mistral that in 1861 the French Academy decreed him its chief poetic prize. Fame, however, did not change the course of his life. He remained at Maillane, writing much both in verse and prose for the *Aïòli*, the *Armana prouvençau*, and other organs of the coterie. In 1867 he brought out a second narrative in verse, *Calendau*, which shows the results of his studies in mediæval Provençal literature. From this time, indeed, his interests gradually became more scientific. The founding of the Société des Langues Romanes at Montpellier, in which he was actively interested, was a sign of the same tendency among all the best of the group to which he belonged. In 1876 he published a collection of his shorter poems under the title *Lis Isclo d'or*. For some time, however, he had been at work upon a great philological task, intended of course to advance the cause he was devoted to—his *Tresor dóu Felibrige*, or dictionary of the dialects of Provence (2 vols., 1878–86). An interesting romance, *Nerto* (1884), dealing with mediæval life in Southern France, showed, however, that he had not wholly given up literature for erudition. This has been followed by a tragedy, *La Rèmo Jano* (1890), on the much-maligned Joanna I. of Naples. There have been many editions of *Mirèio*, and three translations into English (C. H. Grant, Avignon, 1867; H. Crichton, London, 1868; Harriet W. Preston, Boston, Mass., 1872). The original text was accompanied by a French version in prose, and one in French verse has been published by E. Rigaud (Paris, 1880). It has been rendered into several other languages. A. R. MARSH.

Mitchel, JOHN: patriot; son of a Presbyterian minister; b. at Dungiven, County Derry, Ireland, Nov. 3, 1815; graduated at Trinity College in 1836; studied law and practiced for several years at Banbridge; contributed to the local newspapers and the Belfast *Chronicle*; was editor of the Dublin *Nation* for several years; wrote *Hugh O'Neil* (1845), which brought him to public notice; in 1848 started *The United Irishman* in the interests of the advanced Young Ireland party, and with the leaders was arrested, convicted of felony, and transported for fourteen years, but escaped in 1853; went to New York city, where he started *The Citizen*, advocating slavery, but gave it up, and started *The Southern Citizen* at Knoxville, Tenn., which failed; resided at Paris till the war broke out; returned to Richmond, edited *The Enquirer* in the interests of the South, and also lost two sons in its forces; returned to New York and established *The Irish Citizen*, which soon failed; went to Ireland in 1874, where, unmolested, he was elected and returned to Parliament from Tipperary; being declared ineligible, he was again returned to Parliament, but further action was rendered unnecessary by his death, at Cork, Mar. 20, 1875. He also wrote *Jail Journal* (1854); *The Last Conquest of Ireland—Perhaps* (1861); edited the poems of Thomas Davis and James C. Mangan; and wrote a continuation of McGeoghegan's *History of Ireland*. See the *Life* by William Dillon (2 vols., 1888).

Mitchel, ORMSBY MCKNIGHT, LL. D., F. R. A. S.: astronomer and soldier; b. in Union co., Ky., Aug. 28, 1810; graduated at West Point in 1829. He was promoted second lieutenant of artillery, served as Assistant Professor of Mathematics at West Point until 1831, and in garrison until 1832; resigned Sept. 30, 1832; studied law, was admitted to the bar, and practiced in Cincinnati until 1834, when he was elected Professor of Mathematics, Natural Philosophy, and Astronomy at Cincinnati College. He held this position until 1844. Through his influence an observatory was erected on Mt. Adams, within the city limits, and he procured for it in Europe a telescope and other apparatus. After his death the observatory was rebuilt on Mt. Lookout, and was given his name. He served as adjutant-general of Ohio 1847–48. The great work of Prof. Mitchel's life was the stimulus given to astronomy by his popular lectures, which were the direct cause of the establishment of observatories at Albany, Clinton, and Allegheny City. He established in July, 1846, a popular scientific journal entitled *The Sidereal Messenger*; in it, and in a school edition of Burritt's *Geography of the Heavens*, which he prepared in 1849, Prof. Mitchel published his observations upon double stars. In 1848, acting upon a suggestion of Prof. Sears C. Walker, he invented a chronograph for automatically measuring and recording right ascensions by electro-magnetic mechanism, nearly at the time a similar apparatus was constructed by Mr. Locke. In 1849 he devised a declinometer, or apparatus for the accurate measurement of large differences of declinations. During the ensuing five years (1854–59) many zones of faint stars were observed by its means, and nearly 50,000 observations were accumulated. Among the other achievements of Prof. Mitchel may be mentioned his discovery that certain stars were double, notably Antares; his numerous unpublished observations of nebulæ, solar spots, double stars, and comets (chiefly made in 1848–49); and the invention of an apparatus for finding the personal equation. In Aug., 1859, he accepted the post of director of the Dudley Observatory at Albany, N. Y., which had been erected in accordance with plans furnished by him five years before. In 1861 he tendered his military services to his country, was made brigadier-general of volunteers Aug. 9, and ordered to the department of Ohio. He distinguished himself by a forced march into Northern Alabama, seizing the railway between Corinth and Chattanooga, was made major-general Apr. 11, 1862, and given the command of the department of the South in September; but while making energetic preparations for the coming campaign was seized with yellow fever, and died at Beaufort, S. C., Oct. 30, 1862. His principal publications were *The Planetary and Stellar Worlds* (1848) and *The Orbs of Heaven* (1851). See the *Life* by his son (Boston, 1887). Revised by JAMES MERCUR.

Mitchell: city; capital of Davison co., S. D. (for location of county, see map of South Dakota, ref. 7–F); on the Chi., Mil. and St. P. and the Chi., St. P., Minn. and Om. railways; 65 miles W. by N. of Sioux Falls. It is in an agricultural region; has manufactories of chemicals and well-boring machinery, and a daily, 4 weekly, and 2 monthly periodicals; and is the seat of Dakota University (Methodist Episcopal, opened 1885). Pop. (1880) 320; (1890) 2,217; (1900) 4,055.
EDITOR OF "REPUBLICAN."

Mitchell, ALEXANDER FERRIER, D. D.: a professor and author; b. at Brechin, Forfarshire, Scotland, Sept. 10, 1822; was educated at the University of St. Andrews; has been minister at Dunnichen 1847–48; professor in the College of St. Mary and University of St. Andrews, of Hebrew, 1848–68, and of Ecclesiastical History and Divinity since 1868; was convener of the Church of Scotland's Jewish mission 1856–74; since 1860 has been convener of the Westminster

minutes committee; since 1880 convener of the Pan-Presbyterian council on *Desiderata* of Presbyterian history; is member of Scottish text and history societies; honorary member of the American Society of Church History; a representative to all the councils of the Reformed Churches; and moderator of the General Assembly 1885. He has published *The Westminster Confession of Faith: a Contribution to the Study of its History* (Edinburgh, 1866; 2d ed. 1867); *The Wedderburns and their Work* (1867); *Minutes of the General Assembly, 1644–49, with Introduction* (1874); *Introduction to Black-letter Edition of Archbishop Hamilton's Catechism* (1882); *The Westminster Assembly: its History and Standards* (Baird lectures for 1882; London, 1883); *Catechisms of the Second Reformation* (London, 1886); *Reprint, with Introduction, of the First Protestant Treatise in Scottish Dialect* (Edinburgh, 1888); *Register of Knox's Congregation in Geneva*; *Introduction to the Records of the General Assemblies in Edinburgh, 1846–47*; and many historical articles in reviews and cyclopædias.

C. K. Hoyt.

Mitchell, Donald Grant (*Ik Marvel*): author; b. at Norwich, Conn., Apr. 12, 1822; graduated at Yale in 1841; passed three years on a farm; traveled in Europe; studied law in 1846 in New York; published *Fresh Gleanings* (1847); *The Battle Summer* (1849), a record of his observations in 1848 in Paris; *The Lorgnette* (1850); *Reveries of a Bachelor* (1850); *Dream Life* (1851); was U. S. consul at Venice 1853–55; *Fudge Doings* was published in 1854; in 1855 he settled upon a farm near New Haven, Conn.; published (1863) *My Farm of Edgewood*; *Wet Days at Edgewood* (1864); *Seven Stories* (1865); *Doctor Johns*, a novel (1867); *Rural Studies* (1867); *Pictures of Edgewood* (1868); *About Old Story-tellers* (1876); *Out of Town Places* (1884); *English Lands, Letters, and Kings* (1889–90).

Revised by H. A. Beers.

Mitchell, Hinckley Gilbert, A. M., Ph. D., D. D.: minister and educator; b. at Lee, Oneida co., N. Y., Feb. 22, 1846. He was educated at Falley Seminary, Wesleyan University (A. B. 1873; A. M. 1876), Boston University, School of Theology (B. D. 1876), and at Leipzig University (Ph. D. 1879). After serving as pastor of a Methodist church at Fayette, N. Y., 1879–80, he taught Latin and Hebrew at Wesleyan University 1880–83; was instructor 1883–84, and since 1884 has been professor of Hebrew and Old Testament in Boston University. He has published *Hebrew Lessons* (1884); *Amos: an Essay in Exegesis* (1893); *Hints for Bible Students: The Pentateuch* (1893); a translation of *Theology of the Old Testament*, from the French of Ch. Piepenbring (1893).

A. Osborn.

Mitchell, Margaret Julia: actress; b. in New York city in 1832. She is best known as Maggie Mitchell. She began her stage career by playing child's parts in the Old Bowery theater. In 1851 she appeared successfully as Julia in *The Soldier's Daughter* at Burton's Chambers Street theater, New York. In 1854 she played Constance in *The Love Chase*, at the Chestnut Street theater, Philadelphia. She produced *Fanchon* at the Olympic theater, New York, in 1862, and acquired a great reputation by its performance. Other successful parts on the same lines were Mignon, Little Barefoot, and the Pearl of Savoy. She married her manager, Henry Paddock, Oct. 15, 1868.

B. B. Vallentine.

Mitchell, Maria, LL. D.: astronomer; b. at Nantucket, Mass., Aug. 1, 1818, of Quaker parentage; assisted her father, William Mitchell, in his favorite astronomical studies; gave special attention to study of nebulæ and of comets; received in 1847 a gold medal from the King of Denmark for the discovery of a comet; was afterward employed upon the Coast Survey and *The Nautical Almanac*; removed with her family to Lynn, Mass.; became in 1865 Professor of Astronomy in Vassar College; and was a member of various learned societies. The degree of LL. D. was conferred upon her by Hanover College in 1852, and by Columbia College in 1887. D. in Lynn, Mass., June 28, 1889.

Mitchell, Silas Weir, M. D.: neurologist, novelist, and poet; b. in Philadelphia, Feb. 15, 1829; son of John Kearsley Mitchell, D. D.; was educated at the University of Pennsylvania and at Jefferson Medical College, where he graduated in 1850; was greatly interested in natural history, and carried on a series of investigations regarding snake poisons, publishing in the *Smithsonian Contributions to Knowledge* in 1860 his researches upon the characteristics of rattlesnake venom, and in later years various monographs on allied topics. He was appointed an acting assistant surgeon in the army in the hospital for injuries, etc., to the nerves, in Philadelphia in 1863; here he made the observations on injuries of the nerves and their consequences that have given him a worldwide reputation. In 1871 he published a little work, *Wear and Tear, or Hints for the Overworked* (5th ed. 1887). *Injuries of the Nerves and their Consequences* appeared in 1873 (Philadelphia and London); *Lectures on the Nervous System* in 1881, 2d ed. 1885 (Philadelphia and London); *Fat and Blood* in 1885. He has published several volumes of poetry and fiction, including *Hephzibah Guinness* (Philadelphia, 1880); *The Hill of Stones, and other Poems* (Boston, 1882); *In War Time* (1884); *Roland Blake* (Boston, 1886); *A Mosque and other Poems* (Boston, 1887); *Hugh Wynne, Free Quaker* (1897); and *The Adventures of François* (1898).

Mitchell, Sir Thomas Livingstone, D. C. L., F. R. S.: explorer; b. in Stirlingshire, Scotland, in 1792; entered the British army in Portugal at the age of sixteen; was aide-de-camp to the Duke of Wellington, and afterward on the staff of the quartermaster-general till the end of the Peninsular war; was sent back to Spain as a member of Sir Henry Torrens's survey of the fields of battle; in 1827 was appointed deputy surveyor-general of New South Wales, and ultimately became surveyor-general, filling that post until his death. In that capacity he conducted four daring expeditions into the great deserts of Australia; discovered Mt. Byna, the vast region called Australia Felix, the Red, Peel, Nammoy, and Victoria rivers, explored the courses of the Darling and Glenelg rivers, and mapped out a practicable route between the colonies of Victoria and South Australia. He published in 1838 an account of his first three expeditions, and in 1848 his *Journal* of the heroic but unsuccessful effort to reach the Gulf of Carpentaria from Sydney. He also published several elementary geographical and military treatises, and an account of a "boomerang propeller" invented by him for steam vessels. He was knighted in 1839; made a colonel in 1854. D. at Park Hall, near Sydney, Oct. 5, 1855.

Mite: See Acarus.

Mitford, Mary Russell: author; b. at Alresford, Hants, England, Dec. 16, 1786; published in early life some volumes of poems, and then became a successful and highly popular prose-writer. The greater part of her life was spent near Reading. Her principal works are *Our Village*, a series of pleasant sketches (5 vols., 1824–32); *Belford Regis, Country Stories, Recollections* (1852); *Atherton and other Tales* (1854); and a number of dramas, of which *Rienzi* (1828) was the most successful. D. at Swallowfield, Jan. 10, 1855. See her *Life and Correspondence*, edited by Rev. A. G. K. L'Estrange (3 vols., 1878), and his *The Friendships of Mary Russell Mitford* (1882).

Revised by H. A. Beers.

Mitford, William: historian; b. in London, Feb. 10, 1744; was educated at Queen's College, Oxford, where he studied little but Greek; retired to his Hampshire estate, and often sat in Parliament; became Professor of History in the Royal Academy; wrote *An Inquiry into the Principles of Harmony in Languages* (2d ed. 1804) and *History of Greece* (5 vols., 1784–1815), once regarded as a standard work, but long since superseded. It is written from the aristocratic standpoint. The best edition (8 vols. 8vo, 1838) has the notes of his brother, Lord Redesdale. Mitford died at Exbury, Feb. 8, 1827.

Mithras [= Gr. Μίθρας, Pers. *Mithra*; cf. Sanskr. *Mitra*, name of a god, liter., the friendly one]: originally the Persian god of light, who was afterward identified with the sun-god. As such he was the god of wisdom as well as of everything good, and overcame the demons of darkness and of evil. By degrees he became the chief god of the Persians, though in most ancient times he was not so reckoned. In Roman times his cult was introduced into Greece and Rome, chiefly through the pirates whom Pompey conquered. Mysteries were connected with the worship of Mithras. The intrant had to pass through eighty degrees of trial before he could be initiated into the mysteries. In numerous works of art Mithras is represented as a young man in Asiatic costume kneeling upon the back of a prostrate bull, whose head he pulls back with his left hand, while with his right he plunges a sword into the bull's breast.

J. R. S. Sterrett.

Mithrida'tes (in Gr. Μιθριδάτης): a Persian name common throughout the Orient. It was the name borne by

most of the kings of Pontus.—Mithridates I. (337–302 B. C.) submitted to Alexander the Great, and was killed by Antigonus.—Mithridates II. (302–266 B. C.) withstood the successors of Alexander, and increased the kingdom.—Mithridates III. fought the Gauls.—Mithridates IV. conquered and annexed Sinope.—Mithridates V., Euergetes (156–121 B. C.), received a great part of Phrygia from the Romans for service rendered in the third Punic war.—Mithridates VI., surnamed Eupator, or more generally The Great (121–63 B. C.), b. at Sinope, the capital of the kingdom, in 134 B. C.; succeeded his father in 121 B. C.; conquered during the first period of his reign the territories along the northern coast of the Euxine as far as Chersonesus Taurica; incorporated the kingdom of Bosporus farther to the W.; turned then to the countries S. of the Euxine, attacked Cappadocia and Bithynia, and met here with the Romans. Three wars ensued, known in the history of Rome as the Mithridatic wars—namely (1) 88–85 B. C.; (2) 83–82 B. C.; and (3) 74–66 B. C. They are fully described under Sulla, Lucullus, and Pompey, and ended with the complete defeat of Mithridates, who retreated behind the Euxine, and killed himself at Panticapæum, where he was besieged by his own son, Pharnaces, in 63 B. C. Nevertheless, the Romans considered him as the most formidable enemy the republic had ever had to contend with, and he was evidently a highly gifted man, both as a general and a statesman. He had received a Greek education and spoke twenty-two languages, and, although he was an Asiatic despot in all his measures and in his whole character, he had a fine taste for art and science. His collection of gems and his library of medical books were celebrated. See Reinach, *Mithridate Eupator* (Paris, 1890). J. R. S. Sterrett.

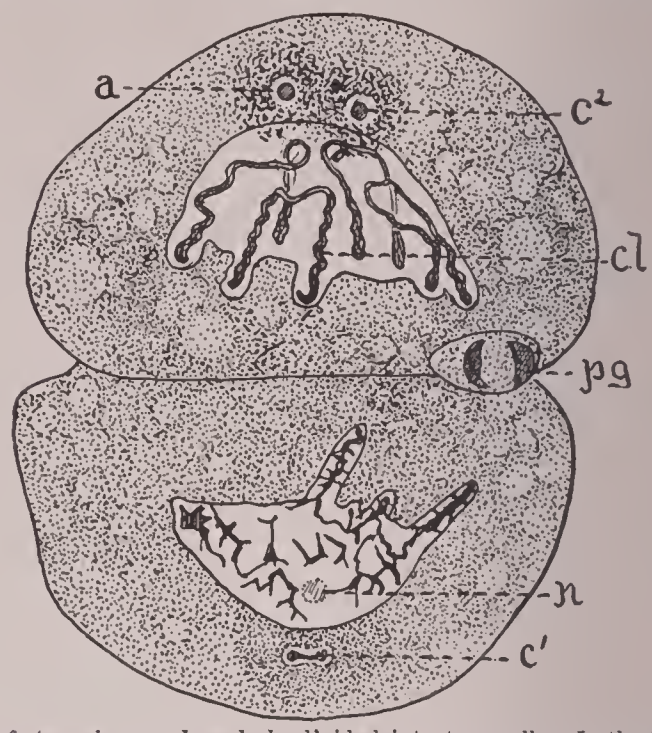
Mit'la, or **Mictlan'**: See Mexican Antiquities.

Mito: an old town and clan of Northern Japan; in the province of Hitachi and prefecture of Ibaraki (see map of Japan, ref. 6–E). The town lies 7 miles inland from the Pacific, and is five hours distant by rail from Tokio. The castle, a most picturesque spot, has not been dismantled, but the inclosure is now devoted to educational purposes. During the civil war of the restoration it was the scene of severe fighting, traces of which remain. Mito was ruled by a succession of able princes closely allied by blood to the Tokugawa shoguns, to whom they supplied regents in the case of a minority, and in some cases heirs, the last shogun, Keiki, being a son of the lord of Mito. It was and is a center of Confucianism and conservatism. A fine garden, constructed by Rekko, the most famous of its princes, is now the public garden; that formerly attached to the Mito residence in Tokio is the finest in the empire. Pop. 19,000. There are manufactures of cloth and household utensils.

J. M. Dixon.

Mito'sis: a term introduced by Flemming for indirect cell-division, called by Schleicher karyokinesis. In outline the process is as follows: Each cell of animal or plant (see Cell) consists of different kinds of protoplasm arranged in a subcentral *nucleus* and in extra-nuclear protoplasm or *cytoplasm*. Most characteristic of the nucleus is a peculiar substance known as chromatin, from the readiness with which it takes histological stains. This chromatin, in the resting nucleus in the shape of a network, is supported in a secondary network of non-stainable material, the *linin*, and the interstices of these networks are occupied by the nuclear fluid. In the cytoplasm there exists likewise a network of firmer material, in the meshes of which is more fluid material. Besides these two long-known portions, recent investigations have shown the existence in the cytoplasm of a distinct structure, the *pole-body* or *aster*. This consists of a central portion or *centrosome* surrounded by a clear space or *archoplasm*, and outside this a denser mass of granules, frequently arranged in a radiating manner around the centrosome, the whole presenting a starlike appearance, justifying the term aster.

In the ordinary or mitotic cell-division the aster apparently takes the initiative. Lying as it does on one side of the nucleus, it divides into two equal portions, each of which moves a quarter way around the nucleus until the new asters come to lie at opposite poles. At the same time the starlike appearance is being formed around each centrosome, while on one side the rays from the two stars intermingle, giving rise eventually to a spindle-shaped figure between the two. The appearance has well been compared to the "lines of force" exhibited by iron filings between the poles of a horseshoe magnet. In the meantime the nuclear structures are exhibiting changes. The network of chromatin becomes converted into a long filament which is coiled like a wreath. Then the filament becomes thickened, and finally it breaks into V-shaped loops, the number varying with different species. While this is going on the nuclear wall, separating the nucleus from the cytoplasm, breaks down, and at last the chromatin loops become ar-



Egg of *Ascaris megalocephala* divided into two cells. In the lower the nucleus is in the resting stage and the chromatin is irregularly distributed; the centrosome (c^1) is beginning to divide. In the upper cell the centrosome has divided, while the chromatin loops (*cl*) have formed. *a*, archoplasm; c^1 c^2, centrosomes; *cl*, chromatin loops; *n*, nucleolus; *pg*, polar globule.

ranged in a plane around the spindle. The next step is the equal division of the loops. Each splits lengthwise, the split beginning at the folded end. As it progresses one half of each loop moves along the threads of the spindle toward one centrosome, and the other half travels in a similar manner toward the other. When these loops have reached their respective poles, the spindle threads break and are withdrawn, while the loops unite again into a wreath, and then become modified into the nuclear network of the new nucleus. A new nuclear wall forms, and, after these steps are complete, a constriction appears in the cytoplasm which results in its division into two cells.

Recent investigations have shown this division by mitosis to be almost universal. The direct or amitotic division occurs comparatively rarely. In this case all the strange steps outlined above are lacking, the cell and its nucleus are simply drawn apart like so much plastic matter.

The meaning of mitosis has not yet been placed beyond a doubt. There is evidently some important function to be fulfilled by such a complicated process to bring about an equal division of the chromatin, and upon these phenomena several theories of Heredity (*q. v.*), notably that of Weismann, have been based. It is noticeable that amitosis takes place only in fully differentiated tissues. The literature of mitosis in the last two decades has reached enormous proportions. The most recent summary of our knowledge is to be found in O. Hertwig's *Die Zelle und die Gewebe* (Jena, 1893), where full references to the literature will be found.

J. S. Kingsley.

Mitrailleuse: See Machine and Rapid-fire Guns.

Mitre, mee'trā, Bartolomé: general, politician, journalist, and author; b. at Buenos Ayres, Argentine Republic, June 26, 1821. His father, a schoolmaster, educated him carefully, and before he was eighteen he began to make his mark in literature. The persecutions of Rosas forced the family to emigrate to Montevideo, where young Mitre served as an officer in the defense of the city during part of the "nine years' siege." The opposition to Argentine officers drove him in 1846 to Bolivia, where he was chief of staff to President Ballivian and director of a military school. After Ballivian's deposition (1847) he went to Peru, and thence to Chili; here he devoted himself to journalism. In 1851–52 he was banished to Peru for alleged complicity in revolts. He joined Urquiza in the campaign against Rosas, and took a prominent part in the battle of Monte Caseros (Feb.

3, 1852), when the dictator was overthrown. Urquiza, as the leader of the federalists, became president of the Argentine Confederation. Elected deputy, Mitre at once took the lead of the "unitarian" party, which aimed at the establishment of a strong central government and a free press, and through his influence Buenos Ayres set up a separate government (Sept. 11, 1852). Urquiza, at the head of the other states, made vain efforts to reduce Buenos Ayres to submission, and in 1859 appealed to arms. Mitre, then Minister of War for Buenos Ayres, took the field against him, and was defeated at the battle of Cepeda Oct. 23, 1859; Buenos Ayres was thus forced to re-enter the confederation. Mitre was immediately elected governor of the new state, and in this office he continued to resist Urquiza and his successor, Derqui. War again broke out, and on Sept. 17, 1861, Mitre defeated the federalist army of Urquiza at the battle of Pavon. The result was the dissolution of the old confederation. Elected president *ad interim*, Mitre called a constituent congress, which met at Buenos Ayres May 25, 1862, and adopted the present constitution of the Argentine Republic. Under it Mitre was duly elected president for six years in Oct., 1862. With him began an era of unparalleled prosperity. Paraguay having declared war on the Argentine in 1865, Mitre joined with Brazil and Uruguay in the triple alliance against that country, and until 1867 he commanded the allied forces. He was succeeded in the presidency (1868) by Sarmiento, who appointed him special envoy to Brazil. In 1874 he was again a presidential candidate, and, failing of election, headed a short-lived rebellion. Mitre was hardly less distinguished in literature than in politics. Besides poems, sketches, political writings, etc., he published two important historical works—the *Historia de Belgrano* (1857) and *Historia de San Martin* (3 vols., 1869). The latter, though in its inception a biography, is really a history of the war for independence in South America, and shows great research; an English abridged translation by Pilling bears the title *The Emancipation of South America* (London, 1892). In 1853 Mitre established at Buenos Ayres a daily newspaper, *La Nación*, which continued under his control, and is now the most important paper in South America. D. at Buenos Ayres, Jan., 1894. H. H. Smith.

Mitylene: See Lesbos.

Miv'art, St. George, F. R. S.: anatomist and zoölogist; b. in London, Nov. 30, 1827; was educated at Clapham Grammar School, King's College, London, and St. Mary's, Oscott. Although he studied law and was admitted to the bar in 1851, he devoted himself to science, and in 1862 became lecturer on Comparative Anatomy and Zoölogy at St. Mary's Medical School, London, a position he held until 1884. From 1874 to 1877 he was Professor of Biology at the Catholic University College, Kensington, and since 1890 he has been Professor of the Philosophy of Natural History at the University of Louvain, Belgium. Prof. Mivart has been vice-president of the Linnean and Zoölogical Societies of London, and has published many papers, chiefly anatomical, in the *Proceedings* and *Transactions* of these societies, and in the *Philosophical Transactions* of the Royal Society. Among his other works are *The Genesis of Species* (1870–71); *Lessons in Elementary Anatomy* (1872); *Man and Apes* (1873); *Contemporary Evolution* (1876); *The Cat, an Introduction to the Study of Back-boned Animals* (1881); *The Origin of Human Reason* (1889); *Monograph of the Canidæ* (1890); and *Types of Animal Life* (1893). He is widely known as an opponent of certain features of the Darwinian theory, denying that evolution is applicable to the human intellect. D. April 1, 1900. F. A. Lucas.

Mixed Mathematics: the application of mathematical principles to scientific investigations or to practical construction in the arts. The term is used in contradistinction to "pure mathematics," which is applied to the investigations of the purely scientific principles of mathematics.

Mixed Modes (in music): See Mode.

Mixes: See Indians of Central America.

Mizon, Lieut. L.: See the Appendix.

Mnemonics, nĕe-mon'iks [from Gr. *μνημονικός*, mnemonic, deriv. of *μνήμων*, mindful, remembering, deriv. of *μνήμη*, memory]: artificial systems intended to aid the memory. They were highly esteemed in antiquity, attracted much attention after the revival of learning, and still claim a share of popular interest. The systems depend on associations, usually of an artificial sort. The plan commonly used by the Greeks and Romans was to select a real or imaginary house, and impress on the mind the different rooms with their walls, windows, furniture, etc. In preparing a discourse each part (cf. the phrase "in the first place") was associated with a given room, and the subdivisions, etc., with the parts of the room; then the orator in delivering the discourse would imagine himself going through the rooms and seeing the parts with which he had associated his headings. Houses were also set apart for memory of different classes of facts, and symbols were "stored" up in them. Then the houses were combined to make a street or town. A different plan, approved by Winckelman and Leibnitz for the memory of dates, etc., is to associate letters with the numbers. The letters, usually consonants, corresponding to the numbers, are made into real or meaningless words by the addition of other letters, and the words are associated with the fact to be remembered. Thus if it be desired to remember that printing was invented about 1436, according to one system 1 = t, 4 = r, 3 = m, and 6 = g, and the combination *tremengous* can be formed and associated with printing because it was such an important discovery. Other systems consist of memorizing series of images, and especially memorial rhythms which are associated with the facts to be remembered. Or intermediate or additional associations, often of an absurd or startling character, are added. Systems of mnemonics will doubtless enable "the victims" to call up disconnected dates and facts which it might not otherwise be possible to remember; but it may well be doubted whether it be any advantage to keep such things in mind. There are some cases (e. g. the number of days in the months and the rhythm, "Thirty days hath September, April, June, and November") where an artificial aid may be worth the while, but the elaborate systems which have been proposed would seem to crowd the mind with useless furniture and interfere with logical and judicious memory. Bacon compared the feats of memory which can be performed by such systems with the exhibitions of rope-dancers, which may "cause admiration" but "can not be highly esteemed." True methods for cultivating the memory are logical ways of conceiving, classifying, and analyzing facts, and connecting them with central and permanent interests. J. McKeen Cattell.

Mnemotechnics [Gr. *μνήμη*, memory + *τέχνη*, art]: the art of memorizing, together with the artificial devices and systems for aiding the memory. Another and more common term is Mnemonics (*q. v.*).

Mnevis: the sacred ox or bull of Heliopolis, probably dedicated to the sun-god, Ra, as was the city (Strabo, xvii., i., 22, 27), or possibly to Osiris (Plutarch, *Isis*, § 33) as Osiris-Mnevis. His cult is supposed to have been similar to that of the Apis bull at Memphis (see Serapis), and to have furnished the prototype of the golden calf worshiped by Israel in the desert (Ex. xxxii.). See also Wilkinson, *Ancient Egyptians*, iii., 306–307. As to the color of the animal there is some uncertainty. Ancient authors speak of it as black, but on the basis of obscure inscriptions some suppose it to have been white. Charles R. Gillett.

Moa: supposed to have been the Maori name for the extinct gigantic birds of New Zealand, and now used as a common name for any species of Dinornis (*q. v.*).

Mo'abites [deriv. of *Moab*, from Heb. *Mō'ābh*]: descendants of Moab, the son of Lot by his eldest daughter (Gen. xix. 37). An idolatrous people, they were hostile to the Israelites, in spite of the relationship between them. The southern boundary of the Moabites was the brook Zered (the modern Wady el-Ahsy), which empties into the southeast corner of the Dead Sea. Their territory was about 20 miles from E. to W., and at one time extended as far N. (50 miles) as the mountains of Gilead. At the time of the Exodus they had lost about 30 miles of territory, having been driven S. of the Arnon by the Amorites. Subdued by David, they regained their independence after the dismemberment of the Hebrew kingdom, aided Nebuchadnezzar (604–561 B. C.) against the Jews (2 Kgs. xxiv. 2) and rejoiced in their overthrow (Ezek. xxv. 8–11; Zeph. ii. 8–10), which conduct induced the prophetic denunciations of Isaiah (xv., xvi., xxv. 10), Jeremiah (xxv. 21; xlviii.), and Amos (ii. 1–3), all of which were fulfilled, for they soon after disappear from history.

Moabite Stone, The: a stone or block which celebrated the achievements of one of the Moabite kings, Mesha (about 900 B. C.). It was of black basalt, 3 ft. 8½ in. high, 2 ft. 3½ in.

wide, and 1 ft. $1\frac{78}{100}$ in. thick, rounded at both ends, and inscribed with thirty-four lines of Hebrew-Phœnician writing. It was found Aug. 19, 1868, by the Rev. Mr. Klein at Dhiban (the ancient *Dibon*), just N. of the Arnon. Though broken to pieces afterward by the Arabs, six-sevenths of the inscription have been preserved, and two-thirds of the stone itself are now in London. This inscription proves that the Greeks added nothing to the alphabet which was brought to them from the East. The best edition of the text, with a translation and copious notes, is by Canon Driver in his *Notes on the Hebrew Text of the Books of Samuel, with an Introduction on Hebrew Palæography, and the Ancient Versions and Facsimiles of Inscriptions* (Oxford and New York, 1890, pp. lxxxiv.–xciv.). He thus translates it:

1. I am Mesha son of Chemoshmelek, king of Moab, the Da-
2. -ibonite. My father reigned over Moab for 30 years, and I reign-
3. -ed after my father. And I made this high place for Chemosh in QRHH, a high place of sal-
4. -vation, because he had saved me from all the kiugs (?), and because he had let me see my pleasure on all them that hated me. Omr-
5. -i was king over Israel, and he afflicted Moab for many days, because Chemosh was angry with his la-
6. -nd. And his son succeeded him; and he also said, I will afflict Moab. In my days said he th[us;]
7. but I saw my pleasure on him, and on his house, and Israel perished with an everlasting destruction. And Omri took possession of the [la-]
8. -nd of Mehedeba, and it (i. e. Israel) dwelt therein, during his days, and half his son's days, forty years; but [resto-]
9. -red it Chemosh in my days. And I built Baal-Meon, and I made in it the reservoir (?); and I built
10. Qiryathen. And the men of Gad had dwelt in the land of Ataroth from of old; and built for himself the king of I-
11. -srael Ataroth. And I fought against the city, and took it. And I slew all the [people of]
12. the city, a gazingstock unto Chemosh, and unto Moab. And I brought back (*or*, took captive) thence the altar-hearth of Davdoh (?), and I drag-
13. -ged it before Chemosh in Qeriyyoth. And I settled therein the men of SHRN, and the men of
14. MHRTH. And Chemosh said unto me, Go, take Nebo against Israel. And I
15. went by night, and fought against it from the break of dawn until noon. And I too-
16. -k it, and slew the whole of it, 7,000 men and . . . , and women, and . . . .
17. -s, and maid-servants: for I had devoted it to Ashtor-Chemosh. And I took thence the [ves-]
18. [-sels] of YAHWEH, and I dragged them before Chemosh. And the king of Israel had built
19. Yahaz, and abode in it, while he fought against me. But Chemosh drave him out from before me; and
20. I took of Moab 200 men, even all its chiefs; and I led them up against Yahaz, and took it
21. to add it unto Daibon. I built QRHH, the wall of Ye-arim (*or*, of the Woods) and the wall of
22. the Mound. And I built its gates, and I built its towers. And
23. I built the king's palace, aud I made the two reser[voirs (?) for wa]ter in the midst of
24. the city. And there was no cistern in the midst of the city, in QRHH. And I said to all the people, Make
25. you every man a cistern in his house. And I cut out the cutting for QRHH with the help of prisoner-
26. [-s of] Israel. I built Aroer, and I made the highway by the Arnon.
27. I built Beth-Bamoth, for it was pulled down. I built Bezer, for ruins
28. [had it become. And the chie]fs of Daibon were fifty, for all Daibon was obedient (to me). And I reign-
29. -ed [over] an hundred [chiefs] in the cities which I added to the land. And I buil-
30. -t Mehede[b]a and Beth-Diblathen, and Beth-Baal-Meon; and I took there the sheep-grazers (?),
31. . . . . sheep of the land. And as for Horonen, there dwelt therein . . . . and . . . .
32. . . . . Chemosh said unto me, Go down, fight against Horonen. And I went down . . . .
33. . . . . [and] Chemosh [resto]red it in my days. And I went up thence to . . . .
34. . . . . And I . . . .

Revised by S. M. JACKSON.

Moaviah: See OMMIADES.

Moberly: city; Randolph co., Mo. (for location of county, see map of Missouri, ref. 3–G); on the Mo., Kan. and Tex. and the Wabash railways: 130 miles E. by N. of Kansas City. 148 miles W. of St. Louis. It contains the division headquarters and machine-shops of the Wabash railway system, 2 vitrified pressed-brick plants, flour and planing mills, machinery repair-shops, foundry, agricultural-implement works, and ice-factory, and has a national bank and 2 daily and 4 other periodicals. Pop. (1890) 8,215; (1900) 8,012.

EDITOR OF "MONITOR."

Mobile: city (founded in 1702, capital of the province of Louisiana till 1720, captured from the English by the Spanish in 1780, occupied by the U. S. troops in 1813, incorporated as a city in 1819, area reduced and name changed to Port of Mobile in 1870, rights of municipal government restored in 1887); capital of Mobile co., Ala., and only port of entry in the State (for location, see map of Alabama, ref. 8–A). It is on the Mobile river near its entrance into Mobile Bay, and on the Louisv. and Nashv., the Southern, and the Mobile and Ohio railways; 30 miles N. of the Gulf of Mexico, 140 miles E. of New Orleans. The city is built on a sandy plain rising from the river's bank, and in the suburbs are several attractive hills on which are many costly residences. It has a newly constructed, city owned water-supply from Spring Hill, 7 miles distant, from Clear Creek, 11 miles distant, and from artesian wells, struck in 1892. A complete sewerage system was constructed in 1900. Modern quarantine protective measures have relieved the people from all apprehension of danger from yellow fever. The harbor, formerly very shallow, has been improved by the U. S. Government, and vessels drawing 23 feet of water are admitted to the city wharves. Mobile has an extensive export trade, particularly in cotton and naval stores, lumber, rosin, turpentine, iron, and coal, and Western foodstuffs, machinery, etc., and an import trade chiefly in tropical fruits, sisal grass, and wood. In the calendar year 1900 the value of exports was $14,095,029, and of imports $2,934,071. The census returns of 1890 showed that 229 manufacturing establishments (representing 51 industries) reported. These had a combined capital of $1,450,373; employed 2,331 persons; paid $857,660 for wages and $1,433,136 for materials; and had products valued at $2,872,017. The principal industry according to the amount of capital employed was the manufacture of lumber, which had 9 establishments and $564,910 capital, employed 703 persons, paid $220,594 for wages and $513,376 for materials, and had products valued at $937,499. Then followed printing and publishing, foundry and machine-shop products, saddlery and harness, flour and grist mill products, tobacco, and ship-building. Market-gardening has become an important industry, having an average annual product valued at $500,000. The city has 52 churches, a Jesuit college at Spring Hill, Roman Catholic academy at Summerville, 9 other Catholic schools, Barton Academy, Alabama Medical College, 3 libraries (Public and Bar) with about 30,000 volumes, 4 orphan asylums, U. S. Marine Hospital, a port hospital, Providence Infirmary, U. S. Government building, 2 State banks, with combined capital of $250,000, 2 national banks with capital of $550,000, and 3 daily and 12 weekly periodicals. Pop. (1890) 31,076; (1900) 38,469.

EDITOR OF "REGISTER."

Mobile River: a stream formed by the confluence of the Alabama and Tombigbee rivers. A few miles below the junction it divides into two branches, of which the eastern is called Tensas, and both branches subdivide into several others, which meet in a common embouchure at the head of Mobile Bay. The total length of the Mobile river proper is 50 miles. The city of Mobile is on its west bank.

Moccasin [Indian, Algonquian, *makisin*], or **Water-moccasin**: a very venomous serpent of the Southern U. S., found in swamps and wet places, and even in water. It is 2 feet long, dark brown above and gray beneath. Its bite is justly dreaded. Its scientific name is *Ancistrodon* (*Toxicophis*) *piscivorus*. The name moccasin is also given to the copperhead (*Ancistrodon contortrix*).

Moccasin Flower: See CYPRIPEDIUM.

Mo'cha: town; in the province of Yemen, Arabia; on the Red Sea, in lat. 13° 19′ N. (see map of Persia and Arabia, ref. 10–D). It has a good, strongly fortified harbor, and is the most celebrated coffee-market in the world. Mocha is a comparatively modern city, probably much later than the establishment of Islamism. It became rapidly important as the place of export of the coffees of Yemen, hence called Mocha coffee. The place has lost its importance and decayed, especially since the British took possession of Aden. Pop. about 5,000.

Revised by M. W. HARRINGTON.

Mocha-stone: See CHALCEDONY.

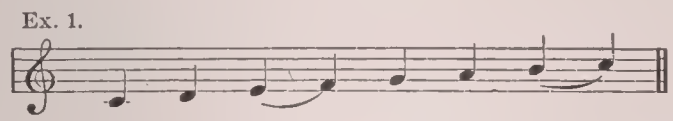
Mocking-bird: a singing-bird (*Mimus polyglottus*) of the family *Turdidæ*, found in the warmer parts of North America. Its general color is ashy brown above, white below, with the outer tail feathers and bases of primaries white. It is a rare summer visitant in the more Northern States. The mocking-bird is reputed to be the best American songbird. Besides its own delightful song, it imitates the notes of most other birds. It readily learns to whistle tunes, but not to talk. The mocking-bird bears confinement well, especially if taken when young from the nest. Its song in the cage is often superior to that of the wild bird, but the

bird often becomes a nuisance from its persistent utterance of loud whistling notes. Revised by F. A. Lucas.

Mode, or **Mood**: See Verb.

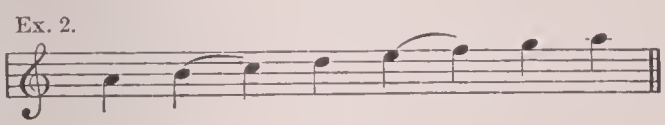
Mode [viâ O. Fr. from Lat. *mo'dus*, measure, due measure, manner, mode, rhythm, melody]: in modern music, a certain scheme or arrangement of sounds in direct order from low to high, or *vice versa*, under which they are recognized by the ear as forming a complete and conclusive series extending over eight degrees, and having a distinctly marked beginning, progress, and ending. If the eight principal sounds comprised in the octave were *equidistant*, there could be only one such mode or system, inasmuch as a series of notes commencing on D or E, etc., would differ only in point of pitch (not in quality) from another series commencing on B or C; but as it is, we find in the octave five whole tones and two *semi*-tones; and it is also essential that these tones and semitones shall fall into a certain order to render the scale available in modern music. That order may be twofold—viz., major and minor—and these two forms of scales constitute the two *modes* now in use, the third above the tonic being in the one case major, and in the other minor. The pattern scale of the *major* mode, with the places of its two smaller intervals or semitones marked by slurs, is given in Ex. 1:

Ex. 1.



From no other starting-point but C can such a scale be formed by the use of the natural notes or intervals, inasmuch as the relative positions of the two semitones between the third and fourth and the seventh and eighth could not be preserved if we should begin on D, E, F, or any other degree of the scale. A scale in this mode may, however, be founded on any other degree by the use of such sharps or flats as may be found necessary to raise or lower the incorrect intervals, and thus bring them into conformity with the normal scale of C. (See Transposition.) The pattern scale of the *minor* mode (that of A), with the peculiar position of its two semitones, is shown in Ex. 2:

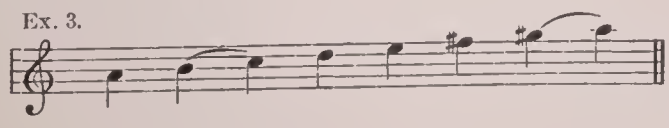
Ex. 2.



A scale such as this also can be formed from the natural notes only by beginning on A. But (as in the major mode) it may take its rise from any other degree of the scale by using the necessary sharps or flats to bring its intervals into correspondence with the model.

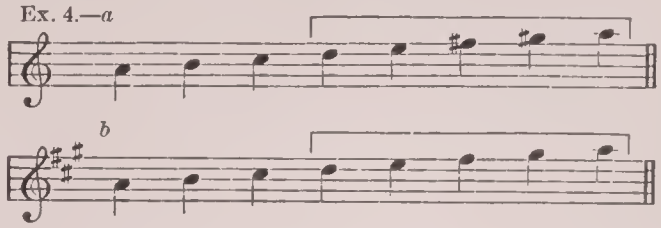
The distinction between the two modes springs chiefly from the dissimilarity of the respective thirds, sixths, and sevenths, which are all (in their natural or original form) one semitone greater in the major than in the minor mode. These intervals are therefore the characteristic and essential elements of the modes when those modes are viewed in their simple and normal condition. In the minor mode there is a certain peculiarity which does not appertain to the major—viz., a difference between the ascending and the descending scale—and also an indeterminate or equivocal quality in the sixth and seventh of the scale which is too subtle to be regulated by any fixed rule. In the ascending scale (see Ex. 2) it will be observed that the seventh is *minor*, and for that reason can not be a true and satisfactory "leading note" to the octave above. The interval of a whole tone thus existing between the seventh and the eighth is disappointing and repulsive to the cultivated ear, and especially so in final cadences. To obviate this, it becomes necessary to bring the seventh one semitone nearer to the octave by means of a sharp, thereby constituting it a leading note similar to that of the major mode. By this process we create a new difficulty by widening the distance between the *sixth* and the seventh into the interval of an augmented second. This also admits of adjustment by raising the sixth also a semitone, which places it now midway between the fifth and the seventh. With these modifications the ascending minor scale of A will stand as in Ex. 3:

Ex. 3.



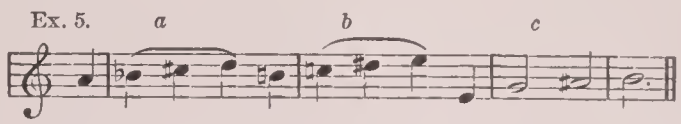
It is a valid objection, however, to this sharping of the *sixth* that it renders the upper part of the minor scale identical with that of the major; for it is evident that by such a process every trace of a distinctively minor mode is obliterated. On comparing the altered minor scale at *a*, in Ex. 4, with the major scale at *b*, it will be seen that *from the fourth upward* there is no difference whatever:

Ex. 4.—*a*



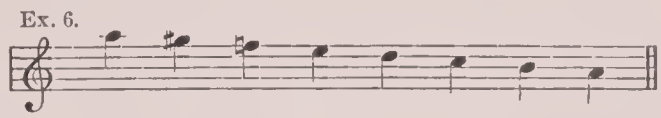
For this reason composers of instrumental music often prefer the use of the natural to the sharped sixth; and this not only when the progression of the melody turns *downward* from the sixth, but also when it *ascends* to the sharped seventh and the octave. Some illustrations of this are given at *a*, *b*, and *c* in Ex. 5:

Ex. 5.



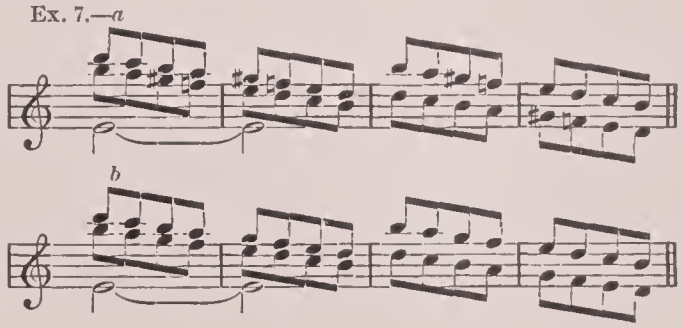
A similar difference of opinion and practice prevails also in regard to the *descending* scale in the minor mode. Ordinarily, the seventh and sixth are taken in their natural form—i. e. unchanged by sharps, etc.; but frequently the progression by the sharped seventh and the *natural* sixth is preferred, and in numerous cases is even imperative. In this form, as shown in Ex. 6, one of the strongest characteristic intervals of the mode is preserved—viz., the somber and plaintive effect of the sixth:

Ex. 6.



In this form of the descending minor scale a singularly beautiful effect is produced by a chain of thirds or sixths, as at *a* in Ex. 7, while no such effect is observable when the same movement is taken on the natural notes of the scale, as at *b*:

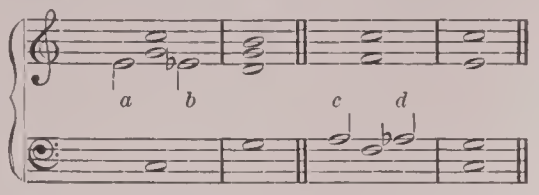
Ex. 7.—*a*



Mixed Modes.—In modern music much of the variety and beauty of the harmony often arises from the mingling of chords belonging to one of the modes with the regular progressions of a composition written in the other. This occurs most frequently when in the course of a piece in the *major* mode certain harmonies are borrowed from the corresponding *minor*, and are substituted for those which would naturally occur. By a skillful use of this device many of the most striking and expressive traits of the minor mode may be transferred and incorporated into the major mode, thereby enriching that mode with new and singularly beautiful effects, and also surprising the ear by a train of unexpected and graceful turns of the harmony, such as could not be produced by the ordinary progressions of either of the modes exclusively. The chief characteristic intervals of the modes are the third and sixth, with the diminished seventh of the minor. Those belonging to the *minor*, when judiciously transferred into music of the major mode, as passing harmonies, not implying or leading into other keys, give a new interest and coloring even to very commonplace ideas, and are also the source of the grandest as well as the most elegant and pathetic developments of modern musical art. In its simplest form this mixing of

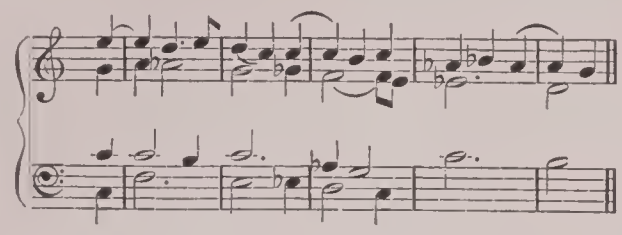
modes occurs when, for instance, we change the *major* triad of the tonic or subdominant into the corresponding *minor*. Thus in Ex. 1 the tonic triad of C major at *a* is exchanged at *b* for the tonic triad of C minor; and at *c* and *d* a similar change takes place with the subdominant triad:

Ex. 1.



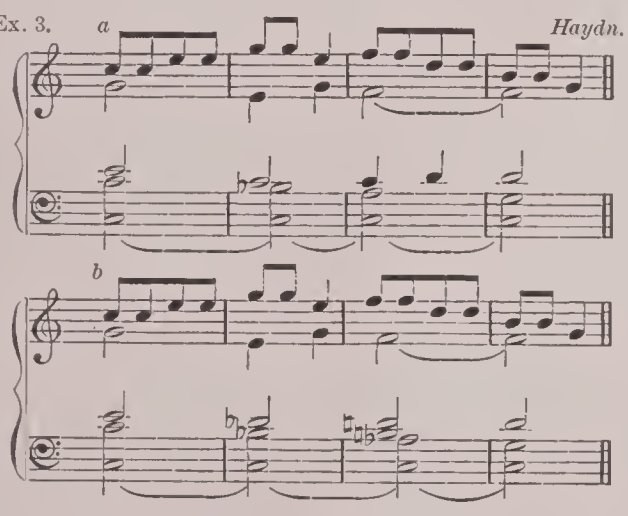
It is quite evident here that the harmony at *a* and *c* belongs to the scale or key of C *major*, while that at *b* and *d* is derived from C *minor*. On the same principle are to be interpreted such progressions as those in Ex. 2, where several intervals of one mode are exchanged for those of the other (major yielding to minor), as indicated by the accidental flats. N. B.—By *omitting* all the flats, the example will be reduced to a simple major harmony, and may be so played:

Ex. 2.



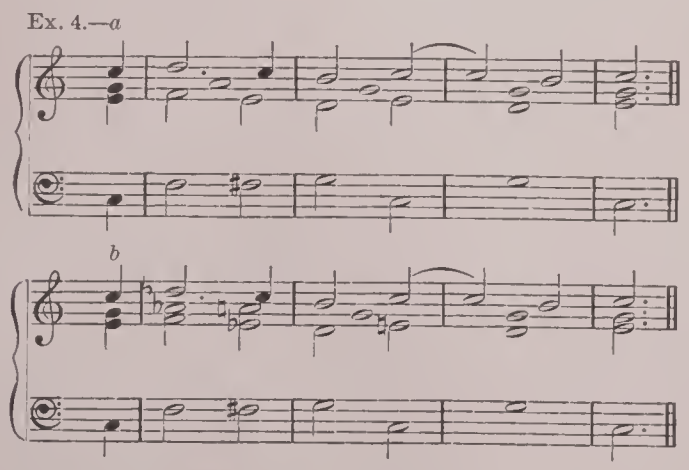
The superior richness of effect thus obtained by the mixture of modes will be still better apprehended by comparing the plain harmony of Ex. 3 at *a* with that at *b*, where two diminished sevenths are borrowed from the minor scales of F and C:

Ex. 3.



Compare also the passage at *a* in Ex. 4 with the harmony given at *b*, the mysterious beauty of which latter arises altogether from the adoption of two chords (in the first full bar) belonging to foreign scales:

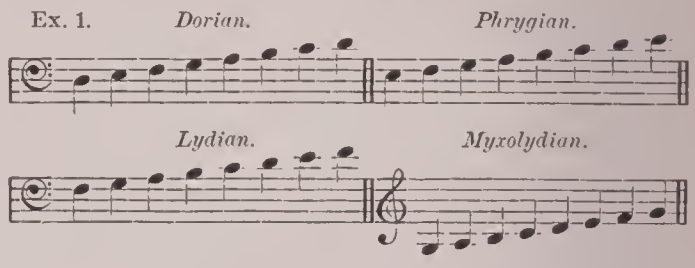
Ex. 4.—*a*



Ecclesiastical Modes are those on which, for many ages, the music of the Church was founded. Each of these scales consisted of five tones and two semitones in the octave, as in the modern diatonic scale. The notes, however, were taken in their natural order (i. e. without flats or sharps) from whatever degree of the scale the series might begin. The relative position of the two semitones to the five tones would therefore differ very much in the various scales, and music written in one scale could not be transposed to another without the loss of most of its distinguishing features. A scale beginning on C, for instance, was quite different in structure from another beginning on D or E, etc. There were, in reality, as many modes as there were scales; and with one exception they were unlike either the major or minor modes of our modern system. Each scale had its own peculiarity of form, and from that form resulted a certain quality or effect—solemn, tranquil, joyous, or plaintive—which constituted its special characteristic.

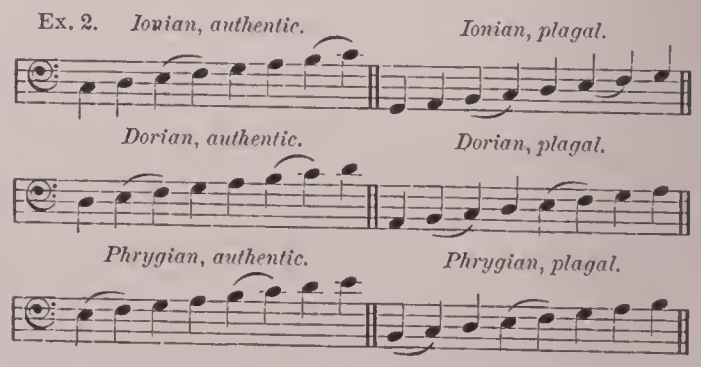
The ancient Greeks, amid their confused, bewildering, and almost unintelligible speculations concerning musical intervals and their mathematical proportions, finally classified or arranged them in these several species of octaves now called "modes." At first there appear to have been only four, and these were for the most part named after the nations to which their origin was referred. These four modes were the Dorian, Phrygian, Lydian, and Myxolydian (or mixed Lydian). The first of these began on D of the scale, the second on E, the third on F, and the fourth on G; and their scales were as in Ex. 1, with a semitone in every case falling between E and F and between B and C.

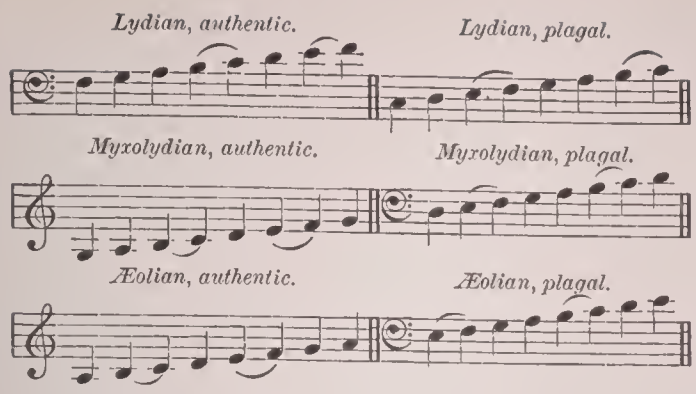
Ex. 1.



To these four modes were added by the Greeks two others called the Ionian and the Æolian, and subsequently the Hypo-Dorian (from ὑπό, below), the Hypo-Phrygian, Hypo-Lydian, Hypo-Myxolydian, Hypo-Ionian, and Hypo-Æolian, making in all twelve modes by *name*, though (as will be seen presently) several of them appear to be only duplicates. Of these modes, St. Ambrose in the fourth century selected the original four for use in the Church—viz., the Dorian, Phrygian, Lydian, and Myxolydian. And, as the plain-chant or *canto-fermo* in the early ages seldom exceeded a fourth or fifth in its compass or range of inflection, the limits of these scales were held to be sufficient for all the psalmody and liturgical demands of public worship. Eventually, however, the Church melodies were extended so as to embrace the remaining degrees of the octave, and in the course of time they assumed a character so nearly resembling what was afterward called the "florid style" as to require much more space than that afforded by the narrow bounds of the recognized modes. This led to the introduction by St. Gregory (200 years after St. Ambrose) of the other modes above mentioned, though with some modifications and under a different nomenclature. The old modes, including also the Ionian and Æolian, were called "authentic," or principal, while the added modes were styled "plagal," or subordinate: and on these twelve modes (or those most approved) the chants and other music of the Church were written. Hence the rise of the well-known "Gregorian tones" or chants, eight in number. These were short strains consisting of intonations (or introductory notes), reciting notes, mediations, cadences, and usually several terminations or "endings." The plagal modes always began on the fourth below the corresponding authentic, as if three notes below were added to the authentic, and the three upper ones omitted. In Ex. 2 all these modes, both authentic and plagal, are exhibited, and the different places of the semitones are marked, as before, by slurs:

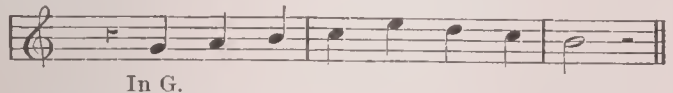
Ex. 2.



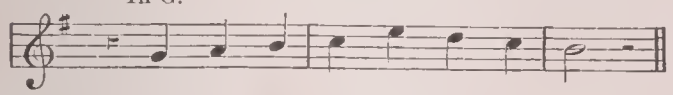


On noticing this example critically, it will be seen that several of the plagal scales are apparently mere duplicates of some of the authentic. Thus the Lydian plagal and the Ionian authentic are the same in *notes*, as are also the Myxolydian plagal and the Dorian authentic. It is not to be presumed, however, that these scales are in all respects identical. There is a probability, at least, that the Greeks made use of some kind of *temperament*, by which certain intervals of these similar scales were so far modified as to give them a special coloring or effect, and thus enable any one to recognize in them a real distinction. It is known also that the melodies, cadences, and general mode of treatment proper to the plagal were not also considered appropriate to the authentic; and thus a difference might exist, though the notes were in other respects the same. This may perhaps be better understood by observing that something similar often occurs even in modern music, an illustration of which is given in Ex. 3, where the *same train of notes* will be found to suggest different ideas, according as the notes are regarded as belonging to the key of C or that of G:

Ex. 3. In C.

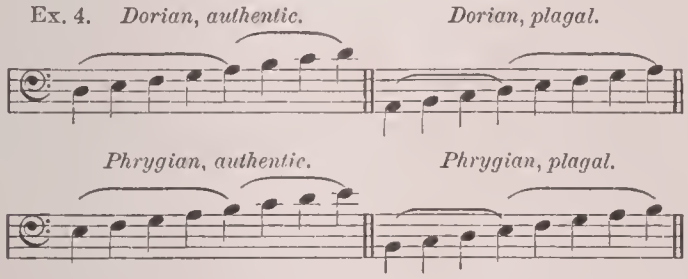


In G.



There is also a further point of difference between authentic and plagal modes, which are alike in notes. Each mode was treated by the ancients as consisting of two parts or divisions, the lower and the upper. In the authentic, the lower division comprehended five degrees of the scale, and the remainder (beginning on the fifth) formed the upper division; but in the plagal the case was reversed—the lower division comprising only four degrees, while the upper (commencing on the fourth) contained five. The difference is shown in Ex. 4, where the divisions in two of the modes are marked by strokes:

Ex. 4. *Dorian, authentic.* *Dorian, plagal.*



From this it will be evident that the whole course of a melody in a plagal mode would give an impression essentially different from one in an authentic mode, even though the two should coincide in notes, and seem to form one and the same scale.

In some of the modes it was found expedient to correct the imperfection of the fourth and fifth by the use of an accidental flat or sharp. In Gregorian music the *flat* is often expressly written in cases where the note requires it; but it is probable that the *sharp* was in many cases used, though not actually written. See Grove's *Dictionary of Music and Musicians.* Revised by DUDLEY BUCK.

Mo'dena (anc. *Mutina*): a large town of Northern Italy, capital of the former duchy of Modena, which embraced the territory between Venetian Lombardy, the Pontifical States, Tuscany, and the Mediterranean, and the duchy of Parma and the kingdom of Sardinia (see map of Italy, ref. 3–D). The town itself, situated in lat. 44° 38′ N., lon. 10° 56′ E., lies in a low, moist, but healthful and fertile plain between the Secchia and the Panaro, with which rivers it is connected by canals. It is connected by canal with the Po and the Adriatic also. From the ramparts, now converted into a public promenade, the views are fine; the city itself is well built and the streets and squares are spacious. The Duomo was begun in 1099; adjoining it is the famous tower La Ghirlandina, 315 feet in height. The ducal palace, a vast and grand mediæval edifice, contains a picture-gallery with many fine works by the best Italian masters; a library of 90,000 volumes and 3,000 MSS.; a museum with 26,000 ancient medals; also archives of the greatest interest. Modena boasts many learned societies, and is conspicuous for her educational and charitable institutions. The university, founded in 1678, has nearly 300 students. There are manufactures of leather, silk, vinegar, and cast metals, and a large trade in agricultural produce. The history of this town may be traced to 200 B. C. Mark Antony besieged it without success. Cicero names it as one of the most splendid of the Roman cities. In the reign of Constantine it began to decline, and so rapidly that St. Ambrose in 387 speaks of it as "but the corpse of a city." Its mediæval history is stormy and changeful. In 1288 the Marquis Obizzo d'Este became ruler of Modena, and in 1291 also lord of Reggio. From this time, with a few brief intervals, the house of Este, in one or another of its branches, governed Modena and its dependencies until 1859. Among the most distinguished of its dukes should be mentioned Borso (1452), afterward also Duke of Ferrara, a true friend of peace and of the people; Alphonso I. (1476), a man of great genius and valor and the patron of Ariosto; Alphonso II., a brilliant and magnificent prince, whose court was made illustrious by the poet Tasso. Modena formed a part of the Cisalpine republic, but in 1814 was restored to Francis IV., who in 1831 dishonored himself by his faithlessness in the terrible affair of Ciro Menotti. Francis V. was driven out by his subjects in 1848, restored soon after by Austria, and obliged to fly a second time in 1859, soon after which Modena by a popular vote was annexed to the kingdom of Italy. Pop. (1892) 64,500.

Modes'to: town (founded in 1870); capital of Stanislaus co., Cal. (for location of county, see map of California, ref. 7–D); on Tuolumne river, and S. Pacific Railroad; 30 miles S. E. of Stockton. It is in an agricultural, wool-growing, and fruit-raising region, and in the center of the Modesto and Turlock irrigation district of 250,000 acres; contains 7 churches, gas and electric-light plants, a national bank with capital of $100,000, a State bank with capital of $175,000, and a savings-bank with capital of $20,000, and 2 daily and 3 weekly newspapers; and has manufactories of agricultural implements. Pop. (1890) 2,402; (1900) 2,024.

Modesty and Bashfulness: See the Appendix.

Mod'ica (*Sar Mohac, Motycat, Motuca*): a large town in the province of Syracuse, Sicily: in a fruitful valley surrounded by lofty hills; about 20 miles W. S. W. of Noto and about 10 miles from the sea (see map of Italy, ref. 10–F). The streets are narrow, but the buildings are good, and among them are some fine churches, a municipal palace, and a strong castle. The trade here is considerable, and the exports are wheat, barley, olive oil, hemp, etc. The chief interest of Modica for the traveler, however, consists in the remains of a troglodyte city not far distant in the direction of Spaccaforno. Pop. about 38,400.

Modjes'ka, HELENA: actress; b. in Cracow, Poland, Oct. 12, 1844. Her father was Michael Opido, a cultured man, who gave lessons in music. She manifested at an early age a taste for the stage, but did not adopt the profession, on account of family opposition. When seventeen years old she married Modrzejewska, a Government official in Cracow. When she went on the stage in the U. S. she abbreviated her name to Modjeska. In 1862 she made her first appearance in an amateur performance at Bochnia, a little town in Austrian Poland. Her success was such that a small company was organized, and, assisted by her younger sister, she played at the Government theater in Lemberg, Czernowce, and towns in Galicia. She returned to Cracow in 1865, and became the leading lady in the theater in that city. She received offers to play in France and Germany; the younger Dumas personally inviting her to appear in Paris as Marguerite Gautier in his *Dame aux Camélias.* She refused, preferring to remain in Poland. After her first husband's death, she married in Sept., 1868, Charles Bozenta Chlapowski. In Warsaw she played the heroines in the principal plays of Shakspeare, Goethe, Schiller, and Molière, and in new Polish dramas. She remained seven years in that city, and her repertory in her native tongue comprised 284 parts.

She left the stage in 1876 and went to the U. S., settling near Los Angeles, Cal., where she hoped to found a Polish colony. After studying English for a few months, she made her first appearance in the California theater, San Francisco, in 1877, as Adrienne Lecouvreur. Her success was immediate. She has since made a number of tours throughout the U. S. and in England, and also has visited Poland professionally. Beatrice, Imogen, Juliet, and Rosalind are her favorite Shakspearean characters, but she has achieved distinction as Mary Stuart and Camille. B. B. VALLENTINE.

Modulation [from Lat. *modula'tio*, deriv. of *modula'ri*, measure, regulate, modulate, deriv. of *mo'dulus*, dimin. of *mo'dus*, mode]: in music, the process by which, in any part of a composition, a transition is made from one key to another. Every piece of music, if regular, is written in some particular key, and to this several others are so nearly related that short excursions may be made into them from the original key. From a *major* key we may thus proceed to the keys of its dominant, subdominant, relative minor, and the relative minors of the dominant and subdominant —i. e. from the key of C major, for instance, we may proceed to the keys of G, F, A, E, and D, and from a *minor* key we may pass to the keys of its dominant and subdominant, its relative major, and the relative major of its dominant and subdominant; i. e. in the key of A minor we may modulate to the keys of E, D, C, G, and F. It is to be observed, also, that a transition may be made into any of these nearly related keys by the intervention of a single chord—viz., that containing the leading note and dominant of the new key. Transitions of this kind, being simple and easily effected, constitute what is called *natural* modulation. *Abrupt* modulation occurs when a transition is made into some more remote key, as from C major to A♭; or by a sudden change of the mode, as from C major to C minor, A minor to A major, etc. *Enharmonic* modulation takes place when one and the same note (with the harmony dependent upon it) is treated as equivocal or having two distinct relations, and therefore capable of progression in two entirely different directions. This occurs, for instance, when F♮ is assumed to be E♯, or when B♭ is regarded as A♯, and a transition is unexpectedly made in accordance with the *latter*, instead of the former quality of the note or chord. The modern tendency is toward remote modulation, and our ears have become so accustomed to it that much which would have horrified the composers and auditors before Beethoven's day is now accepted by us as only a mild and gentle stimulant. It is certain, however, that modulation should not be introduced *simply for the sake of modulating*, but for the purpose of illustrating some new phase of thought or emotion. To render this effective implies that the key of the piece should previously have become well defined and settled to the ear before such modulation is introduced. Otherwise the effect produced will be that of a restless uncertainty as to key and tonality. As "it is a poor rule that will not work both ways," the restlessness referred to might be exactly the purpose of the composer. Shifting modulations would then constitute the best means to that end. The student will find an admirable illustration of this idea in the first scene in Wagner's *Tannhäuser*. Revised by DUDLEY BUCK.

Module: in architecture, one-half the lower diameter of the column used as a scale of dimension for all the various parts of a classic order. The Italian architects of the middle of the sixteenth century, especially Vignola and Palladio, and later Scamozzi, sought to establish an exact canon of proportion and form for every detail of the five classic orders, based on comparative measurements of antique Roman examples. The *module* was taken as the unit, and divided into "minutes" or "parts"; twelve in the Tuscan and Doric orders, and eighteen in the Ionic, Corinthian, and composite; or, according to Sir William Chambers, into thirty minutes for all the orders. The height, projection, and thickness of every part of each order were specified in minutes and modules. This highly artificial system of proportions has never prevailed to any great extent outside of the text-books, though sometimes employed in detailed comparisons of different examples of the orders. See ARCHITECTURE and ORDERS OF ARCHITECTURE. A. D. F. H.

Modulus: See LOGARITHMS and IMAGINARY QUANTITIES.

Modulus of Elasticity: a constant number expressing a certain quality of an elastic solid. If a force is applied to elongate a bar of any material whose cross-section is 1, and whose length is L, the amount of elongation will depend upon the nature of the material and upon the intensity of the force. If the applied force is not too great, the bar will recover its original length when the force ceases to act; and the greatest strain to which a bar may be thus subjected and recover its original length is called the limit of the body's elasticity. If we denote the total elongation of the bar in question when acted upon by a force W, within the limit of the body's elasticity, by l, we shall have the relation

$$W = \frac{l}{L} \times E, \text{ or } E = \frac{WL}{l},$$

in which E is constant for each particular material; this constant is called the *modulus of elasticity*. See Mahan's *Civil Engineering*, Appendix, note D.

Moe, mō, JØRGEN ENGEBRETSEN: poet, folk-lorist, and clergyman; b. in the district of Ringerike, Norway, Apr. 22, 1813; received his first education in a public school, and was then privately prepared for the university. While receiving this tuition he gained the friendship of P. C. Asbjörnsen (see ASBJÖRNSEN, PETER CHRISTIAN), a friendship that was to be of the greatest importance not only for these two men personally, but for Norwegian literature and the study of folk-lore as well. Moe studied divinity at the university, graduated in 1839, and, after teaching school and preaching in different parts of Norway, was in 1875 appointed bishop of the diocese of Christiansand. Among his poems (*Digte*, 1850; 2d ed. 1856) are some of the most popular Norwegian romances and ballads. *I Brønden og i Kjærnet* (In the Well and in the Tarn, 1851) contains some exquisite stories for little children. Moe's chief importance lies in his activity as a gatherer and reteller of popular fairy tales. Moe made several journeys into the country to gather popular tales, first in 1835, then every year from 1841 to 1852. The full appreciation of the scientific and national value of these treasures that had been hidden among the people was only gained by Moe after he had seen the famous collection of the Grimm brothers. In 1842 he published, together with P. C. Asbjörnsen, the first installment of *Norske Folkeeventyr, samlede ved P. C. Asbjörnsen og Jørgen Moe* (1842–44; 2d ed., with a scientific introduction by Moe, 1852; 5th ed. 1874; translated by George Webbe Dasent, *Popular Tales from the Norse*, Edinburgh and New York, 1859; 3d ed. 1888). Of the sixty tales contained in the second edition of this book, thirty-one are by Moe. The influence these popular tales have had on Norwegian language, literature, and art, can hardly be overestimated; thus the present Norwegianizing of the language dates from the appearance of their work. Moe's *Samlede Skrifter* (Complete Writings) were published in two volumes by his son, Moltke Moe, in 1877. D. in Christiansand, Mar. 27, 1882. P. GROTH.

Moebius, PAUL JULIUS, M. D.: neurologist; b. at Leipzig, Germany, Jan. 24, 1853; studied medicine in the Universities of Leipzig, Jena, and Marburg, graduating M. D. from the former in 1876; in 1883 was appointed docent in his *alma mater*. He has given special attention to nervous diseases. He has been associate editor of *Schmidt's Jahrbücher* since 1885. Among his published works are *Die Nervosität* (Leipzig, 1882); *Allgemeine Diagnostik der Nervenkrankheiten* (Leipzig, 1886). S. T. ARMSTRONG.

Mö'en: an island of Denmark, in the Baltic Sea; separated from Seeland by Ulfsund, and from Falster by Grönsund. Area, 84 sq. miles. Pop. about 13,000. It is one of the most fertile and (on account of its elevated and diversified surface) one of the most beautiful of the Danish islands, presenting a row of bold bluffs toward the Baltic. Principal town, Stege.

Moeris [*Meri*, the lake, or *Mer-ur*, great lake, in the Paiom = Fayum, the lake]: an artificial reservoir covering 63 sq. miles, at the entrance (S. E.) of the Fayum region, in Egypt, constructed by Amenemha III. of the twelfth dynasty. By the ancients the construction was attributed to a king to whom the name Moeris was given. The lake can not be identified with the Birket el-Kurûn, the existing natural lake at the N. W. of the district, because the latter's low level (200 feet below the entrance through the Libyan Hills) would have rendered it useless for its purpose. It was employed for the storage of water in time of high Nile, for purposes of irrigation. Its destruction was due simply to the natural decay of the retaining embankments through lack of care. The region was explored and the line of embankments traced by Linant Bey (*Mémoire sur le lac Moeris*, 1843, and *Mémoires sur les principaux*

travaux d'utilité publique, pp. 47–88; Lepsius, *Letters from Egypt*, p. 92), and they are still to be seen. For ancient descriptions, see Herodotus (ii., 149 f.), Diodorus (i., 52), Strabo (xvii., i., 37), and Pliny (*Nat. Hist.*, v., 9, 50; xxxvii., 12, 76). These writers, however, do not agree with one another, and all their statements can not be true. Remnants of the two pyramids mentioned by Herodotus have been discovered in recent times. CHARLES R. GILLETT.

Mœ'sia: province of the Roman empire, corresponding to the present Bulgaria and Servia; bounded N. by the Danube, E. by the Black Sea, S. by the Hæmus (Balkan Mountains), and W. by the Save. Originally it was inhabited by tribes of Thracian race, with whom the Romans came in contact after the conquest of Macedonia, but it was not made a Roman province until the time of Augustus. It was then divided into Mœsia Inferior (Bulgaria) and Superior (Servia), fortifications were constructed along the Danube, and several Roman settlements were formed. Among its towns the most remarkable were Tomi on the Black Sea, whither Ovid was banished; Durostorum (Silistria) on the Danube; and Singidunum near the present Belgrade. In 250 A. D. began the invasions of the Goths, and in 395 several Gothic tribes settled in the country and received the names of Mœso-Goths. The country remained a province of the East Roman or Byzantine empire until, in the seventh century, the Slavonians and Bulgarians entered it and formed the kingdoms of Servia and Bulgaria.

Mœso-Goths: See ULFILA.

Moffat, ROBERT: missionary; b. at Ormiston, Scotland, Dec. 21, 1795; was by occupation a gardener; went to South Africa as a missionary in 1816, and passed fifty-four years in successful labors among the Bechuanas and other barbarous tribes, into whose languages he translated portions of the Bible, hymn-books, and other religious books. He published in 1842 *Labors and Scenes in South Africa*. He returned to England to live in 1870. A testimonial, amounting to £5,800, was presented to the venerable missionary in 1873, in recognition of his lifelong labors. D. at Leigh, Kent, Aug. 9, 1883. The wife of the explorer Dr. Livingstone was a daughter of Mr. Moffat. See J. S. Moffat, *Lives of Robert and Mary Moffat* (1885).

Mogador, or **Suera**: town of Morocco, on the Atlantic; about 130 miles W. of the city of Morocco (see map of Africa, ref. 2–B). It is regularly laid out and well built, and has an excellent harbor. It has extensive exports of wool, gum, wax, hides, gold-dust, feathers, and almonds. Pop. about 15,000, half of whom are Jews.

Moghilev: government of Russia; situated on the Dnieper, between lat. 52° and 55° N. Area, 18,551 sq. miles. The surface is a level or slightly undulating plain, of an elevation of from 600 to 900 feet, forming the watershed between the Dnieper and the Dwina; the soil is very fertile and the climate mild. Of the whole area, nearly one-half (46 per cent.) is under crops; nevertheless, considerable quantities of grain are usually imported, on account of the immense consumption of the distilleries. Grain, timber (especially masts), and cattle are largely produced, and carried on the Dnieper to the ports of the Black Sea. The cultivation of hemp is very important; hemp and hemp-seed oil are exported to Riga. Pop. (1897) 1,707,613.

Moghilev: capital of the government of Moghilev, Russia; on the Dnieper (see map of Russia, ref. 7–C). It is a handsome and well-built town, the see of a Greek bishop and a Roman Catholic archbishop, and the residence of many of the Russian nobility. It has many good educational institutions, several manufactures, and a lively export trade in grain, hides, leather, wax, and honey through the ports of the Baltic and those of the Black Sea. The preparation of skins is an old and famous industry of the place. Its cathedral, built in 1780, is a very fine building. Pop. (1897) 43,106, of whom two-thirds are Jews and the rest White Russians.

Moghilev: town in the government of Podolia, Russia; on the Dniester; 190 miles N. W. of Odessa (see map of Russia, ref. 9–B). It is a beautifully situated and thriving town, with about 18,500 inhabitants, of whom nearly one-half are Jews and the rest Little Russians. Grain, wine, spirits, timber, etc., are bought in Galicia and sold in Odessa, and manufactured goods are imported from Austria and sent to the interior of Russia. The Little Russians are mostly occupied with agriculture, gardening, wine-making, and mulberry-culture.

Mo'gul, Moghul, or **Mughal** [a corruption of Mongol]: the name generally applied by Europeans to members of that Mohammedan dynasty of Mongol descent which in the sixteenth century established itself in Hindustan under Baber, a descendant in a direct line from Timour or Tamerlane, and which here founded a great and powerful empire. The most remarkable of the rulers of this dynasty were Akbar (1556–1605), Jehangir (1605–27), and Aurungzebe (1658–1707), during which period the empire comprised almost the whole of Hindustan. In Europe these monarchs were generally known under the name of the *Great Mogul*, and the most extravagant stories of their riches and power were current. Their magnificence became proverbial, and hints at their wealth and splendor are frequent in all comic writers of that period of European literature. The title used by themselves was the Persian *shah*, and Persian was the official language. After the death of Aurungzebe the power of the dynasty rapidly declined, and at the beginning of the nineteenth century the Mogul empire was but a shadow of itself. When the British conquered India they gave the rulers of this dynasty a pension, but after the rebellion of 1857, in which it was implicated, the last Great Mogul was banished to Rangoon.

Mohacs, mō-haach': town of Southern Hungary, on the Danube; 37 miles by rail E. S. E. of Fünfkirchen (see map of Austria-Hungary, ref. 8–G); the center of a considerable trade in cattle, grain, wine, and other agricultural products, which are shipped hence to Vienna. Pop. (1890) 14,468. It is famous as the place where two of the most momentous battles in Hungarian history were fought (Aug. 29, 1526, and Aug. 12, 1687). In the former the young and chivalric king, Louis II., with an army of hardly 25,000 men, attacked, without waiting for the re-enforcements which approached under John Zapolya, a Turkish army of 200,000 men, under Solyman the Magnificent. After a protracted and desperate fight the Hungarian army was cut entirely to pieces, the king in his flight drowned in the Csellye, and a large portion of the country fell into the hands of the Turks. In the latter battle the Austro-Hungarian army under Charles of Lorraine completely defeated the Turks, and put an end to their dominion in Hungary.

Mo'hair [from O. Fr. *mouhaire* > Fr. *moire* (whence Eng. *moire*); cf. Arab. *mukhayyar*, a kind of coarse camelot or haircloth]: a name for the wool of the Angora goat and the fabrics woven from it. This kind of goods, formerly made only in the East and imported sparingly into Europe by way of Venice, is now extensively produced in Great Britain and other parts of Europe, and less extensively in the U. S. Mohair is combed like coarse wool or worsted and alpaca. It is mixed in many cases with cotton or silk. The raw material brings a high price.

Mohammad, SHAMS UD-DĪN: See HĀFIZ.

Moham'med, or **Ma'homet** [from Arab. *Muhammad*, a man's name, liter., praised, deriv. of *hamada*, to praise]: the founder of Islam; the prophet of the Mussulmans or Moslems; b. at Mecca, in Arabia, Aug. 27, 570. His family, Hashem, was poor, but his father, Abd-Allah, who died two months before his birth, belonged to the Koreish, the most distinguished of the Arabian tribes, to whom the guardianship of the KAABA (*q. v.*) was hereditarily intrusted. When six years old he lost his mother, Amina, and two years later his grandfather, Abd-el-Mouttalib. Adopted by his uncle, Abou-Talib, he accompanied him to Syria, where he met the monk Bahira or George, who in those early interviews exercised a large influence on his subsequent history. At the age of fourteen he was present with his uncles at the battle of Nakla between the Koreish and the Havazin, and picked up the arrows as they fell in the fight. Then he served as a shepherd and camel-driver for Abou-Talib (584–594), by the integrity of his conduct winning the surname of El Amin, the faithful. Employed by the wealthy widow Khadijah, the chief lady in Mecca, as her business agent, he so won her gratitude and esteem that, although fifteen years his senior, she offered him her hand and became his wife the following year. Mohammed proved a faithful and devoted husband. Their union was happy, save that of their seven children the three sons died in infancy. The years 596 to 610 were comparatively uneventful. Freed by his marriage from the necessity of daily labor, Mohammed was able to give full exercise to that religious sentiment which had always been dominant in his character. Every year he withdrew for long periods to Mt. Hira, near Mecca, and passed the time in meditation and prayer.

The religious condition of Arabia was most deplorable. The original monotheism of the Arabs had been supplanted by star-worship, demon-worship, snake-worship, and every variety of fetichism, often accompanied with debasing and inhuman rites and practices. Judaism and Christianity were indeed adhered to by certain tribes, but in such degraded and distorted forms as to be little preferable to the prevalent polytheism. None of those faiths could satisfy Mohammed.

The Arab historians state that on a Friday, the seventeenth day of the month of Ramazan, while in the cave of Hira, Mohammed saw in a dream the angel Namous (Gabriel) and heard himself saluted as prophet of God. These ecstatic visions were repeated at intervals in his subsequent life, attended by bodily convulsions resembling epilepsy. In them Gabriel revealed to him the successive chapters of the Koran (*q. v.*), which he committed to memory, as he could neither read nor write. These experiences he at first confided only to Khadijah, who became his immediate convert. During three years he preached in secret and made eight converts, his nephew Ali becoming the first male Mussulman. During nine years (613–622) he preached publicly, making few converts, often in peril of his life, enduring all manner of insult and persecution from the Meccans, and especially from the Koreish. Khadijah and Abou-Talib died in 619. In 620 he converted six men from Yatreb who had come in pilgrimage to Mecca. On their return home they advocated the new faith with success. Two years afterward (Mar., 622), Yatreb, in the person of seventy-five representatives, on the hill of Acaba, not far from Mecca, solemnly swore that it accepted Islam and acknowledged Mohammed as the prophet of God. He now chose twelve apostles, after the example of Christ, to propagate his religion. The Mussulmans of Mecca emigrated to Yatreb, leaving only Ali and Aboubekr with the prophet. Despite attempts at his assassination he succeeded a few months later in escaping (see Hejira) to Yatreb, which at once changed its name to Medinet-el-Nabi, City of the Prophet. A mosque was immediately begun, at the erection of which he labored with his own hands, and in which he preached his first sermon (623). Hostilities soon broke out between Mecca and Medina. The Mussulmans, 314 in number, defeated a thousand Koreish at the battle of Bedr (Jan., 624), but at the battle of Mt. Ohud (Jan., 625) were themselves defeated by Abou-Souphian, the leader of the Koreish, on account of disobedience to the prophet's orders. Medina was besieged (627), but Mohammed was able to divide his enemies, some of whom became his adherents. He signed a truce (628) for ten years with the Koreish, wherein it was stipulated that he might make the pilgrimage to Mecca the following year. This he did (629) accompanied by 2,000 Mussulmans. As the Koreish violated the treaty, he marched on Mecca with 10,000 men. The Koreish surrendered without fighting. The conqueror destroyed the 360 idols surrounding the Kaaba, and Abou-Souphian and all the inhabitants declared themselves converts to Islam. The negotiations he had undertaken with Abyssinia, Persia, and the Byzantine empire, were unsuccessful. During the years since the Hejira, Islam had made such constant and rapid progress as to have become practically the religion of Arabia; so when Mohammed again made the pilgrimage to Mecca, it was at the head of 100,000 Mussulmans (632). His constitution had been undermined four years previously by poison given him by a Jewess. Soon after his return to Medina he sickened and died June 8, 632. In the unconscious delirium of his last moments he talked of the angels and God.

The two charges brought against Mohammed are that he sanctioned and himself practiced polygamy—marrying fourteen wives after the death of Khadijah, ten of whom survived him—and that he sometimes employed artifice or the sword in propagation of his faith. Till the death of Khadijah, when he was forty-nine years old, the closest scrutiny reveals no flaw in his character. He was devotedly attached to his mother's memory, never forgot a kindness, and was unselfish and just. He was an able statesman and a skillful commander, intrepid in battle, generous and humane in victory. He put forth no extravagant claims concerning himself, always declaring that he was only an ordinary man, unable to work miracles, and that his sole commission was to proclaim the unity of God. Whether self-deceived or not, he was sincere. The better he is understood, the more favorable will be the verdict upon his life and work. Impartial investigation must pronounce him one of the greatest and most sagacious reformers the world has seen. See Davenport's *Apology for Mohammed and the Koran* (London, 1869); Gagnier's *La Vie de Mahomet* (Amsterdam, 1732); Muir's *Life of Mahomet* (London, 1861); d'Ohsson's *Tableau de l'Empire Ottoman* (Paris, 1787); Caussin de Perceval's *Essai sur l'histoire des Arabes* (Paris, 1847–48); Saint-Hilaire's *Mahomet et le Coran* (Paris, 1865); Sedillot's *Histoire des Arabes* (Paris, 1854); Bosworth Smith's *Mohammed and Mohammedanism* (London, 1874); Sprenger's *Das Leben und die Lehre des Mohammed* (Leipzig, 1861–65); Garcin de Tassy's *L'Islamisme* (Paris, 1874); Weil's *Mohammed der Prophet* (Stuttgart, 1843).

E. A. Grosvenor.

Mohammed: the name of four Ottoman sultans. Mohammed I. (1413–21), b. in 1379. When Bayezid I. died in captivity (1403), one year after the battle of Angora, and Tamerlane retired beyond the Oxus, the Ottoman empire remained in anarchy during ten years, while Bayezid's four sons, Souleïman, Musa, Isa, and Mohammed, disputed the throne. In 1413 Mohammed alone survived, and became sole ruler. His main effort was to restore the almost ruined empire to its former condition. Though his reign was filled with wars against the learned dervish Behreddin, the impostor Mustapha, Karamania, Persia, and Venice, he loved peace, and was a sagacious, just, and generous soveregin.—Mohammed II. el Fatih, the Conqueror, the Great (1451–81), b. in 1429; son of Murad II. Illustrious as general, statesman, and legislator, no other sultan is equally revered by the Ottomans. He was expert with the sword and bow, and possessed prodigious strength and courage. He knew Arabic, Greek, Latin, and Persian; was a poet and writer, and was well versed in geography and mathematics. He favored the arts and sciences, built hospitals, mosques, and schools, and founded the great Ottoman code, or fundamental law, the Kanoum-Namé; yet he was treacherous, cruel, and revengeful. He conquered Servia in 1459, the Peloponnesus in 1460, the empire of Trebizond and Wallachia in 1461, Karamania and Bosnia in 1463, Herzegovina in 1467, Negropont in 1470, the Crimea in 1476, Albania in 1479, and captured Otranto in 1480. He was successfully resisted by Hunyadi at Belgrade (1455), by Seanderbeg in Albania till the death of that hero (1467), and by the Knights of St. John at Rhodes (1480). His pre-eminent exploit was the overthrow of the Byzantine or Eastern Empire by the capture of Constantinople (May 29, 1453) after a fifty-three days' siege. That city he reorganized as capital of the Ottoman empire, guaranteeing the Christians many rights and privileges, and attracting inhabitants from abroad. He died May 2, 1481, while leading his army in an expedition, the object of which has always remained unknown.—Mohammed III. (1595–1603), b. in 1566; son of Murad III. and of the Venetian Baffa. On his accession he had his nineteen brothers bowstrung. An indolent and incapable prince, the empire rapidly declined during his reign. Insurrection followed insurrection, and the wars with Moldavia, Wallachia, the German empire, and Persia, were disastrous, despite the capture of Erlau and the Ottoman victory of Kerestes (Oct. 26, 1596), where 50,000 Germans and Hungarians perished.—Mohammed IV. (1648–87), b. in 1641; son of Ibrahim I. Indifferent to the empire, he devoted himself to hunting and pleasure. His reign, though signalized by two illustrious grand viziers of the Kupruli family, was disastrous. Its chief events were the completion of the conquest of Crete (1669), the terrible defeats of St. Gothard (1664), and Mohacs (1687), and the unsuccessful siege of Vienna (1683). The army, sharing the popular discontent, deposed Mohammed in 1687 and raised his brother Souleïman II. to the throne. Mohammed was confined in the seraglio, where he died five years later (1692).

E. A. Grosvenor.

Mohammedan Art: the art of the Mohammedan peoples. In it certain dominant traits, due largely to common religion, override the wide racial distinctions which separate the Aryan Persians and Indians from the Semitic Arabs and the Turks. The Mohammedans excel in many of the decorative arts, and in all branches of design display a special predilection for brilliant but harmonious color, and for surface ornament of extreme intricacy and minuteness of detail. Such ornament is generally composed of wholly conventional or geometric elements, except in Persia, where the Koranic prohibition of pictorial art is less rigidly construed than among the Arabs and Turks. In textile fabrics, especially rugs and carpets, in wall decoration by quarry ornament and encaustic tiling, in cabinet-work and inlays, in certain branches

of metal-work, and in manuscript illumination, the art of the Levantine Moslems, the Persians, and the Mohammedans of India, is particularly brilliant and worthy of study. In architecture each of these races has built up its national style out of materials and suggestions furnished by the peoples it has conquered; so that traces of Byzantine, Sassanian, Norman, and even classic art are found in all Saracenic, Persian, and Indo-Moslem works. In all these one detects the predominance of the idea of surface decoration, whether of inlay or carving, in marble or plaster or wood; the dependence on color rather than on architectural form for the chief effect, and the development of geometric motives as the basis of ornament. To this should be added a wholly original innovation in the decorative use of Arabic lettering, in relief or in color, to form borders and friezes of great richness and beauty.

The Arabs, who in the seventh century carried the conquering standard and faith of Islam from the gates of India to the Pillars of Hercules, were neither artists nor builders, nor even for the most part dwellers in cities, but nomadic tribesmen, and therefore compelled to make use of the arts and of the craftsmen of the lands they conquered. The Sassanians in Persia, the Copts in Egypt, the Byzantine Greeks in the Mediterranean countries, were their builders and decorators for centuries. The earlier Mohammedan works therefore partake of the character of the arts of widely diverse peoples, though these arts were transformed in time by the imperious control of the Arabic mind and Koranic restrictions. These facts explain the variety of style which distinguishes from each other the arts of the Egyptian Arabs, the Moors, the Turks, the Persians, and the several schools of Indo-Moslem art. The most characteristic manifestations of Arabian art, so called in distinction from the Moorish or Moresque art of Northwestern Africa and Spain, are to be found in Egypt, especially in Cairo, and in Syria. The splendid mosque of Omar in Jerusalem was built (637 A. D.) by Byzantine architects, but is quite unlike any Byzantine type. The same was true of the great mosque of El Walid at Damascus (705 A. D.), recently destroyed or seriously injured by fire. In Cairo also the earlier mosques and tombs were by Coptic architects; but, unlike the Coptic Byzantine churches, they presented a new model of design, consisting of many parallel rows of slight columns or piers bearing arches and supporting richly decorated wooden ceilings. The hall was preceded by an atrium or court, and the end of its central aisle was adorned by a *mihrab* or prayer-niche, indicating the direction of Mecca, as in the partly ruined mosques of Amron (642–720) and Ibn Toulam (876). In later mosques a domical hall or a cavernous vaulted chamber, open to the court, replaced the columnar areaded hall, its walls incrusted with colored marbles in rich designs (mosque of Barkouk, 1149, and of Hassan, 1356). In these and some others one sees, associated with the mosque proper, a whole congeries of schools, hospitals, and tombs in plans of great complexity. In the fourteenth century the general adoption of domes and minarets, under Persian influence, led to a great increase of architectural splendor. The mosques of Hassan (1356), El Muayed (1415), Sinan Pacha (1468), and Kait Bey (1463) are beautiful examples of this style of design, which is illustrated on a smaller scale by the tombs of the caliphs and of the Mamelukes. In all these the four-centered, pointed arch, the Saracenic "stalactite" corbeling, interlaced star-patterns and minute geometric detail, play an important part both in the external and internal decoration of walls, domes, and minarets. The Arabs particularly excel in cabinet-work of small pieces combined in intricate star-patterns, and in lattice-screens of spindle-work of great beauty and variety.

Moresque Art.—The art of Morocco and Tunis is not well known as that of the Moors in Spain, being much less accessible, and seldom comparable either in splendor or importance with the works of the Spanish Moors. Cordova, Seville, Toledo, Granada, Tarragona, and Segovia—all contain relics of the grandeur of the Moslem dominion which lasted from 710 until the final expulsion of the Moors in 1492. The mosque of Cordova, founded in 786, consists of 17 rows of 32 columns, each carrying superposed horseshoe arches, elaborately cusped, with a domical sanctuary built 200 years later. Many smaller mosques of this type exist in Spain, at Toledo, and elsewhere; but the most splendid products of Moorish architecture are palaces, of which the Alcazars at Seville, Segovia, and Malaga, and the Alhambra at Granada are the chief examples. The latter, built during the thirteenth and fourteenth centuries, has always been regarded as one of the wonders of the builder's art, on account rather of its superb decoration than of anything marvelous in its architectonic composition. Begun by Mohammed-ben-al-Hamar in 1238, enlarged in 1279, 1306, and 1348, it comprises two large and several smaller courts surrounded by halls and chambers of varied size and form, and embellished by arcades and fountains of great beauty. The building is one story high, without external regularity, entirely covered internally with rich and minute diaper-work in plaster, brilliantly colored and gilded except where the lower parts are revetted with a wainscot of enameled tiles. The arches are all cusped, the slender columns are of colored marble, and the windows filled with finely executed plaster screens or lattices. There is less of strictly architectural design here than in the buildings of Cairo, but an even freer use of detail in relief, gilding, and color. The influence of this sumptuous decoration was long felt upon the Gothic art of Spain, and even upon the Renaissance art which succeeded it.

Persian Art.—Among the Persians we find a highly original and vital development of style in architecture and decoration. Less ostentatious than the Hispano-Moresque, more rigidly constructive than the Egypto-Arabic, Persian architecture offers examples of imposing conceptions executed with exceeding refinement, and sumptuously decorated without sacrifice of dignity. The Persians appear to have excelled in the construction of vaults and domes from immemorial times, and the type of dome, slightly swelling and pointed, which they adopted for their mosques and tombs is encountered alike in Cairo and in India, where architecture owed much to Persian influences. Various mosques and tombs at Ispahan, Tabreez, Sultaniyé, etc., show a rich decoration of enameled and painted tiles, externally as well as internally—a branch of art for which the Persians have always been famous. The "green mosque" at Broussa (Turkey) may be considered a Persian work, its lining of rich blue-green tiling being wholly of Persian make. The round minaret, universal in Turkey and frequent in India, is also of Persian origin. Not only in tile-making, but in the weaving of rugs and carpets, Persian art displays surpassing excellence; especially in its skillful blending of rich colors broken into minute areas, never in large masses, as in those of Asia Minor. In calligraphy—an important branch of Moslem art—in the illumination of manuscripts, in the printing of calicoes, the Persians have never lost their supremacy. Belonging to the heretical sect of the Shieh, they interpret very broadly the Koranic prohibition of pictorial art, and Persian decoration consequently displays a freedom and resource, especially in its floral forms, not met with in Saracenic or Turkish design.

Turkish Art.—The Seljûkian Turks, who in 1453 under Mohammed II. finally overthrew Constantinople, after occupying for nearly a century the surrounding territory in Asia Minor and Thrace, followed the example of all other Mohammedan conquerors by adopting at once the arts of the conquered race. The Conqueror's mosque, the work of Christadoulos, a Byzantine Greek, was a modification of the St. Sophia type of domical construction and planning, a type which has persisted, with variations, in Turkish mosque designs down to the present time. The noblest example of this is the mosque of Sûleiman the Magnificent (*circa* 1550), while in Constantinople, Broussa, Damascus, and other cities are a number of other examples only inferior to this. The exteriors are more elaborate, the interiors plainer, than those of their Byzantine prototypes, to which the Turks have added minarets and cloisters, domical tombs, and many other accessories. The pointed arch, with voussoirs alternately light and dark, monumental doorways set in vast niches with stalactitic arches or heads, and picturesquely spreading wooden-eaved roofs, are features of Turkish architecture which has produced, besides mosques, some fine tombs and fountains, but it lacks the abandon and exuberance of Arabic, Moorish, or Indian art, and has suffered much from the influence, in the eighteenth century, of the most degraded forms of rococo design, due to the importation of Italian artists. The Turks excel, however, in needlework, rug-weaving, and some branches of metal-work and inlay.

Indian Art.—Northern India came under the Moslem sway at the end of the twelfth century, and the Pathan monuments of the next century in Delhi and Ajmere differ but little from the older Jaina colonnaded courts and halls. This is also true of many of the mosques and tombs of Ahmedabad, Mirzapur, and Birkej, though their domes and minarets ally them with the contemporary buildings of Per-

sia and Egypt. Still more nearly related to Persian models are the mosque and the bazaar at Kalburgah (Deccan), and the Jumma Muddjid and the tomb of Mahmûd at Bijapûr, in which the system of vaulting by domes on intersecting pointed groined pendentives at once recalls the mosque and the bazaar at Ispahan; but the most splendid works of Moslem art in India belong to the Mogul period (1494–1707), in which—especially at Agra and Delhi—the resources of Hindu and Saracenic design seem to have been combined with wonderful results. The Taj Mahal is one of the most beautiful buildings in existence. See INDIA.

Indo-Moslem art can not always be separated from Hindu (pagan) art in its minor products, such as rugs, carpets, brass-work, and wood-carving, in which racial rather than religious characteristics predominate. These works are all marked by a wonderful patience and minuteness of detail, and by rich and harmonious combinations of line and color.

REFERENCES.—For other details, see CONSTANTINOPLE, INDIA, PERSIA, and SARACENIC ART. Among the leading works of reference are Prisse d'Avennes, *L'Art Arabe*; Bourgoin, *Les Arts Arabes*; Texier, *L'Art moderne de la Perse*; Owen Joncs, *Grammar of Ornament* and *The Alhambra*; L. Parvillée, *L'Architecture Ottomane*; J. Fergusson, *Indian and Eastern Architecture*. A. D. F. HAMLIN.

Mohammedanism: the name commonly but improperly applied by Europeans to the religion taught by the prophet Mohammed. The name Islam (resignation, submission) is that given by the founder and invariably employed by its adherents. The latter deprecate being called Mohammedans or Mahometans, asserting they are followers of no human being, but are Mussulmans or Moslems (the resigned or submitted).

Knowledge, according to the Mussulmans, is derived either from the five physical senses or from tradition, thereby including both oral tradition and revelation, or from reason. No knowledge is derived from inspiration. The Koran, the gift of revelation, contains all the laws and doctrines considered of divine origin. This book is further expounded, in addition to its obvious meaning, by the Sunna, or oral tradition concerning the prophet's sayings, actions, and even his silence in certain circumstances; by the Idymay-ummeth, or explanations and legal decisions rendered by the apostles and chief disciples contemporary with or immediately subsequent to the prophet; and by the Kiyass, or later decisions, made during the early centuries of Islam.

The central, all-dominating idea of the faith is the unity of God. In the creed, "There is no God but God, and Mohammed is the prophet of God," the first clause is the all-important, and the second is added, not to exalt Mohammed, but simply that men may accredit his mission, and hence accept and believe whatever he taught as revealed to him concerning the deity. The theologic system, however, embraces many other doctrines. For convenience and definiteness two catechisms have been drawn up: one in Turkish, called *Exposition of the Mussulman Faith*, by Mohammed ben Pir Ali el Berkevi; and one in Arabic, by Nedjhm ud-din Nessefy, who died at Bagdad in 1142. These two catechisms do not disagree, but the latter is the authorized and universally accepted summary of orthodox Islam. With Oriental prolixity, and with scant regard to their logical order or relative importance, it sets forth fifty-eight doctrines or articles of faith, all of which are equally held by the orthodox. Some are sanitary rather than theological; some hardly more than definitions; some seem almost puerile, while others set forth the sublimest truths held in common by all monotheistic peoples.

Doctrines.—The existence of the world proves a creator. This creator is God. "There is only one God: he lives, is eternal, omnipotent, and omniscient; hears all, sees all; is endowed with will and action; in him there is neither form nor face nor limits nor numbers nor members nor parts nor multiplication nor division, because he is neither body nor matter, and has neither beginning nor end; he exists by himself, without generation or habitation, beyond the control of time, incomparable in his nature as in his attributes, which, while not distinct from his essence, do not constitute his being. God possesses the word. The word, eternal in its essence, has neither visible letter nor character nor sound, and its nature is the opposite of silence." "The Koran is the uncreated word of God, written in our books, engraved on our hearts, articulated on our tongues, heard by our ears, in which the sound of the word is received, and not the word itself, which is eternal and self-existent." The believer's future spiritual vision of God is demonstrated by reason and revelation. In the tomb sinners are tormented, there the faithful enjoy spiritual delights, and there all the dead, without exception, are questioned by the angels Munnker and Nekir as to their God, their religion, and their prophet. The resurrection of the dead, the balance wherein are weighed all actions committed during life, the daily record (*kitab*) of each individual, the examination on the day of judgment, the bridge (*al Sirat*), the celestial basin, and a never-ending paradise and hell, are all real and certain. There are twelve capital sins—polytheism, homicide, injury of another, adultery, desertion on the field of battle, magic, robbery of orphans, disobedience to parents, sacrilege at Mecca, usury and illegal gain, theft, use of wine—any of which God may pardon save polytheism. Through the intercession of the prophets guilty believers will not remain in hell forever. Faith is belief in and confession of all revealed by God; good works can be increased or diminished; not so faith, which is the same as Islam. The destiny of the elect and the damned is decreed by the Eternal, for predestination exists in the essence of God, and he never changes; but this predestination extends only to spiritual condition, does not include all mankind, and has no connection with one's moral, civil, or political condition; man is never deprived of free will. The prophets, envoys of God, have attested their mysterious mission by prodigies and marvels: of these Adam is the first: Christ is superior to all the others save Mohammed, the last and most eminent of all. The angels, God's messengers and servants, are without sex. The sacred books descended from heaven, were put into the hands of men, and are in order of rank the Koran, the Pentateuch, the Gospels, and the Psalms. The bodily ascent of Mohammed to the heaven of heavens is a fact. The saints possess the gift of miracles. The funeral prayer for one just dead is incumbent on the survivors. The use of the bath is obligatory on travelers. Date-juice is not a prohibited drink. Saints do not attain the same felicity as the prophets. No man is exempted from obedience to positive and prohibitive laws. The text of a sacred book must be understood in its literal sense. To lack faith in the sacred books, to be indifferent to sin, or to joke about religious matters or about worship, to distrust God, to have no fear of his threatenings or punishments, to put confidence in diviners or omens—all these things are infidelity. Prayers for the dead contribute to the repose of their souls. God listens to prayer and grants its petitions. Certain signs will announce the end of the world. Doctors of theology are not infallible. Human prophets are superior to angelic prophets, and men are higher than angels. The foregoing summary, together with nine doctrines concerning the rank, prerogatives, and limitations of the early caliphs and imams, gives briefly and in the same order the contents of the catechism of Omar Nessefy.

Ritual.—As to matters of ritual or required external observance, there are four systems all equally reputed orthodox, though differing in various details, founded by the imams Azam Ebu Hanifeh (d. 767), Schafiy (d. 849), Malek (d. 795), and Hannbel (d. 855). This ritual has been almost unmodified since the ninth century. Most Mussulmans are followers of Hanifeh, but the four systems are tanght side by side in the large theological seminaries. The external observances are five: purification or ablution, prayer, fast, pilgrimage, and the tithe. The manner whereby each shall be discharged is indicated with scrupulous and minute particularity. Purification does not deliver from sin, which can be washed away only by repentance and works of penitence, but no man is permitted to perform any religious act until himself and his garments are free from material defilement. Prayer must be made toward the KAABA (*q. v.*) five times every twenty-four hours, just before sunrise, at noon, in the afternoon, at evening, and during the night. The words are carefully prescribed as are also the prostrations, genuflections, and changes of position. Prayer is incumbent on every Mussulman, male or female, after the age of seven. Fast continues through the entire month of RAMAZAN (*q. v.*). This is obligatory after the age of fourteen. As to pilgrimage, see HADJ. The tithe, not really though nominally a tenth, is required only of the rich, or of those in easy circumstances, and is devoted to indigent coreligionists. Though these observances, save the fifth, are demanded from every believer, a variety of conditions may free from the performance of any or even of all. This discharge may be many times repeated, through months, during years, or even throughout a lifetime. Thus

poverty, sickness, physical defects, inability to provide for family necessities in case of absence, may and does dispense thousands from the hadj. These exemptions are specially frequent in the case of women, on account of their physical weakness or physical conditions of sex.

Moral Code.—This can hardly be separated from Mussulman theology, the two so trench upon and are so connected with each other. Its minutiæ are almost infinite. The vices specially denounced are hypocrisy, as in reading the Koran for pay or admiration; envy, as wishing that another may lose his property; obstinacy, covetousness, gluttony, and avarice. Love of the world is the initial principle of sin, and is folly, for real joy is only in heaven. One must not honor the rich simply for his wealth, or despise the poor, or seek out a neighbor's secret faults, or deceive another, or ever lose from sight the real motive for shunning vice. The foremost virtue is patience, whereby one endures misfortune and suffering without expressed or secret complaint; such patience is the necessary first fruit of Islam, inasmuch as the believer is entirely and joyfully submissive to God's will. Gratitude to and fear of God, trust in his mercy, aversion to merely worldly delights, are in close connection. Humility is requisite whereby one declares himself the least of the faithful. One should always think well of others, but judge himself severely. A promise must be strictly kept; one must never lie nor steal, or touch anything impure, or play games of chance. Friday should be especially esteemed, because Adam and Eve were created on that day. Kindness to animals is duty and wisdom, for each shall be judged not only by his conduct toward men, but toward brutes. One must watch carefully against any sin that may enter by any of "the seven doors," which might then become "the seven gates of hell." Those doors are the ears, eyes, tongue, hands, feet, stomach, and the organs of sex.

Charges against Islam.—The main charges are sensuousness, toleration or approval of slavery and polygamy, the position to which it is supposed to relegate woman, and that it has often been propagated by the sword. The first and last charges are well sustained. The doctrine of literal interpretation seems to necessitate that the glowing passages of the Koran be taken in strict literal sense. They are so understood by the vast majority of Mussulmans, have hence furnished a most powerful incentive in battle, and largely contributed to the diffusion of the faith. Yet many of their theologians assert that these passages are pictures or metaphors, the literal interpretation of which must mean "interpretation according to the idea contained." As to slavery and polygamy, Mohammed found them everywhere in Arabia. He destroyed neither, but restricted and ameliorated both. As to the third charge—so far as it can be divorced from considerations of polygamy—woman was elevated by Islam; not, indeed, to the highest dignity, but still to a position such as in Arabia she had never known before. The seclusion of woman is primarily the result of Oriental prejudice and ideas, not of Islam. Nowhere is the mother held in greater reverence than among the Mussulmans.

Fidelity to External Observances and Influence of the Moral Code.—Islam has many merely nominal adherents, and others apparently uninfluenced by its moral teachings. Moreover, by strange inconsistency, many zealous Mussulmans have adopted and openly maintain customs and ideas opposed to their prophet's teaching, and directly violating his commands. For example, Islam forbids castration and the employment of eunuchs, yet eunuchs abound in the palaces and mansions of wealthy Mussulmans. The fifty-second doctrine denounces faith in diviners, magicians, fortune-tellers, astrologers, and omens, yet belief in these things is universal among Mussulmans. Persistency in denying human free will is expressly declared impiety deserving of death, yet Kismet—the most absolute and all-embracing fatalism—is practically accepted by the Mussulman world. Mohammed declared, "No monasticism in Islam," yet the seventy-two orders of dervishes—really monks, though married—are its most fanatical, most revered, and perhaps most powerful supporters. Yet, after all this is granted, the fact remains that Islam does have a marvelous hold on its members, and that its external requirements are observed in general with marvelous fidelity. The rite of circumcision is never omitted. The Mussulman who does not make his purifications and stated prayers, who eats pork or indulges in wine, who does not scrupulously keep the fast and, if wealthy, give his alms, is the rare exception. The young Mussulman, educated abroad or in contact with Western or European customs, may be lax, indifferent, or skeptical, but the immense majority adhere to their religion and its practices with a tenacity probably never greater than to-day. Some of the virtues it enjoins they possess in higher degree than they do others, but the average Mussulman is patient, submissive, simple, unenvious, honest, temperate, hospitable, and kind.

Sects.—Mohammedan sects are exceedingly numerous, and many have become extinct. They are often spoken of as the "seventy-two heretical sects," but this estimate is far below the real number. While sometimes founded on interpretation of doctrines, as the Wahabees, they have generally arisen in partisanship, in adherence to the supposed claims of some individual leader, as among the Shiïtes. In the intensity of their sectarianism they have often been envenomed and fanatical almost beyond belief. See Ismaïlis, Karmathians, Motasalis, Nusairieh, Shiïtes, Wahabees, etc.

More than almost any other great religion, Islam seems held by its very nature within certain geographical boundaries. It might spread indefinitely E. and W. along an immense belt N. and S. of the equator, yet there are certain parallels beyond which it can hardly pass, or, if it passes, where it can never hold its own. Local in its self-imposed restrictions, it lacks capability of adjustment. Yet a modern school of Mussulmans claim that it is capable of adapting itself to all latitudes and civilizations. See the references under Mohammed, and Caliph, Ommiades, Shiïtes, Sunnites, and Dervishes. E. A. Grosvenor.

Mohammedan Schools: See the Appendix.

Mohave Indians: See Yuman Indians.

Mohawk River: the principal affluent of the Hudson, surpassing in volume that stream above its confluence. It rises in Lewis co., N. Y., and after a generally eastward course reaches the Hudson at Cohoes. It affords valuable water-power, and flows through a valley famed for its beauty.

Mohawks: See Iroquoian Indians.

Mohee'lev: same as Moghilev (*q. v.*).

Mohegans: See Algonquian Indians.

Mohl, Jules, von: Orientalist; b. at Stuttgart, Germany, Oct. 25, 1800; educated at Tübingen for the Lutheran ministry, but was early attracted to Oriental studies, Chinese, and especially Persian, in which he was destined to win renown. In 1823 he went to Paris, where, under the leadership of de Sacy, at this time was the great school for Oriental learning in Europe. He thus came under the influence of Ampère, Eugène Burnouf, and Abel Rémusat. In 1826 he received the appointment of a professorship of Oriental Languages at Tübingen, with permission to remain in Paris. At this time the French Government commissioned him to prepare an edition of Firdausī's *Shāh Nāmah* (see Firdausī), the first volume of which appeared in 1838. He worked also for a time in London and at Oxford. In 1847 he became Professor of Persian at the Collège de France, and in 1852 director of the Oriental department of the national printing-office. He was a member of the Institute, and was most closely associated with the Société Asiatique down to the time of his death, Jan. 4, 1876. His principal work is his edition of Firdausī's *Shāh Nāmah*, text and translation (*Le Livre des Rois par Firdousi*, 6 vols., Paris, 1836–68), incomplete at his death. An edition of the translation, in seven volumes, appeared after his death (Paris, 1876–78). Important also are his collected reports published posthumously under the title *Vingt-sept Ans des Études Orientales* (Paris, 1879).—His brother, Hugo von Mohl, b. at Stuttgart, Apr. 8, 1805; studied medicine and natural science at Tübingen, and was appointed Professor in Botany and director of the botanical garden in that city in 1835. D. Mar. 31, 1872. He was the most eminent vegetable anatomist of his day. His principal works are *Ueber den Bau und das Winden der Ranken und Schlingpflanzen* (1827); *Beiträge zur Anatomie und Physiologie der Gewächse* (1834); *Grundzüge zur Anatomie und Physiologie der vegetabilischen Zelle* (1851); and a large number of memoirs, the principal ones collected in his *Vermischte Schriften*.

Revised by A. V. Williams Jackson.

Möhler, mö'ler, Johann Adam: theologian; b. at Ingersheim, Würtemberg, May 6, 1796; studied theology at several of the most prominent universities of Germany, both Protestant and Roman Catholic; was ordained a priest of the Roman Catholic Church in 1819: became Professor of Theology at Tübingen in 1825, and at Munich in 1835. D. at Munich, Apr. 12, 1838. His principal works are *Die Einheit in der Kirche, oder das Princip des Katholicismus*

(1825), and his *Symbolik* (1832), which ran through many editions, and was translated into English in 1832 by Robertson. It is an exposition of the doctrinal differences between Roman Catholics and Protestants as set forth in their recognized creeds or *symbols*. It was answered by Nitzsch, Marheineke, and especially by Baur. The controversy which ensued rendered Möhler's position so painful that he sought a transfer to some other university. Chairs at Bonn and Münster were offered, but he finally accepted the call to Munich. Revised by JOHN J. KEANE.

Mohn, HENRIK: meteorologist and geographer; b. at Bergen, Norway, May 15, 1835; attended the cathedral school 1845–52; the university in Christiania 1852–58; was assistant observer at the astronomical observatory at Christiania 1860–66: has been professor in the university and director of the Meteorologieal Institute since 1866. He was a member of the international committee of the meteorological congresses of Rome, Vienna, and Munich. He was a director of the physical part of the Norwegian North Atlantic expedition with the Vöringen 1876–78, and member of its editorial committee. He was also a member of the international polar conference, and organized the Norwegian polar station at Bossekop. He received the honorary degree of Ph. D. from Upsala in 1877. His publications are numerous. Among them may be mentioned his *Atlas des tempètes de l'Institut Mét. de Norvège* (1870); the *Reports of the Norwegian Atlantic Expedition*, Astronomy, Geography (1882), Meteorology (1883), Depths, Temperature, and Circulation of the North Sea (1887); and especially his excellent *Grundzüge der Meteorologie* in Norwegian and German (1875; 4th ed. 1887), also translated into Russian, Spanish, Italian, and French. M. W. HARRINGTON.

Moir, DAVID MACBETH: physician and author; b. at Musselburgh, Scotland, Jan. 5, 1798; became in 1817 a successful practitioner of medieine at Musselburgh, where he was settled till his death. He soon became widely known as "Delta," from the letter Δ appended to his numerous poems in the periodical literature of that time. His *Legend of Genevieve* (1824), *Autobiography of Mansie Wauch*, a novel (1828), *History of Medicine* (1831), *Domestic Verses* (1846), and his lectures on *Poetical Literature* (1851) are all of value. D. at Dumfries, July 6, 1851. Revised by H. A. BEERS.

Moisture: See HUMIDITY.

Mojave Indians: See YUMAN INDIANS.

Mojós, or **Moxós**, mō-hōs': a race of Indians in Northern Bolivia, principally on the Mamoré, one of the great branches of the Madeira. Formerly they extended to the Guaporé, Itonama, and Beni, and were very numerous; their tribal relations were loose, each village being practieally independent; they subsisted principally by agriculture, wore long shirts made of bark, and were mild and friendly in disposition. When the Jesuit Cyprian Baraza came among them in 1674 they readily listened to his teachings, and fifteen large mission villages were established in their territory; one of these, Trinidad (founded 1687), is now the capital of the department of Beni. The descendants of the Mojós are devout Catholics; they are industrious, excel in light artistic work, and are much in demand as canoemen and rubber-gatherers. Physically they are a handsome race, and rather light colored for Indians. By their language they belong to the great Maypuré or Arawak stock, whieh once extended to the Bahama islands; the Guanás of Matto Grosso are closely allied to them. They are said to number about 30,000, but this includes other tribes which have mingled with them in the missions. The best existing grammar and vocabulary of their language is that of Father Marban (Lima, 1701). See Keller, *The Amazon and Madeira Rivers* (1875). HERBERT H. SMITH.

Mokanna: See HAKIM-BEN-ALLAH.

Mokrý, mok'rē, OTOKAR: poet and novelist; b. at Budějovice (Budweis), Bohemia, in 1854; studied law at Prague; is state notary at Vodňany, and editor of the *Laciná knihovna národní* (People's Cheap Library). He belongs to the romantic sehool. His poems, epic and lyrical, are collected in *Jihočeské melodie* (Melodies from Southern Bohemia, Prague, 1880); *Básně* (Poems, 1883); *Na dívčím kameni* (On the Maiden's Rock, 1885); *Dumy a legendy* (Reflections and Legends, 1888). His short stories, *Povídky a arabesky* (Short Stories and Arabesques, 1883) and *Povídky a drobné kresby* (Short Stories and Sketches, 1886), contain reminiscences of his travels in the South. J. J. KRÁL.

Molale: See WAIILATPUAN INDIANS.

Molasses, or **Treacle** [formerly *melasses* from Fr. *mélasse*, from Span. *melaza*, molasses < Lat. *mellā'ceus*, honey-like, deriv. of *mel*, *mel'lis*, honey]: a thick, dark-colored sirup, produced during the manufacture of sugar, consisting essentially of uncrystallizable sugar, water, coloring-matter, and various impurities. It is in part the product of the sugar-plantations (known as West India and New Orleans molasses), and in part comes from the sugar-refineries of other countries (sugar-house molasses). The latter is separated by the centrifugal process, by claying, and the other operations of sugar-refining. Molasses is used as a cheap substitute for sugar, especially by the poorer classes, and is imported in considerable quantities for the manufacture of RUM (*q. v.*). See SUGAR.

Molay, JACQUES BERNARD, de: the last grand master of the order of Knights Templars; b. in Burgundy about 1244. Little is known of his life till about the year 1298, when he became grand master. Philip IV., who was then reigning in France, viewed the order with suspicion and longed to get possession of its vast wealth. His hostility was increased when the management of the order was intrusted to so able a chief as de Molay, who soon won renown for himself and his comrades by his invasion of Syria in 1299 and his temporary conquest of Jerusalem. He was defeated, however, in 1302, and forced to take refuge in Cyprus. There he received an order from the pope at the instance of Philip commanding him to return to France. He obeyed the summons, was hospitably received by the king, and made an ostentatious entry into Paris, but Philip at once began active proceedings against the order. In Oct., 1307, de Molay was arrested, tortured, and forced to confess the guilt of the Templars; afterward recanting his confession, he was dragged to the stake and burned to death by a slow fire in Paris, Mar. 18, 1314. F. M. COLBY.

Molbech, CHRISTIAN: scholar; b. in Sorö, Denmark, Oct. 28, 1783; was connected with the Royal Library, was director of the Royal theater, and Professor of Literature at the university. His most important work is his dictionary, which, though out of print, is still a standard work. He was a diligent investigator and a voluminous writer, but lacked breadth and sympathy. D. June 23, 1857. Among his publications may be mentioned *Dansk Haand-Ordbog til Retskrivnings og Sprogrigtigheds Fremme*, etc. (1813); *Den danske Riimkrönike* (1825); *Henrik Harpestrengs Lægebog* (1826); *Den ældste danske Bibel-Oversættelse*, etc. (1828); *Dansk Ordbog*, etc. (1833; 2d ed., 2 vols., 1859); *Dansk Dialect-Lexikon*, etc. (1841); *Dansk Glossarium over forældede danske Ord . . . fra det 13de til det 16de Aarhundrede* (2 vols., 1857 and 1866). D. K. DODGE.

Molbech, CHRISTIAN KNUD FREDERIK: poet; son of Christian Molbech; b. in Copenhagen, July 20, 1821. From 1853 to 1864 he was Professor of the Scandinavian Languages and Literatures at the University of Kiel; during the following seventeen years censor of the Royal theater and dramatic and literary critic. In the latter capacity he wrote several sympathetic and original criticisms of Shakspeare. His first collection of poems, *Billeder fra Jesu Liv* (Pictures from the Life of Jesus, 1840), is a successful attempt to reproduce Oriental local color. The drama, *Klintekongens Brud* (The Cliff-king's Bride, 1845), is almost wholly lyrical, but *Venusbjerget* and *Dante* (1852) show decided advance in dramatic power. His most popular work is the drama *Ambrosius* (1877), which displays remarkable technique. His translation of Dante (begun 1848), while characterized by great beauty and finish, is somewhat lacking in force and historical truth. Among his other works may be mentioned *Lyriske Digte og Romancer* (Lyrical Poems and Romances); *Dæmring* (Twilight, 1856); and *Efterladte Digte* (Posthumous Poems, 1889). D. May 20, 1888. D. K. DODGE.

Moldau, mōl'dow: a river of Bohemia. It rises in the Böhmerwald Mountains at an elevation of 3,750 feet, flows first in a southeastern, then in a northern direction, becomes navigable at Budweis, and joins the Elbe opposite Melnik after a course of 276 miles.

Moldavia: See ROUMANIA.

Molding: See MOULDING.

Molds: See MUCORACEÆ and WATER-MOULDS.

Mole [M. Eng. *molle*, appar. abbrev. of *molewerp*, *moldwerp* (: Germ. *maulwurf*, mole); O. Eng. *molde*, soil + *weorpan*, throw]: a name given to the various small inseetivorous mammals forming the sub-family *Talpinæ*, distinguished

by their adaptation to an underground life. The eyes are minute, the body cylindrical, the neck short, the feet broad, powerful, and more or less turned on edge. The fur is soft,

European mole (*Talpa europæa*).

Fore-foot of the mole.

Hind-foot.

thick, and silky in texture. The common European mole (*Talpa europæa*) constructs a dwelling consisting of a central nest, surrounded by two circular tunnels, an upper and a lower, connected by various passages, and from these the long burrows open out in different directions. The mole of the Eastern U. S., *Scalops aquaticus*, excavates long subterranean passages, the earth being thrown up at intervals, forming the well-known mole-hills. The star-nosed mole (*Condylura cristata*) is easily distinguished by the curious fleshy points surrounding the nose. The name mole is often applied to burrowing animals resembling the true moles in habits and general external appearance, such as the golden moles (*Chrysochloridæ*) of Africa, and the sand-mole or mole-rat (SPALAX, *q. v.*) of the *Muridæ*. See also TALPIDÆ.

F. A. LUCAS.

Molé, mō'lā', LOUIS MATHIEU: statesman; b. in Paris, Jan. 24, 1781; was educated in Switzerland and England; attended afterward the École Polytechnique of Paris; published in 1806 his *Essais de Morale et Politique*, which attracted the attention of Napoleon by their defense of monarchical principles; held different offices in the civil service during the empire; was made a count and peer of France, and was confirmed in the possession of these dignities by the Bourbons; became Minister of Marine in 1815, of Foreign Affairs in 1830, and Prime Minister from 1836 to 1839; retired from political life after the *coup d'état*, and died at Champlâtreux, Nov. 23, 1855.

Mole-cricket: a name given to the burrowing crickets, and primarily to those of the genus *Gryllotalpa*. In the U. S. they are most common in the South. They are more commonly found in wet ground, and some species are very destructive to crops.

Molecules: according to the commonly accepted theory of matter, the smallest particles of any definite substance that can exist in the free state. For example, water, the chemical compound, consists of the elements hydrogen and oxygen, which are combined chemically with each other. Now, the mass of water is believed to consist of extremely minute particles, each of which has the same composition as water. These particles are the molecules of water. If the molecule is decomposed, the constituents of the molecules are obtained, and these are hydrogen and oxygen. When water is converted into vapor these molecules are separated from one another, and move freely through the mass, the average velocity of the motion increasing with increasing temperature. See CHEMISTRY.

IRA REMSEN.

Mo'leschott, JACOB: physiologist; b. at Herzogenbusch, Holland, Aug. 9, 1822; studied medicine at Heidelberg; began to practice at Utrecht; lectured on physiology at Heidelberg from 1847 to 1854, but was considered to endanger religion and morals by his views of the absolute relation between the lowest material conditions and the highest spiritual manifestations of human life; received a professorship at Zurich in 1856; removed in 1861 to Turin (in 1879 was called to the same chair in Rome); in 1876 became an Italian senator. Wherever he was the physiological course became one of the most popular courses in the curriculum, and the influence of his teaching in rehabilitating the methods pursued in the Italian universities can not be overestimated. His principal works are *Physiologie des Stoffwechsels in Pflanzen und Thieren* (Erlangen, 1851); *Der Kreislauf des Lebens* (Mentz, 1852); *Lehre der Nahrungsmittel* (Erlangen, 1858); *Physiologie der Nahrungsmittel* (Giessen, 1859); *Physiologisches Skizzenbuch* (Giessen, 1861); *Lehre vom Leben* (Giessen, 1867). He was coeditor of the *Holländische Beiträge zu den anatomischen und physiologischen Wissenschaften* from 1846–48, and of the *Untersuchungen zur Naturlehre des Menschen und der Thiere* from 1856–70. D. at Rome, May 19, 1893.

S. T. ARMSTRONG.

Molesworth, GUILFORD LINDSAY, K.C.I.E.: civil engineer; brother of Rev. William Nassau Molesworth; b. at Millbrook, Hants, England, in 1828; was educated at the College of Civil Engineers, Putney; served an apprenticeship on the London and Northwestern Railway; perfected his studies in mechanical engineering under Sir William Fairbairn at Manchester; superintended the construction of the buildings and machinery of the royal arsenal at Woolwich in 1854–55; was for several years a consulting engineer in London; went to Ceylon in 1859; became chief engineer and director-general of the railways in that island, and in 1871 was appointed consulting engineer to the Government of India. His *Pocket-book of Engineering Formulæ* passed through six editions in a single year, and is recognized as a standard work in the profession. Among other publications are *State Railways in India* (1872) and *Imperialism in India* (1885).

Molesworth, Sir WILLIAM: statesman; b. at Camberwell, London, England, May 23, 1810; succeeded to the baronetcy in 1823; studied at the University of Cambridge, but was obliged to leave on account of having challenged a tutor to fight a duel; finished his education at Edinburgh University and in Germany; traveled through Europe; became in 1831 an enthusiastic advocate of reform measures; was elected to Parliament for East Cornwall Dec., 1832; was an intimate friend of Bentham and James Mill, of whose opinions he was a leading exponent in Parliament; founded *The London Review* in 1835, which he merged in *The Westminster Review* in 1836, and published at great expense a magnificent edition of the *Works of Thomas Hobbes* (16 vols., 1839–45), of which he presented copies to the leading libraries of Great Britain and Ireland, and left unfinished a *Life of Hobbes*, which remains unpublished. Sir William Molesworth was the first to call public attention to the horrors of the convict system then in vogue, and to the maladministration of the Colonial Office, and was largely instrumental in effecting a radical change in both these important branches of the administration. In 1853 he became first commissioner of public works in the cabinet of the Earl of Aberdeen, and in 1855 Secretary of State for the Colonies in Lord Palmerston's first cabinet. This appointment was hailed with great enthusiasm by the colonies, but before any considerable results could be derived from his policy Molesworth died in London, Oct. 22, 1855.

Molesworth, WILLIAM NASSAU: clergyman and historian; b. at Millbrook, near Southampton, England, Nov. 8, 1816; was educated at King's School, Canterbury, St. John's and Pembroke Colleges, Cambridge, where he was graduated in 1839; took orders in the Church of England; became incumbent of St. Andrew's, Manchester, in 1841, and vicar of St. Clement Spotland, Roehdale, in 1844. He published, besides several minor works, a *History of the Reform Bill of 1832* (1864); a *New System of Moral Philosophy* (1867); and a *History of England from the Year 1830* (3 vols., 1871–73). A later edition brings this valuable work to the year 1874. D. Dec. 19, 1890.

Revised by W. S. PERRY.

Molfet'ta: town; in the province of Bari delle Puglie, Southern Italy; in lat. 41° 13′ N., lon. 16° 39′ E.; on a little peninsula surrounded by the Adriatic except on the S. (see map of Italy, ref. 6–G). A commodious and secure harbor and its central position make this place one of the chief markets of the province, both for imports and exports, the latter consisting of grain, wine, almonds, olive oil, etc. There is also considerable industry here in the way of small manufactures. The origin of Molfetta is not well known, but probably it was founded about 300 A. D. Pop. about 30,000.

Molière, mō'li-ār': JEAN BAPTISTE POQUELIN: certainly the greatest dramatist, perhaps the greatest literary figure, of France, whose stage name, Molière, has completely supplanted his real one. He was baptized in Paris, Jan. 15, 1622, and it has been concluded that this was his birthday as well. Of the circumstances of his childhood and education we have but meager knowledge. As in the case of Shakspeare, with whose career that of Molière presents not a few parallels, what is positively known of his early years gives but a faint and fragmentary picture of his youth and training. That his parents, Jean Poquelin and Marie Cressé, were of the class of tradesmen, of comfortable but modest

circumstances, and that his father held the office of *valet-de-chambre* of the king, and obtained its continuance for his son; that Marie Cressé died in 1632, and that a step-mother came into the family the following year, but died three years later; that Jean Poquelin gave his son a good education, sending him to the College of Clermont and to the law school at Orleans, and looked forward to seeing him succeed to his own honorable trade and office; and that the son deliberately renounced this succession, chose the actor's profession, and at the age of twenty-one became a member of a troupe of players which he helped to form—these are the principal items of our positive knowledge of the youth of Molière. This scanty material has been overlaid with a rich embroidery of tradition and anecdote, to which criticism assigns various degrees of probability, but which can in no case have authority enough to be of any service in helping us to a knowledge of the discipline and development of his mind and talent. The same is true also for the following period of fifteen years, mainly spent in traveling in the provinces, during which he was obtaining the mastery of the instrument of language and of his other dramatic tools, and deepening and enriching that observation of life and that reflection on its facts that gave the materials on which those tools were to be exercised. The new troupe, which styled itself the *Illustre Théâtre*, had at its head the Béjart family, with which Molière connected himself later (1662) by marriage, and of which the most conspicuous member was Madeleine, a woman of beauty and brilliant talents, with the character of whose relations with Molière legend and conjecture have been unprofitably busy, but whose presence so near him in the intimate associations of the theatrical life must have had serious influence upon him. Compelled by a year of persistent failure to leave Paris, where it had made its trial of public favor in the then popular tragedy, the company returned fifteen years afterward (1658) with the fame of especial success in comedy. It was as purveyor of comic material for his troupe, of which he had meanwhile become manager, that Molière founded its prosperity, and at the same time prepared his own career as dramatic author. At first doubtless his work of composition was very slight, consisting merely in throwing into rough dramatic form whatever material came to hand, or adapting to the uses of his company dramatic works from foreign, particularly Italian, sources; but, however slight, it was sufficient to develop that alert, easy, and brilliant style that made even the two pieces which he brought back to Paris (*L'Étourdi*, *Le Dépit amoureux*) of such new and fresh charm that their success was immediate, and won for Molière the protection of the king's brother, and a permanent home in Paris for his players.

Molière, however, was not content with a comedy that redeemed by qualities of style the stereotyped characters and situations of the Italian fashion, and in 1659 he gave, as if to try both his own powers and the temper of the public, the *Précieuses ridicules*, a slight and rapid sketch, in one act and in prose, whose interest could not be sought in the very simple and transparent plot, but lay wholly in the satiric portraiture of features of contemporary society. In it was clearly foreshadowed his mature comedy of manners and character, in which he was to advance from the transient interest of passing fashions to the deeper and more permanent interest of the universal human passions; but in spite of the encouraging success of the *Précieuses ridicules*, he did not make this advance at once or rapidly. Besides a lingering weakness for tragedy, which led to the heroic comedy *Don Garcie de Navarre* (1661), a signal failure that rendered further experiment in that direction inexpedient, there were two serious impediments to the realization of his highest conceptions of comedy. The concern for financial success and the prosperity of his company, which as manager he was bound to feel, forbade him to be negligent of the public taste, and dictated those lighter and more extravagant farces that sacrifice the truth and interest of character to considerations of comic effect, and the royal favor enjoyed by Molière and his company since their return to Paris, which might have secured him a greater independence toward the public taste, was accompanied with no less serious restrictions of his complete artistic freedom; for as manager of the king's comedians he was frequently charged with the preparation of those semi-operatic comedies that were the delight of Louis XIV., and a constantly recurring feature of the great *fêtes* for which his reign is famous. Of the twenty-nine compositions written by Molière after he was finally established in Paris, no less than thirteen were produced directly in view of such festivities, and were intended by their great patron to be subordinate to the accompaniment of dance and music, for which they were hardly more than a pretext. It is not strange, therefore, that it was not till 1662 that Molière gave, in the *École des femmes*, an example of the mature development of his ideas. It is rather a striking mark of his genius and of the wealth of the materials with which observation had stored his mind that in the ten years that intervened before his early death (Apr. 17, 1673), in spite of all obstacles, and under the pressure of such various and absorbing tasks, he produced the series of great comedies that remain the glory of the French drama.

The form that comedy took in these mature and free exhibitions of his art, and of which we have glimpses also even in his farces and his pieces made to order in the striking vigor and truth in the drawing of their personages, is that of the serious comedy of character—serious, not because he ever renounced the use of his great comic gift, or sought to release himself from the comic dramatist's obligation to make his audience laugh, but because the subjects treated by him, the qualities of character and motives of conduct that he presents, and the human relations that he studies are of such profound and permanent concern. The preparation of woman for her *rôle* in society, the question of what that *rôle* really is (*L'École des femmes*, *Les Femmes savantes*); hypocrisy, the means that it uses and the evils that it works (*Le Tartuffe*, *Don Juan*); avarice as a mastering passion and its effects upon the normal human affections and instincts (*L'Avare*); selfishness and an easily sacrificed morality turning a sincere and honest heart to misanthropy (*Le Misanthrope*)—these are some of the more prominent themes of these serious comedies. These qualities of character are set forth, not in abstract types or personifications of a single passion, but in very lifelike, concrete individuals which a penetrating observation of life has endowed with great truth and vitality; and these motives of conduct and these human relations are exhibited in the careful grouping of these individuals and their action and reaction upon one another, which a sane reflection upon life has informed with great interest and value. The serious comedy of Molière hardly employs other means than these for its comic effect, which is none the less genuine and irresistible for being attained by such purely intellectual means. The intrigue is slight, and accessories of costume and scenery are dispensed with. A drawing-room with its ordinary furniture, and a company of men and women in their ordinary dress, furnished all the necessary material.

The following is a list of Molière's dramatic works, with the dates of their first production: *L'Étourdi*, 5 acts, verse (1653 or 1655); *Le Dépit amoureux*, 5 acts, verse (1656); *Les Précieuses ridicules*, 1 act, prose (1659); *Sganarelle, ou le Cocu imaginaire*, 1 act, verse (1660); *Don Garcie de Navarre*, 5 acts, verse (1661); *L'École des Maris*, 3 acts, verse (1661); *Les Fâcheux* (*comédie-ballet*), 3 acts, verse (1661); *L'École des femmes*, 5 acts, verse (1662); *La Critique de l'École des femmes*, 1 act, prose (1663); *L'Impromptu de Versailles*, 1 act, prose (1663); *Le Mariage forcé* (*comédie-ballet*), 1 act, prose (1664); *La Princesse d'Élide* (*comédie-ballet*), 5 acts, verse and prose; *Le Tartuffe*, 5 acts, verse (1664); *Don Juan*, 5 acts, prose (1665); *L'Amour médecin* (*comédie-ballet*), 3 acts, prose (1665); *Le Misanthrope*, 5 acts, verse (1666); *Le Médecin malgré lui*, 3 acts, prose (1666); *Mélicerte* (*comédie-ballet*), 2 acts (unfinished), verse (1666); *La Pastorale comique* (*comédie-ballet*), 1 act, verse (1667); *Le Sicilien* (*comédie-ballet*), 1 act, prose (1667); *Amphitryon*, 3 acts, verse (1668); *George Dandin* (*comédie-ballet*), 3 acts, prose (1668); *L'Avare*, 5 acts, prose (1668); *M. de Pourceaugnac* (*comédie-ballet*), 3 acts, prose (1669); *Les Amants magnifiques* (*comédie-ballet*), 5 acts, prose (1670); *Le Bourgeois gentilhomme* (*comédie-ballet*), 5 acts, prose (1670); *Psyché* (*tragédie-ballet*), 5 acts, verse (1671), Molière and Corneille joint authors; *Les Fourberies de Scapin*, 3 acts, prose (1671); *La Comtesse d'Escarbagnas* (*comédie-ballet*), 1 act, prose (1671); *Les Femmes savantes*, 5 acts, verse (1672); *Le Malade imaginaire*, 3 acts, prose (1673).

All previous editions of Molière's works are superseded for the student by that in the series *Les Grands Écrivains de la France*, edited by Eugène Despois and Paul Mesnard (10 vols., Paris, 1873–89). The tenth volume contains a life of Molière by Mesnard. A handy small edition, in two volumes, preceded by a notice by Sainte-Beuve, has been published. His works have several times been translated into English.

recently by Henri Van Laun (6 vols., London, 1875–77), and by C. H. Wall (3 vols., London, 1876–77). An excellent *Bibliographie Molièresque* has been prepared by Paul Lacroix (Paris, 1875). A. G. Canfield.

Molin, John Peter: sculptor; b. in Sweden, Mar. 17, 1814. In 1843 he went to Copenhagen to take lessons from Thorwaldsen, but the latter died six months later, and Molin was admitted into the studio of the medalist Christensen. He studied in Rome from 1845 to 1853, and on his return to Sweden he became a professor at the Art Academy in 1855. His group *The Wrestlers*, exhibited in London in 1862, secured him a European reputation. D. July 29, 1873. R. B. A.

Molina, mō-lee′năă, Juan Ignacio (in Italian, Giovanni Ignazio): Jesuit historian; b. in the province of Talca, Chili, June 23, 1737. He was educated by the Jesuits, and taught in their colleges, but did not join the order until after its expulsion from America (1767); he then went to Italy, where, in 1771, he was admitted to the society and took orders. After 1774 he resided at Bologna. He had already shown great talents, and was master of several languages; he now devoted himself to teaching, giving his leisure to the preparation of historical works on Chili. In 1776 he published anonymously *Compendio di storia del Chile*, and this was followed by *Saggio sulla storia naturale del Chile* (1782) and *Saggio della storia civile del Chile* (1787). The latter, especially, was very popular, and was translated into several languages, including English. He published various scientific papers, and the advanced doctrines which he taught led at one time to his temporary deposition from orders. A fortune which he inherited in 1815 was bequeathed to his native city to found a literary institute. Molina's works gave the first definite account of Chili, but he can hardly be called a profound historian. D. at Bologna, Sept. 12, 1829. H. H. Smith.

Molina, Luis: theologian; b. at Cuenca, in New Castile, Spain, in 1535; entered the order of the Jesuits in 1553; was Professor of Theology at the University of Evora, Portugal, for twenty years. D. in Madrid, Oct. 12, 1601. In 1588 he published his *Liberi Arbitrii cum Gratiæ Donis, Divina Præscientia, Providentia, Prædestinatione et Reprobatione Concordia*, which, under the form of a commentary on some parts of Thomas Aquinas's *Summa Theologiæ*, attempted to explain, on a new basis, the harmony between grace and free will. The Dominicans, of whom Aquinas is the chief glory, attacked the book and the Jesuits defended it. A heated controversy between the Thomists and Molinists ensued, the matter was referred to Rome, and Clement VIII., in 1597, appointed a commission, the celebrated Congregatio de Auxiliis, to examine it. The deliberations of this body lasted, with various interruptions, nine years, the only result being that the contestants were forbidden to denounce either Thomism or Molinism as heretical. Though discussion on the subject has been renewed at various times, no decision has been rendered by the Church.
Revised by John J. Keane.

Molina, Pedro: statesman; b. in Guatemala, in 1777; received an excellent education; became a physician, and was distinguished as a poet and a politician; was noted for the liberality of the political views which he inculcated in his writings; was one of the members of the first national executive in 1823; went as ambassador to Colombia 1825, and signed a treaty of alliance; represented Central America in the Congress of Panama 1826; was governor of Guatemala 1829, Secretary of State for Foreign Affairs 1832–33; was exiled by Carrera, and resided some years in Costa Rica; was deputy to the constitutional assembly 1848, and for many years president of the medical faculty and chief director of the University of Guatemala. D. about 1850.

Molina, Tirso, de: See Tellez, Gabriel.

Moline: city (incorporated in 1872); Rock Island co., Ill. (for location of county, see map of Illinois, ref. 3–C); on the Mississippi river, and the Burl. Route, the Chi., Mil. and St. P., and the Chi., Rock Is. and Pac. railways; opposite Rock Island, 2 miles E. of Davenport, Ia., 168 miles W. of Chicago. The three cities of Moline, Rock Island, and Davenport are connected by steam and street railways, ferries, and bridges, and all derive water-power for manufacturing from the river. The city is in a rich coal-region, and there are a number of productive mines in its vicinity. It has model water-works, gas and electric lights, 10 churches, 6 public-school buildings, 38 schools, public library (founded 1873), 2 national banks with combined capital of $250,000, 2 State banks with capital of $200,000, and 2 daily, 3 weekly, and 2 other periodicals. The industries include the manufacture of agricultural implements, malleable iron, steam-engines, carriages, buggies, and wagons, paper, lumber, cabinet and pipe organs, lead roofing, windmills, milling-machines, and furniture. Pop. (1880) 7,800; (1890) 11,995; (1900) 17,248. Editor of "Dispatch."

Molinet, mō′lĕĕ′nā′, Jean: chronicler and poet; the date of his birth is unknown. He was canon of Valenciennes, librarian of Marguerite of Austria, and historiographer of the house of Burgundy. D. at Valenciennes, 1507. He wrote a chronicle of Burgundy for the years 1474 to 1506, and a number of poems, *Le Temple de Mars*, *La Vigile des Morts*, *La Complainte de Constantinople*, etc. He turned the *Roman de la Rose* into prose, and gave a Christian interpretation to its allegory. His works are marked by an affectation of wit and by a pedantic Latinizing style which his example helped to accredit. A. G. Canfield.

Mol'inism: See Molina, Luis.

Moli'no del Rey [Span., king's mill]: a massive series of buildings half a mile N. of the castle of Chapultepec, near the city of Mexico. They were originally used as a flour-mill, afterward as a foundry of arms, and were occupied as a fortress by a portion of the Mexican army during the war between the U. S. and Mexico. On Sept. 8, 1847, the buildings were attacked and carried by storm by a division of the U. S. army led by Gen. Worth. The Mexicans were commanded by Leon and Perez. Each side had about 4,000 men, and the loss on both sides was heavy.
Revised by H. H. Smith.

Molinos, mō-lee′nōs, Miguel: mystic; b. near Saragossa, Spain, Dec. 21, 1627; studied at Pampeluna and Coimbra; settled, after being ordained priest, in Rome, where a great number of people chose him for their confessor; when afterward his papers were seized, they included about 20,000 letters from persons asking for his spiritual advice. In 1675 he published his *Guida Spirituale*, which attracted great attention and was translated into different languages. It teaches that true godliness consists in uninterrupted communion with God, established by contemplation, and was the foundation of the so-called Quietism which afterward found its most striking development in Madame Guyon. The Jesuits, however, found that this view endangered the doctrine of good actions. Pope Innocent XI. condemned the book in 1687; Molinos recanted, but was imprisoned for the rest of his life in a Dominican monastery at Rome, where he died Dec. 29, 1696. See Bigelow, *Molinos the Quietist* (New York, 1882).

Molise: See Campobasso.

Mollenhauer, Edward: violinist and composer; b. in Erfurt, Germany, Apr. 12, 1827: when nine years old made a concert tour as a violinist with his two elder brothers, Friedrich and Heinrich; studied under Ernst and Spohr; fled to England to avoid becoming a soldier, and went to the U. S. in 1853, settling in New York. He has played in many concerts as a violin soloist, and has taught many violin scholars. He has composed much for his instrument: three symphonies, some chamber music, songs and miscellaneous pieces, and three operas, *The Corsican Bride* (1861); *Breakers* (1881); and *The Mask Ball*. D. E. Hervey.

Möl'ler, Poul Martin; writer; b. in Denmark in 1794; studied theology, but became a private tutor and later teacher at a Latin school in Copenhagen; in 1818 took an active part in the literary struggle of that time as a supporter of Oehlenschläger; from 1819 to 1821 was chaplain on a China merchantman; from 1827 to 1831 was Professor of Philosophy at the University of Christiania; from 1831 to 1838 held the same position at the University of Copenhagen. Besides a number of songs, he published a translation of the first six books of the *Odyssey* (1825), the earliest in Danish, philosophical and critical articles, and an unfinished novel, *En dansk Students Æventyr* (The Adventures of a Danish Student). This last, his principal work, is one of the most characteristically national productions in Danish literature. It is full of rollicking fun, and shows deep insight into human character. D. 1838. See *P. M. Möllers efterladte Skrifter i et Udvalg ved Chr. Kinther* (Copenhagen, 1873). D. K. Dodge.

Mollus'ca [Mod. Lat., deriv. of Lat. *mollis*, soft]: that great division or branch (phylum) of the animal kingdom of which the cuttlefishes, squids, snails, slugs, clams, oysters,

etc., are familiar examples. The name is given in allusion to the soft character of the tissues, a point of no importance. That branch of zoölogy which treats of molluscs is sometimes termed malacology and sometimes conchology, but both terms are passing into disuse.

To make more clear the essential features of all molluscs we construct what we may term an ideal or schematic animal which will represent the conditions found in no one species, but rather a composite of all forms. By exaggeration of some parts and by modification or even suppression of others, this typical mollusc may be made to represent all known forms. Such a typical mollusc is bilaterally sym-

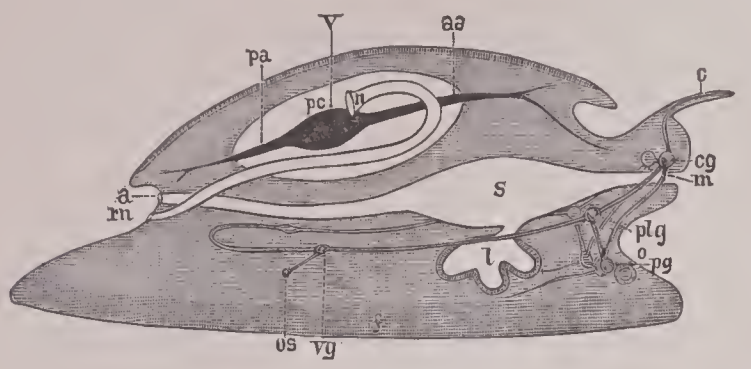


FIG. 1.—Diagrammatic longitudinal section of a mollusc: *a*, vent; *aa*, anterior artery; *c*, tentacle; *cg*, brain; *f*, foot; *l*, liver; *m*, mouth; *pg*, pedal ganglion; *plg*, pleural ganglion; *n*, nephridium; *o*, ear; *pa*, posterior artery; *pc*, pericardium; *os*, organ of smell; *rn*, right nephridial opening; *s*, stomach; *v*, ventricle of heart; *vg*, visceral ganglion.

metrical; its lower surface is developed into a strong muscular creeping-disk, the *foot*; its upper surface is thin, and in its center is a *shell-gland* which has the power of secreting the calcareous *shell* so characteristic of these animals. Around the shell-gland the wall of the body projects as a double fold in every direction, forming the *pallium* or *mantle*, and inclosing between it and the body and foot a *mantle-cavity*. At the anterior end of the body is the *head*, bearing a pair of sensory *tentacles*, and the nearly terminal mouth; the *vent* is in the median line at the posterior end of the body, and the alimentary canal with various convolutions connects the two. In the majority of forms the mouth is provided with jaws and a peculiar ribbon-like structure, armed with hooks or teeth, and variously known as the *radula*, *odontophore*, or *lingual ribbon*. This odontophore is a veritable file, and is used either to rasp the food into small particles or to drill holes through solid substances. The *stomach* is large, and is surrounded by a voluminous liver, while the *intestine* is variously wound and contorted in its course to the vent. The *heart* is dorsal; it consists of a median *ventricle* and a pair (right and left) of *auricles*, and pumps the blood received from the gills (hence arterial) through the arteries. There are no capillaries, the circulation being largely lacunar, i. e. through spaces without proper walls. Surrounding the heart is a *pericardium* or chamber which contains no blood and which is of especial interest, since it is the true body-cavity or *cœlom*, comparable with that of the annelids. This pericardium is connected with the external world by means of a pair of convoluted tubes (*organ of Bojanus*, *nephridia*) which function as kidneys. Their ducts empty into the posterior mantle-cavity, one on either side of the anus. The sexual glands (*gonads*) are also paired, and the sexual openings are near those of the excretory organs. The respiratory organs consist of a pair of

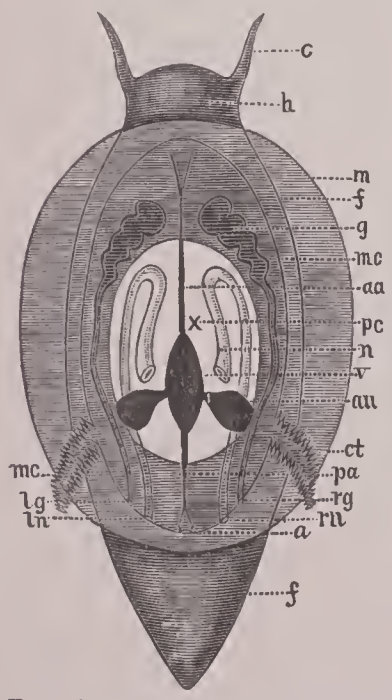


FIG. 2.—Diagram of a mollusc viewed as a transparent object from above: *au*, auricles of heart; *ct*, ctenidium (gill); *g*, reproductive organ; *h*, head; *lg*, left genital opening; *ln*, left nephridial opening; *m*, mantle; *mc*, inner boundary of mantle-cavity; *rg*, right genital opening. Other letters as before.

comb-like gills (*ctenidia*) in the posterior mantle-cavity, but these may disappear, their place being taken, functionally, by gills developed from other parts of the body or by other respiratory structures (lungs). The nervous system is complicated, and consists of several nerve-centers (*ganglia*) connected by nerve-cords (*commissures*). These paired ganglia are (1) the *cerebral*, above the mouth; (2) the *pleural*, on the sides near the head; (3) the *pedal*, in the foot; and (4) the *visceral*, on the sides of the body near the ctenidia.

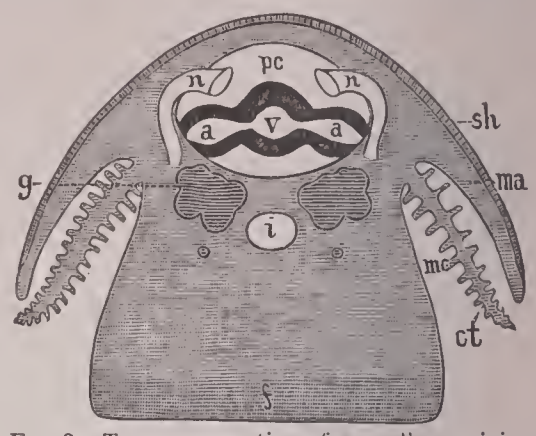


FIG. 3.—Tranverse section of a mollusc: *i*. intestine; *ma*, mantle; *sh*, shell. Other letters as before.

The typical molluscan larva is called a *veliger*, and presents many points of similarity to the larva (trochosphere) of an annelid, or to the larva of a turbellarian worm. It is characterized by the possession of a disk-shaped shell-gland with a delicate shell, a rudimentary foot, and a peculiar organ, the *velum*, consisting of a fold of skin above the mouth, armed with long vibratile cilia which serve as locomotor organs when the larva first escapes from the egg.

With this schematic mollusc as a starting-point, the structure of any of the 20,000 species may readily be understood. A few of the modifications presented by the various structures and organs may be considered here, the reader being referred to the various manuals of comparative anatomy for further details.

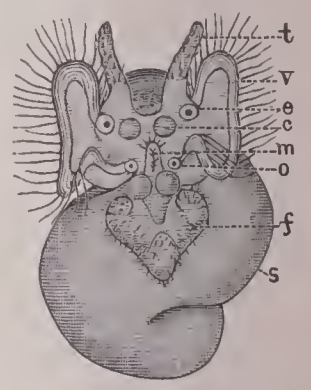


FIG. 4.—Veliger stage of *Vermetus* (after Lacaze-Duthiers): *c*, brain: *e*, eye; *f*, foot; *m*, mouth; *o*, ear; *s*, shell; *t*, tentacle; *v*, velum.

The Foot.—The primitive flat creeping-disk described above occurs in the chitons, in most Gasteropods, and in certain Lamellibranchs. It may at times be divided transversely so that three regions are recognizable, an anterior *propodium*, a middle *mesopodium*, and a posterior *metapodium*. Lateral outgrowths from the foot may also occur, *parapodia*, arising from the creeping surface, *epipodia* from its base. In most Lamellibranchs the foot is compressed, taking a tongue-like form or hatchet shape; in the Pteropods the parapodia are highly developed, and take the wing shape which gives the group its name. In the Cephalopoda two views obtain as to the foot. In one the siphon (see below) is regarded as the homologue of the foot of the Gasteropod; in the other the circle of arms around the mouth. In many molluscs the foot is provided with glands which in many Lamellibranchs secrete strong threads (*byssus*) which fasten the animal to some support.

The mantle is most primitive in the chitons and limpets, and from this condition modifications in various directions may be traced, more or less co-ordinated with the development of a *visceral sac*. This latter name is used to indicate that portion of the body which contains most of the viscera, and which may attain considerable size. It is least prominent in the Lamellibranchs, and here the mantle is developed chiefly as two lobes, one on either side, which envelop the whole body and foot. The lower edges of these mantle lobes may remain free or they may unite to a greater or less extent with openings for the protrusion of the foot and for the ingress and egress of water. These latter openings are always posterior, and the mantle may be prolonged into tubes (*siphons*) sometimes several times the length of the body. In the Cephalopods the visceral sac is greatly developed, and here the mantle is drawn out into a conical sac; in the Scaphopoda this type of modification reaches its extreme, and as the mantle is open at its dorsal end it is tubular in this group. In most Gasteropoda the visceral sac is also large, but it here undergoes a peculiar modification which needs mention. As it grows upward and backward

it topples to the one side or the other, and the result is an interference with the primitive symmetry characteristic of the typical mollusc. As a result the mantle-cavity of one side is more or less completely obliterated, the vent is forced to the opposite side, carrying with it sexual and excretory openings as well as the gills. In the extreme cases the vent is carried to the anterior end of the body, and one of the gills and one of the genital and nephridial ducts may persist, this being placed, by the twisting of the body, on the side opposite to that where it really belongs. The body may at the same time acquire a secondary symmetry, and all clews to the torsion are then to be traced only in the internal structures.

The shell is a characteristic structure, and as it is so easily preserved it is the best known part of the mollusc. It is formed primitively by the shell-gland, but the mantle may also participate in its secretion. It consists chiefly of carbonate and phosphate of lime plus a varying amount of a peculiar horny substance to which the name *conchiolin* has been given. From the method of its formation—secreted by the outer surface of the mantle and shell-gland—it follows that the newer layers of the shell are on its under or inner surface, and as the animal increases in size these newer layers project beyond the older ones, thus producing on the outer surface concentric striæ the *lines of growth*. The mantle is often ornamented with pigmented spots, and these reappear in the shell itself, giving it its peculiar markings, or there may be lobes on the margin of the mantle producing spines or ridges upon the shell. The shell layers are not all formed in the same way. In some the particles of lime have the shape of minute prisms, and in such cases the shells have a dull, earthy or porcelaneous appearance. In other forms the shell is marked with very fine lines which produce diffraction spectra, and such *nacreous* shells are prized for their irideseent or rainbow-like hues. The delicate play of color in pearls is due to the same cause.

The form of the shell varies greatly, but all forms may be reduced to the one type—a flattened cone—already mentioned, and in all but the chitons it is at first a single piece. In the Lamellibranchs this single shell breaks in the median line soon after hatching, and the resulting right and left halves form the two valves so familiar in the oysters and clams. In the case of some Gasteropods (limpets) the shell varies but little from its primitive condition, but in the others the bending of the visceral sac converts the elongate cone into a spiral, which is either right-handed or left-handed accordingly as the sac inclines to the one side or to the other. Most Gasteropod shells are right-handed, but left-handed (*sinistral*) shells occur sometimes as abnormalities in typically dextral species. In many Gasteropods the shell is more or less degenerate. In the slugs (*Limax*, etc.) it occurs only as an internal rudimentary plate, and in the naked molluscs (Nudibranchs) it is present only in the young. In the Cephalopods the shell is either external or internal, the latter being a secondary condition. In the nautilus it is divided internally by transverse partitions into a series of chambers, the purpose of which is not thoroughly understood. The internal shell in the Cephalopods may be illustrated by the "cuttle-bone" of the shops; but space will not allow a consideration of the relations of this to the *pen* of the squids and to the shell and *guard* of many fossil Cephalopods. The shell of the paper nautilus (*Argonauta*) is not a true shell, but rather an egg-protecting case.

In some Gasteropods the dorsal surface of the metapodium (see above) has the power of secreting limy matter, and thus is formed a horny or calcareous door or *operculum*

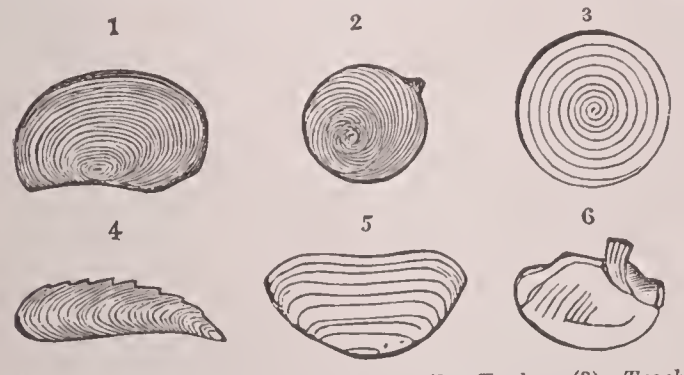


Fig. 5.—Opercula of (1) *Ampullaria*, (2) *Turbo*, (3) *Trochus*, (4) *Strombus*, (5) *Purpura*, (6) *Nerita*.

which closes the aperture of the true shell when the animal is retracted into it. From its method of formation this is clearly not the other valve of the univalve shell, comparable to the second valve of a bivalve shell, as was once held.

The various parts of the shell have received names, some of which may be defined here since they are important in the description of the various groups. In the Lamellibranchs (bivalves) the *hinge* is the line of meeting of the two valves or halves of the shell, and it is provided with an elastic *ligament*, the function of which is to open the valves when the *adductor muscles* which draw them together are relaxed. On the inner surface of the shell may be seen the impressions of these adductor muscles, one or two in number, as well as those produced by the *retractor muscles* of the foot. Along the margin is the *pallial line* caused by the attachment of the margin of the mantle, and in those forms with a well-developed siphon (see above) this line has a deep indentation (*pallial sinus*) behind, produced by the attachment of the muscles which retract these tubes. On the outer surface near the hinge is a prominence (*umbo*) around which, as a center, the lines of growth are arranged, and in most bivalves (except *Nucula*, etc.) this umbo points toward the anterior end. In the univalves the opening of the shell is the *aperture*, the axis of the spiral is the *columella*, the last whorl is the *body-whorl*, and the other whorls form the *spire*. The two edges of the aperture are the *lips*, and the place where they join the other whorls the *suture*. The spire is *posterior*, and both anterior and posterior margins of the aperture may be produced in grooves or *canals* named according to their position. The outer surface shows more or less clearly the lines of growth parallel to the outer lip, and in some species there are periods of rapid growth alternating with lines of rest. In these latter periods there is formed a thickened lip, which being left behind at the next time of growth forms a ridge or varix on the outer surface.

The odontophore occurs in all molluscs except the Lamellibranchiata and isolated individuals in other groups, and its presence or absence was formerly made a basis of division of the molluscs into two great groups. The odontophore consists of an elastic ribbon upon the floor of the throat, replaced by growth at its posterior end as rapidly as it wears away by use in front. It passes over a cartilaginous cushion, like a belt over a pulley, and is moved back and forth by appropriate muscles. On its upper surface are arranged, row after row, numbers of recurved hook-like siliceous teeth, the whole ribbon being not inaptly compared to a flexible file. The number and arrangement of these teeth vary in the different families and genera, and hence the characters presented by the ribbon have been seized upon as an aid in classification. In each transverse row there may be five different kinds of teeth; in the center a *rhachidian* tooth flanked on

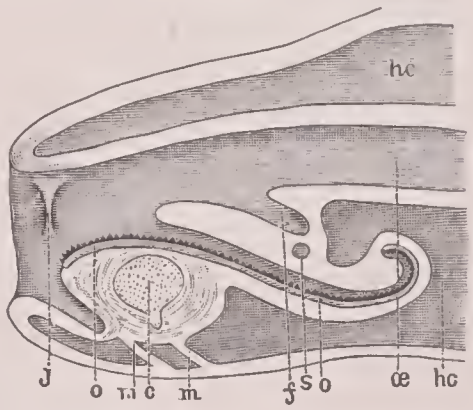


Fig. 6.—Diagram of molluscan mouth and odontophore (after Lang): *c*, tongue cartilage; *f*, fold of radula sheath; *hc*, cavity of head; *j*, jaw; *m*, muscle, *o*, odontophore; *œ*, œsophagus; *s*, opening of salivary gland.

Fig. 7.—Dentition of *Chitonellus*.

either side by one or several rows of somewhat similar *pleural* teeth, and outside of these a varying number of *uncini*. Sometimes the pleuræ may be suppressed, and in certain groups the rhachidian teeth may disappear. The number of teeth on the odontophore vary between very wide limits. Thus in *Eolis drummondi* the total is 30, in *Littorina litorea* 3,500, in *Helix pomatia* 21,000, and in *Helix ghiesbreghti* 39,596. A *dental formula* has been devised to represent diagrammatically the teeth in a transverse row. Thus in *Chitonellus* (see cut) the formula is 5 + 3 + 1 + 3 + 5, indicating that there are five uncini and three pleurals on either side and a single rhachidian in the middle,

while the formula for *Murex* is 1 + 0 + 1 + 0 + 1, the pleurals being absent.

The respiratory organs consist primitively of at least a pair of comb-like or feather-like gills, but the fact that in the chitons and in the Nautilus—the most primitive of the Cephalopods—there is more than one pair, points to the conclusion that this may have been the primitive condition. Each gill possesses two blood-vessels, an artery which brings venous blood from the body, while the vein carries it in the purified condition to the auricle of the heart. At the base of each gill is a peculiar sense-organ, regarded as an organ of smell. As this primitive type of gill may disappear, its functions being taken by other structures, the name *ctenidium* has been applied to it (Gr. κτείς, comb + εἶδος, form), to avoid confusion with other gill-like structures. The ctenidium has undergone least modification in the Lamellibranchs, Cephalopods, and lower Gasteropods. In the other Gasteropods occurs that twisting of the body whereby the gills change sides, and by which one of them may entirely disappear, and with its loss one of the auricles of the heart becomes obsolete. In others of the Gasteropods and in the tooth shells (Scaphopoda) the ctenidia may entirely disappear, their place being taken either by "adaptive gills" developed from almost any part of the body or by so-called lungs, as in our land snails or, lastly (Scaphoda), by the general body walls. The *lungs*, just referred to (see Pulmonata), are formed by a growth together of the mantle edge with the wall of the body, leaving but a small respiratory pore which communicates with the mantle cavity, now converted into the pulmonary sac. The inner upper surface of the sac is lined by a delicate membrane in which a rich network of blood-vessels occurs. The transfer of gases takes place here in the same way as in the human lung. Certain of the lung-bearing Gasteropods have become aquatic (*Lymnæidæ*), but these are forced to come occasionally to the surface and then to breathe like their terrestrial relatives. In the deep water of the Lake of Geneva, however, there occurs one of these Pulmonates (*Lymnæa abyssicola*) which fills its pulmonary sac with water, but the sac seems to have undergone no essential modifications.

Nervous System and Sense Organs.—The nervous system presents too many complications for description here, further than is hinted at in the account of our schematic mollusc. One feature, however, needs mention. In the twisting of the body as a result of the weight of the visceral sac, the commissures leading to the visceral ganglia may become included, the result being that the cords become crossed, and that visceral ganglion which morphologically belongs to the right side is carried to the left and *vice versa*. The organs of special sense deserving notice are the eyes and ears. The olfactory organ has already been mentioned. In most forms the eyes are borne on the head and present varying degrees of complexity. In all cases they are formed by an involution of the external skin, and in the Nautilus the interesting feature occurs of an image-forming eye without a lens, the structure being a reproduction of the "pin-hole camera," which is so familiar. In the Lamellibranchs, where a head is absent, the eyes, when present, occur in other parts. In some they are placed at the ends of the siphons, while in the scallops (Pecten) they are placed at regular intervals along the margin of the mantle, where they appear like veritable jewels. The ears, which are almost universally present, are epithelial sacs in close proximity to the pedal ganglia. The lining cells of these sacs (or *otocysts*) are connected with nerve-fibers, and the cavity is provided with (1 to 100 or more) hard bodies (*otoliths*), which, set in vibration by the sound-waves, hit the sense-cells and thus stimulate the nerves.

Class I. Amphineu'ra. Bilaterally symmetrical marine molluscs with two pairs of longitudinal nerves, untwisted, with ganglion-cells their whole length, and connected by numerous transverse cords.

Order I. Placoph'ora (or Polyplacoph'ora) Amphineura with an oval outline; above the body is protected by eight plates of shell overlapping like shingles. Below (except in *Chitonellus*) is a large creeping foot. In the mantle-cavity are numerous gills (*ctenidia*), and into it empty the paired reproductive and excretory ducts. The median heart is provided with two auricles; the head is not distinct, and cephalic tentacles are lacking. Eyes are usually said to be lacking, but in some species the shells are covered with sense organs (*æsthetes*), which Blumrich regards as tactile. Some of these, however, become modified into organs which, structurally at least, are eyes. A lingual-ribbon is present. The chitons (see Chiton) are comparatively few in number, and most species live in shallow water.

Order II. Solen'ogas'tres. Represented by a few worm-like molluscs (*Chætoderma*, *Neomenia*) from the deeper seas, in which a shell is lacking; the cuticle contains calcareous spicules, the mantle-cavity is reduced, and the foot is rudimentary or even entirely absent.

Class II. Gasterop'oda. Embraces the snails, slugs, etc. Asymmetrical molluscs with a distinct tentacle-bearing head, a large creeping-foot, the viscera contained in a large protruding dorsal visceral sac (which may be secondarily lost), which is usually covered by a univalve shell (generally spirally coiled) into which the whole body may be retracted for protection. A lingual ribbon is always present. The class is divided into three orders—Prosobranchia, Pulmonata, and Opisthobranchs—for the details of which reference should be made to the article Gasteropoda.

Class III. Scaphop'oda. Symmetrical marine molluscs in which the body is elongated in a dorso-ventral direction, and the mantle is converted into a tubular sac which secretes a slightly curved tubular shell open at either end. Ctenidia are lacking, and the strong foot forms an efficient digging organ. These forms (*Dentalium*, etc.), which receive their name, tooth-shells, from their resemblance to an elephant's tusk, have very little of popular interest.

Class IV. Lamellibranchiata. Symmetrical molluscs with the laterally compressed bodies inclosed in a bivalve shell, with a hinge above, the valves opening freely (except in a few sedentary forms) below. The valves are opened by an elastic hinge ligament, and are closed by means of adductor muscles which pass from one to the other. The mantle-cavity is large, and contains the usually broad lamellate gills, there being two on either side. Between the gills is the visceral mass, the foot extending from its lower surface. A distinct head is lacking, as are all of the cephalic organs—eyes, tentacles, radula, etc.—found in the other molluscs. Nephridia and sexual organs are paired, and the heart in most forms has two auricles. Some are dioecious, some hermaphrodite; all are aquatic, most living in the sea. Five orders are recognized: *Protobranchia*, *Filibranchia*, *Pseudolamellibranchia*, *Eulamellibranchia*, and *Septibranchia*. For details, see Lamellibranchiata.

Class V. Cephalopoda (*q. v.*). In these bilaterally symmetrical forms the body is usually elongated in the dorso-ventral direction, the mantle-cavity being large. The foot is divided into two portions. Of these the anterior becomes produced into a circle of arms or tentacles surrounding the mouth, while the rest is formed into the siphon, to be mentioned again below. The arms—eight, ten, or many in number—are provided with numerous sucking-cups, by means of which the animals are enabled to seize their prey. In many forms one of these arms, in the male, can be charged with packets of sperm, and then it is separated from the body and becomes attached to the female. The siphon is a tube on the lower surface of the body, produced by the union of the edges of the foot; into it empty the alimentary canal and the duct of the ink-gland, and it forms, besides, the most efficient organ of locomotion, the water which is taken into the mantle-cavity being forcibly expelled through this tube, the reaction carrying the animal swiftly through the water. The mouth is always provided with an odontophore, and it has, besides, a pair of horny jaws, shaped much like those of a parrot. The auricles and the ventricles of the heart are always separate, and the auricles may be either two or four in number, the number always agreeing with that of the gills. Another feature is the presence, in all the Dibranchiate forms, of an ink-bag which secretes a colored fluid which is discharged, making clouds in the water whenever the animal wishes to escape from its enemies. Many species have the power of changing the color of the body by means of curious expansible color-bearing cells (chromatophores) situated in the skin. In the rapidity and extent of these changes they far excel the famed chameleon. The nervous system is highly developed, and the central portion or brain is inclosed in a cartilaginous case recalling the vertebrate skull. The sense-organs, especially the eyes, are also highly developed. The eyes in the Nautilus are built upon the principle of the "pin-hole camera," but in the others a lens is present, and the whole closely simulates the visual organ of the vertebrates, although developed in an entirely different manner.

The Cephalopoda are divided into two orders based, among other things, upon the number of gills. In the Tetrabranchiata there are four gills, and in the single existing

genus, *Nautilus*, there is a coiled external shell, the interior of which is divided into chambers, in the outer one of which the animal lives. In geological times this order was much more numerous, Ammonites and Nautiloids being very abundant in the Palæozoic and Secondary rocks. In the Dibranchiata there is a single pair of gills, and the shell, when present, is rudimentary and internal. The Dibranchiates are subdivided into two groups, the Octopoda with eight arms and the Decapoda with ten. To the Octopoda belong the cuttlefish proper, and the cuttlebone, fed to birds, is the internal shell of these forms. In the case of the paper nautilus an external shell is built, but this occurs only in the female, and the shell, which is in reality but a case for the eggs, is formed, not by the mantle, but by a pair of expanded arms. In the Decapoda are grouped the squid and their allies, and of these the giant squid of Newfoundland deserve especial mention. Only recently have they been brought to the attention of naturalists. The largest one known measured 20 feet from the beak to the end of the body, while one of the arms was 35 feet in length. The smaller squid are caught in large numbers as bait for cod.

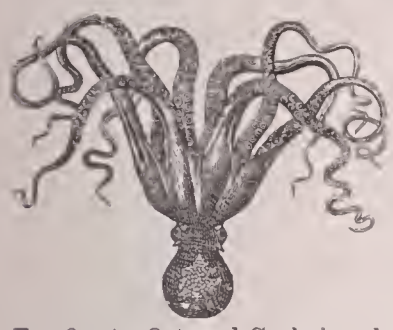


FIG. 8.—An Octopod Cephalopod: *Octopus tuberculatus* (about one-tenth its natural size).

The literature of the Mollusca, especially that descriptive of the shells, is enormous. In spite of its age, the best general work is Woodward's *Manual of the Mollusca* (3d ed. 1875). The best account of anatomy and embryology will be found in Lang's *Lehrbuch der vergleichenden Anatomie* (1892). Several authors have attempted monographs of all known species. Of these the most complete are the works of Kiener, Martini and Chemnitz, and Tryon. See PALEONTOLOGY. J. S. KINGSLEY.

Molluscoi'dea [Mod. Lat.; *mollus'ca*, mollusc + Gr. *εἶδος*, appearance, form, likeness]: a name applied by Henri Milne Edwards in 1844 to a group of animals containing the Brachiopods, Polyzoans, and Tunicates. These are now distributed in other classes, and the term is not now used in systematic zoölogy. See BRACHIOPODA, BRYOZOA, TUNICATA, and PALEONTOLOGY. F. A. L.

Mollymawk: the common or almost universal name among English-speaking sailors for the smaller albatrosses, *Diomedea brachyura*, and *D. melanophrys*. It is a modification of the German *mallemuck*, applied to the fulmar petrel (*Fulmarus glacialis*), which in turn came from the Dutch *mallemugge*, a name for small flies or midges which associate in swarms. F. A. L.

Mo'loch, or **Molech** [from Heb. *mōlekh*, deriv. of *melekh* (: Arab. *melik*), king], called also **Milcom** (1 Kings xi. 5) and **Malcham** (Zeph. i. 5): the fire-god of the Phœnicians (a modification or hypostasis of Baal, the sun-god), but spoken of in Scripture as more especially "the abomination of the Ammonites." That children were sacrificed to this deity is not to be questioned, although "passing through the fire to Molech" may not always mean so much. Solomon and other later Kings of Judah are mentioned as worshiping it, but the captivity seems to have effectually extirpated his cultus. Diodorus Siculus (xx., 14) describes a brazen image used among the Carthaginians in sacrificing children to Cronos or Saturn. Revised by S. M. JACKSON.

Molokai, mō-lō-kaa'ĕē: the middle island of the Hawaiian group, and one of the smallest. It is 35 miles long by 6 broad, contains about 175 sq. miles, and is thinly populated. It is flat in the center, but elevated at the ends; the western part is arid, the eastern wooded. There is a colony of lepers on the island, numbering about 700. On the island Oahu, to the W., is an asylum for the children of these lepers. Pop. Molokai and Lunai (1900), 2,504. M. W. H.

Molting: See MOULTING.

Molt'ke, HELMUTH CARL BERNHARD, von: field-marshal; b. Oct. 26, 1800, at Parchim, in Mecklenburg; was educated at the Military Academy of Copenhagen; entered the Prussian service in 1822, and was appointed a member of the staff in 1832. He devoted himself with great energy to the scientific part of his office, and published in 1835 a work on the Turko-Russian war of 1828–29. This war, as all questions relating to the Orient were of great interest to Prussia, led Moltke, who was thoroughly conversant with them, to make a journey to Turkey in 1835. The sultan, Mahmud, to whom he was introduced, and whose confidence he enjoyed, procured for him a furlough of several years, during which time he aided the sultan by his advice, both in the reorganization of the Turkish army and in the improvement of the fortifications of Silistria, Shoomla, Varna, Roostchuk, and the Dardanelles. Together with several other Prussian officers on furlough, he accompanied the Turkish army in the campaigns against the Kurds and against Mehemet Ali, Viceroy of Egypt. After the death of Sultan Mahmud he returned home, and published in 1841 *Letters on the Situation in Turkey in the Years 1835–39* (1841), and a map of Constantinople and the Bosphorus on the scale of 1 : 25,000. In 1846 he was appointed adjutant to Prince Henry of Prussia, who lived in Rome, and the fruit of his residence in this city was a map of its surroundings. After the death of the prince in 1847, he was attached to the governor-general on the Rhine, and became chief of a division of the staff in 1848, chief of the staff of the Fourth Army-corps from 1849 to 1855, adjutant to Prince Friedrich Wilhelm in 1856, and chief of the staff of the whole army in 1858. In this prominent position he made his name immortal as a general. Under his inspiriting leadership the staff became a most convenient and effective means of commanding the army, and in the subsequent wars his plans and dispositions resulted in an unbroken series of brilliant victories. For the achievement of such results the presence of the king was of vital importance. In 1866 and in 1870–71 the latter led as commander-in-chief, and gave absolute authority to Moltke's dispositions. On a minor field, in 1864 against Denmark, Prince Friedrich Karl having received the command in April, Moltke led the army for the first time in war, having drawn up beforehand the plan of the whole campaign. In 1866, in the war against Austria and her allies, he entered a larger theater, and showed his strategical talent in a most brilliant manner. In June, 1866, he was made a general of infantry, and after the short and astonishing campaign was finished the king gave him the highest Prussian order, that of the Black Eagle, and the Diet voted him a dotation. He was elected a deputy to the North German Diet in the next year. Anticipating the French attack, he planned a campaign against France immediately after the Austrian war. This plan was laid before the king in 1868, and followed out in 1870 as far as such a plan could be followed—that is, with respect to the organization of the army and the choice of the first point of attack. The French campaign of 1870–71 is probably one of the most brilliant that have ever been fought, and although its entire success can not be ascribed to Moltke, as many different agencies were at work, the larger share is nevertheless his due. Although possessed of the highest theoretical education, he was never caught by a theory, but surveyed with admirable freedom the changing incidents of war, and acted in accordance with them. With him the greatest audacity of plan was connected with a perfectly cool and sober calculation in the execution; and this was his greatness. On the day of the capitulation of Metz the king made him a count; on the conclusion of the armistice he gave him one of the five grand crosses of the Iron Cross, and on the day of the return of the troops to Berlin he made him a field-marshal. He also received a dotation of 300,000 thalers, and the freedom of many cities was presented to him. His ninetieth birthday was celebrated in Berlin with great magnificence. He was not very talkative, and as he was thoroughly conversant with several languages, people said of him, epigrammatically, that he was silent in seven languages. Among the works which he partly wrote, partly edited, are *The Italian Campaign of 1859* (1863); *The German Army* (1871); and *The Franco-German War* (1872). He was placed on the retired list of the army in 1888 and appointed president of national defense. D. in Berlin, Apr. 24, 1891. Revised by JAMES GRANT WILSON.

Moluc'cas, or **Spice Islands**: a large group of islands of the Malay Archipelago, lying between Celebes and New Guinea, between lats. 3° S. and 6° N., and between lons. 126° and 131° E. Total area about 42,000 sq. miles. They are all of volcanic origin, high, mountainous, and exceedingly fertile. The forests, which cover the mountains to their very tops, contain teak, ebony, sandal, iron, and satin wood, besides palms, breadfruit trees, and many varieties of the finest fruit-trees. Rice, sage, cotton, indigo, coffee, and sugar are grown; the nutmeg and the clove are indigenous to

all the islands, but the Dutch have confined the cultivation of the clove to Amboyna and the Uliassers, and that of the nutmeg to the Banda islands; on the other islands the trees of native growth have been rooted out. The original inhabitants were Malays; Arabs, Hindu, and Chinese have since immigrated and settled, and there are many mestizoes, descendants of Europeans—Portuguese, Spaniards, or Dutch—and natives. The northern division of the archipelago, comprising the islands of Ternate, Tidore, Batjan, Makian, Motir, and the Obi group, and forming the residency of Ternate, which contains about 100,000 inhabitants, is only indirectly under Dutch Government, while the southern division, comprising Amboyna, the Banda islands, and the Uliassers, and forming the two residencies of Amboyna and Banda, which together contain about 242,000 inhabitants, is governed directly as a province of the motherland. The northern division is inhabited largely by Mohammedan pirates; the southern by Christians in orderly communities. The Dutch have possessed these islands since the beginning of the seventeenth century. See AMBOYNA and BANDA ISLES.

Revised by M. W. HARRINGTON.

Mo'ly [= Lat. = Gr. *μῶλυ*]: a fabulous herb, a sovereign remedy for all diseases, which Mercury gave Ulysses as a counter-charm against Circe. The ancients identified it with a species of garlic. A wild Oriental garlic is now called *Allium moly*; it is a showy plant, cultivated under the name of golden garlic for ornament.

Molyb'denite: the natural sulphide, a mineral crystallizing in the hexagonal system, with eminent cleavage, and occurring commonly foliated or in highly flexible, inelastic scales. In its crystallization, hardness (1–1·5), lead-gray color, and metallic luster it much resembles graphite, but is distinguished from that mineral by its streak, which is lead gray, its specific gravity, 4·6, and by emitting sulphurous fumes before the blowpipe. It is met with in gneissoid, granitic, and other crystalline rocks. The natural dioxide, molybdic acid, occurs as *molybdite*, a yellow earthy mineral, and also combined in several minerals, as with lead in wulfenite.

Molybde'num [from Mod. Lat. *molybdæ'num*, from Lat. *molybdæ'na* = Gr. *μολύβδαινα*, galena or litharge, deriv. of *μόλυβδος*, lead]: an elementary metal, occurring in a well-known mineral which is so extremely similar to graphite or black lead that it was first discovered in 1778 by Scheele to yield the peculiar oxide known as *molybdic acid*. A few years later, in 1782, Hjelm isolated its metal. Molybdic acid occurs native, as *molybdite* or molybdic ocher, of which there are several American localities. Of the native sulphide, *molybdenite*, there are quite a number of localities in America. Its most important compound, practically, up to this time, is the compound of molybdic acid with ammonia, used in chemical analysis for the detection and determination of phosphoric acid.

Revised by IRA REMSEN.

Mombasa: an important town on a coral island near the east coast of Africa, in 4° 4′ S. lat., with one of the best harbors on that coast (see map of Africa, ref. 6–G). Founded by the Arabs after they began their occupation of the east coast in the eighth century, seized by the Portuguese in the sixteenth century, and from early in the seventeenth century the possession of the rulers of Muscat and Zanzibar, it was ceded (1891) in perpetuity to the Imperial British East Africa Company, and is the capital of their territory Ibea. It is comparatively healthful, its harbor has been greatly improved, many new houses have been built, and it is to be the coast terminus of the railway to Victoria Nyanza. Mombasa is the starting-point of many caravans to the interior. Pop. about 25,000.

C. C. ADAMS.

Moment: a term used in mechanics, with several significations. The moment of a force with regard to an axis is the product of the force by a certain function of its position with regard to the axis; it is the measure of the tendency of that force to cause rotation about the axis. If the axis and force are at right angles, the moment is simply the product of the force by its distance from the axis, and in that case the moment of the force may be said to be taken with regard to the point in which the perpendicular plane through the force meets the axis. If there be several forces acting in the same plane, the sum of their moments, with regard to an axis perpendicular to the plane, or a point in the plane, taken positively or negatively, according to the direction in which they cause rotation, is called the resultant moment. If this resultant moment be zero for all points in the plane the forces are in equilibrium, and conversely, if several forces in the same plane are in equilibrium the algebraic sum of their moments with regard to any point must vanish. (See STATICS.) If the forces be expressed in pounds and the distances in feet the moments are expressed in the compound unit called a pound-foot.

The *bending moment* at any section of a beam is the algebraic sum of the moments of all the forces on either side of that section. Thus in Fig. 1 the beam, whose depth is d

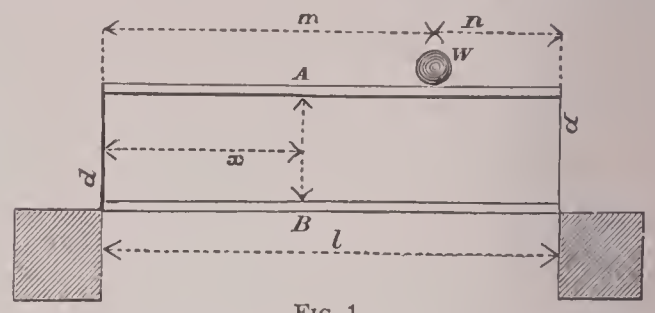


FIG. 1.

and length is l, is loaded with a single weight W, whose distance from the left and right supports are m and n respectively. The reaction of the left support, due to the weight W, then is $W\frac{n}{l}$, and the reaction of the right support is $W\frac{m}{l}$. The bending moment at the section AB distant x from the left support, is $W\frac{nx}{l}$. Accordingly, the bending moment for a section between the left support and the weight varies directly as x, it being zero at the support and becoming $W\frac{nm}{l}$ at the load. The greatest bending moment due to W will occur when it is at the middle of the span, or when $m = n = \frac{1}{2}l$, and this is the position which causes the greatest stress in the beam. (See FLEXURE.) If a load, W, be uniformly distributed over a beam, so that w is the load per linear unit, the bending moment at any section distant x from the support is

$$M = \tfrac{1}{2}wlx - \tfrac{1}{2}wx^2,$$

and the law of variation of the moments is that of a parabola. The maximum bending moment occurs at the middle of the span, or when $x = \frac{1}{2}l$, and its value is $\frac{1}{8}Wl^2$, which is only one-half of that due to the same load concentrated at the middle.

The *statical moment* of a plane surface is the sum of the products obtained by multiplying each element of the surface by its distance from an axis in that plane. If a be any elementary area and y its distance from an axis, the general expression for the statical moment is Σay. As one of the simplest special cases the rectangle in Fig. 2, whose breadth is b and depth d, may be considered, and with reference to an axis coinciding with the base the statical moment is $\frac{1}{2}bd^2$. This may be obtained by summing the expression Σay by the integral calculus, or more simply by multiplying the area of the surface by the distance of its center of gravity from the given axis. If the axis pass through the center of gravity of the surface the statical moment is zero.

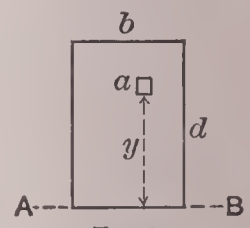


FIG. 2.

The *moment of inertia* of a plane surface is the sum of the products obtained by multiplying each element of the surface by the square of its distance from an axis in the same plane. Thus the general expression is Σay^2, and the value for any particular case is obtained by integration. For instance, the moment of inertia of the rectangle in Fig. 2, with respect to the axis AB, is

$$I = \int_0^d (bdy)y^2 = \tfrac{1}{3}bd^3.$$

The least moment of inertia with respect to an axis parallel to AB will be for an axis through the center of gravity of the given surface; for the rectangle this is $\frac{1}{12}bd^3$. The term moment of inertia when used without qualification generally means the value for an axis through the center of gravity of the figure; if this be called I the moment of inertia I' for any other parallel axis may be derived by the rule $I' = I + Ah^2$, where A is the area of the surface and h the distance between the two axes. The values of the least

moments of inertia for the cases of most importance are given in the article FLEXURE.

The polar moment of inertia of a plane surface is the product Σay^2, where y is estimated with respect to a point in the plane instead of with respect to a line. Its value can be found by a double integral in polar co-ordinates, or more simply by adding together the two moments of inertia taken with respect to two axes at right angles to each other and passing through the given point. Thus the polar moment of inertia of a rectangle with respect to its center is $\frac{1}{12}bd^3+\frac{1}{12}b^3d$. The polar moment is principally used in connection with the torsion of shafts.

In the computations arising in the design of structures and machinery, tables giving numerical values of the moments of inertia of angle-iron sections, I-beams, etc., are advantageous. These will be found in Trautwine's *Engineers' Pocket-book*, and extensive tabulations for the various sections of columns are given in Osborn's *Tables of Moments of Inertia* (New York, 1889). See also DYNAMICS and FORCE. MANSFIELD MERRIMAN.

Môniers, mō′mi-ā′ [= Fr., liter., mummers, maskers; cf. O. Fr. *momer*, mumm, mask one's self]: the cant name given in 1818 to a body of evangelical Protestants of Switzerland and the adjoining parts of France and Germany, whose distinguishing characteristic was the fervency of their religious exercises. The Môniers accused the national Church of Switzerland of apostasy from Calvinism, especially in denying the divinity of Christ. They were consequently subjected to repressive measures, and ultimately returned to the orthodox communion. The most distinguished of the Môniers was Rev. Cæsar Malan. See *Geschichte der Momiers* (2 parts, Basel, 1825).

Momm'sen, THEODOR: historian; b. at Garding, Schleswig, Germany, Nov. 30, 1817; studied law and philology at Kiel; traveled 1844–47 in France and Italy collating MSS. and inscriptions; was Professor of Roman Law at Leipzig in 1848, but was dismissed for political reasons; was called to Zurich in 1852, to Breslau in 1854, and to Berlin in 1858 as Professor of Ancient History. Mommsen is alike distinguished as a historian, jurist, epigraphist, numismatist, and philologist proper. Of the monumental *Corpus Inscriptionum Latinarum*, of which he is the originator and editor-in-chief, he himself published vol. i., iii., viii., ix., the preface to vol. i. being additionally noteworthy as one of the finest specimens of modern Latin prose. This work has illumined vast areas of previous darkness, and laid the foundation for the scientific study of Roman antiquities; his *Roman History* (vol. i.–iii., 8th ed., vol. v., 3d ed., on the Roman provinces; vol. iv. on imperial Rome is not to appear till after his death; transl. into English by W. P. Dickson) is one of the great masterpieces in the domain of historiography. Its style is of crystalline clearness, and in the famous chapters dealing with Roman literature or in his characterizations of individuals, for instance, it is brilliant. The originality of his inferences and historical combinations, based as they are upon an unprecedented mastery of all available sources of information, have elicited universal admiration even by those who attacked some of his views, notably his flagrantly unjust disparagement of Cicero. His *Römisches Münzwesen* (1850), *Römische Chronologie* (1859), and above all his *Römisches Staatsrecht* (3 vols., 3d ed. 1888), are the fundamental and standard works on these respective subjects. Equally celebrated are his edition of the *Digests*, *Solinus*, *Jordanes*, the *Monumentum Ancyranum*, his *Römische Forschungen*, 2 vols., *Zur Lebensgeschichte des jüngeren Plinius* (in *Hermes* iii., pp. 31–139), etc. A complete list of all his writings up to 1887 is given by C. Zangemeister, *Theodor Mommsen als Schriftsteller*, and takes up sixty closely printed pages. In 1880 part of his fine library was destroyed by fire, but was replenished by donations from foreign scholars.—TYCHO, brother of Theodor, b. at Garding, May 23, 1819; studied at Kiel, traveled in Italy and Greece, and taught in gymnasia in Eisenach, Oldenburg, and Frankfort. He is chiefly known as the editor of *Pindar* (1864); wrote *Parerga Pindarica* (1877); and is the author of a German translation of his favorite poet.—AUGUST, another brother, b. at Oldesloe, July 25, 1821; studied at Kiel; taught school in various German cities. He is an authority on Greek and Roman chronology. Cf. especially *Heortologie* (1864); *Chronologische Untersuchungen über das Kalenderwesen der Griechen* (1883). ALFRED GUDEMAN.

Momostenan'go: a town of Guatemala, department of Totonicapan; on the high plateau; about 12 miles N. N. W. of Totonicapan city and 60 miles W. N. W. of Guatemala (see map of Central America, ref. 3–D). It is an agricultural center of some importance. Pop. (1892) said to be nearly 17,000. H. H. S.

Momot'idæ [Mod. Lat., named from *Momo'tus*, the typical genus, from Eng. *momot*, from Amer. Ind. *motmot*, momot, Momotus]: a family of birds containing the motmots. The bill is rather long, somewhat decurved, depressed at the base, compressed forward, and with denticulated edges; the tarsi short and scutellated; the toes normal; the tail is graduated and produced toward the middle. The maxillopalatines and vomerine bones are of the "desmognath" type. The birds are most closely related to the todies (*Todidæ*) and more distantly to the *Coraciidæ*, *Meropidæ*, and *Alcedinidæ* or kingfishers. According to Murie (*Ibis*, 1872, pp. 383–412) there are four well-defined genera—viz., *Momotus*, *Barypthengus*, *Hylomanes*, and *Eumomotus*.

Revised by F. A. LUCAS.

Mompox, mōm-pōs′ (often written MOMPOS, or MOMPOZ): a town of the department of Bolivar, Colombia; on a swampy island, formed by the river Magdalena, which here divides into several channels; near lat. 9° 18′ N. (see map of South Ameriea, ref. 1–B). It was founded by Heredia in 1539 on the western bank of what was then the main river channel, and it was long the chief river-port of this region. In 1762 it was nearly destroyed by a flood, but was rebuilt. In 1868 the main river channel became changed to one of the other branches, and only small boats can now reach Mompox; in consequence, the place is falling to decay. Mompox has a college of some note. It was the scene of important combats during the war for independenee. Pop. about 10,000. H. H. S.

Mo'mus [= Lat. = Gr. *Μῶμος*, liter., blame, ridicule]: in Greek mythology, a son of Night, according to Hesiod, and the personification of mockery and censure. Aphrodite was the only being whom he found blameless, a fact which angered him so much that he burst.

Mon'achism [from Lat. *mo'nachus*, monk (whence Eng. *monk*) = Gr. *μοναχός*, monk, deriv. of *μόνος*, alone]: a life of religious retirement from the world, whether in solitude (the anchoretie or eremitic life) or in company with others (the cœnobitic life). Monachism is of very ancient origin, and has a history without as well as within the Christian Church.

I. PRE- AND EXTRA-CHRISTIAN MONACHISM.

Pre-Christian monachism had its most elaborate and striking development in India.

Hindu Monachism.—The beginnings of Hindu monachism are shrouded in mystery, but Buddha found it in existence as an important adjunct if not an essential feature of Brahmanism when he began his work in the fifth or sixth century before Christ, and doubtless it was already of long standing. According to the code of Manu, which, though of uncertain date, is the chief embodiment of nomistic Brahmanism, the lives of all twice-born men, or members of the three highest castes, Brahmans, Kshatriyas, and Vaisyas, are to consist of four stages or periods. They are to be first unmarried students, then married householders, then they are to leave their families and retire to the forest, where they are to live the life of anchorites, and finally they are to become and remain until death mendicants, absorbed entirely in religious contemplation. This rule was of course never carried out strictly by all, but Hindu monks, especially from the ranks of the Brahmans, were certainly numerous at an early day.

The austerities to which many of these monks subjected themselves were very severe. From the earliest times Brahmanism had made much of the doctrine of penance, and had taught that not only the voluntary relinquishment of the comforts and amenities of life, but also self-inflicted bodily torture, was efficacious for the acquirement of religious merit, and for the release of the soul from the bondage of transmigration and its absorption in deity. Where such a belief existed of course not only retirement from the world for the sake of religious meditation, but also ascetic practiees of the severest kind were bound to be widely adopted by such as were supposed to be in a position to benefit by them —that is, by the "twice-born." The forests and mountains during the centuries preceding the Christian era were filled with devotees, whose austerities equaled anything that can be found in history. They lived on roots and herbs; they drank water only; they exposed themselves unprotected to

all changes of the weather; they scourged and lacerated and mutilated themselves; they went almost naked, many of them entirely so. They became known to the Greeks in the time of Alexander, and were called by them gymnosophists, or "naked philosophers," and there can be little doubt that their influence was felt to a greater or less extent by many, not only among the Greeks, but also among the peoples of Western Asia, and possibly even among the Egyptians.

Gautama and Buddhistic Monachism.—The greatest figure in the history of Hindu monachism is Gautama, the founder of Buddhism. Out of the individualistic monasticism of Brahmanism he built a monastic order, and promoted the cœnobitic at the expense of the eremitic mode of life. His principal object was the formation of a monastic brotherhood, the members of which should be dominated by one idea and pledged to the propagation of one doctrine—that all life is misery and must be got rid of by a long process of discipline, which involves in this life the subjugation of the body and its passions by rigid asceticism, and by the undivided devotion of the soul to spiritual things. Such a monastic brotherhood or order, as Monier-Williams well says, "constituted in its earliest days the very essence, the very backbone, of Buddhism, without which it could never have been propagated nor even have held its own." Buddhism was in fact itself monasticism, for no one could become a truly enlightened disciple of Buddha, no one therefore could attain the blessedness of Nirvana, who had not lived for some time at least the life of a monk.

Buddhistic monachism differed from earlier Hindu monachism in still another and very important respect. In Brahmanism the monastic life was open only to the three upper castes, and in practice was confined chiefly to the Brahmans themselves; but Buddha threw his order open to all. Even the lowest might enter it and through it attain that blessedness which had hitherto been reserved for the favored few. Moreover, in spite of the stigma which attaches in India to unmarried women, Buddha even sanctioned female monachism and organized an order of nuns, thus making the highest blessedness possible of attainment to women as well as to men. Buddha's monastic order did not constitute a priest class, nor was the rite of initiation looked upon in any sense as an act of ordination conferring special grace upon the initiated. There was no hierarchical organization, and no central authority. No vow of obedience was taken, as in the monastic orders of Christendom, each monk being left to work out his own salvation in his own way, and expulsion from the brotherhood took place only in case of the gravest offenses, such as theft, murder, and indulgence in sexual intercourse. Nevertheless the monks were expected to govern themselves by certain well-defined rules. They were to eat only the simplest food, and to possess nothing except what they got by collecting alms from door to door. They were to eat only one meal a day, and were to abstain entirely from intoxicating drinks. They were to live during the dry season in the forests with no covering except the leaves of the trees; during the wet season they might dwell in caves, or in huts built in groups and forming regular monastic villages. Their clothing was to be of rags or strips of yellow cloth. Buddha disapproved of the nakedness of many of the Hindu monks, and insisted that his followers should always be fully clothed, though in the simplest and poorest possible manner. Moreover, he did not encourage the extreme austerities practiced by many, which resulted often in the entire breaking down of the physical constitution. He inculcated subjection but not destruction of the body.

Gautama's monastic order started with ten members, but grew very rapidly, until its adherents were numbered by hundreds of thousands. Buddhism was from the beginning a missionary religion, and the monks were the missionaries. They found their way gradually to China, Korea, Japan, Mongolia, Tibet, and many other Asiatic countries, and, though driven out of India, where they had become shamelessly corrupt, in the eighth and ninth centuries of our era, their numbers multiplied rapidly in other lands.

Monachism in China and in Persia.—Outside of India monachism seems never to have been widely prevalent in ancient Asia, except where Buddhism made its influence felt, though there are traces of ascetic tendencies of a mild character and of a predilection for a life of retirement in the teachings of Confucius and Mencius, the Chinese sages, and the monastic life apparently found a limited acceptance at an early day in Persia. The sharp dualism of the Persian religion would seem well calculated to promote the extremest kind of asceticism, and to lead to the general prevalence of monachism, but its effect was far less marked than might have been expected.

Among the Hebrews and Greeks.—Among the Hebrews the tendency toward an ascetic and monastic life appeared at an early day in the Nazarites and later in the Essenes, but the religious and ethical principles of the people at large were not favorable to its growth. Among the Greeks, foreign as all their native instincts were to anything of the kind, the ascetic and monastic tendency appeared in the Pythagoreans and in the Orphic brotherhood, and also, though in another form and on quite different grounds, in the Cynics.

Among the Egyptians.—In Egypt monachism found a home and enjoyed a striking development in the Alexandrian period in connection with the worship of Serapis. The Serapis temples, especially the famous one at Memphis, were made the abode of multitudes of monks, who came thither that they might dwell in seclusion from society and from their families and friends, in the hope of attaining that purity which was not to be gained in the midst of the engrossments of the world. Some rather striking similarities between the Serapis monachism and the Christian monachism of Egypt have been pointed out by Weingarten in his *Ursprung des Mönchthums* and in the *Zeitschrift für Kirchengeschichte* (1877, i.).

Among the Mohammedans.—The Mohammedans also, although the teachings of the Koran are not such as to promote or even to leave much room for monasticism, have had from an early day their dervishes or fakirs, many of them simply wandering monks, belonging to no sect or society, but others of them forming regularly organized monastic orders, and as such constituting the historic representatives of Sofism, or the spiritual and mystical side of Islam. There are to-day many such orders among the Mohammedans, and they are both influential and popular. Membership in some of them is compatible with marriage and home life and the pursuit of a regular trade or business; in other cases it involves temporary or permanent retirement from society and residence in regular monasteries; in still others absolute solitude, the strictest asceticism, and the most rigid and even revolting austerities.

BIBLIOGRAPHY.—Besides the general works upon the religions of India, China, Persia, Egypt, etc., see especially R. Spence Hardy's *Eastern Monachism* (1850); Monier-Williams's *Brahmanism and Hinduism* (1891) and *Buddhism* (1889); J. P. Brown's *Dervishes, or Oriental Spiritualism* (1868); Letronn's *Matériaux pour l'histoire du Christianisme en Égypte* (1832); and Boissier's *La religion romaine d'Auguste aux Antonines.*

II. Christian Monachism.

To such pre-Christian forms of monachism as have been described some scholars have sought to trace the origin of Christian monachism, regarding the latter as of foreign, not of native, growth. Weingarten, for example, puts the origin of Christian monachism into the Post-Constantinian period, and traces its rise especially to the influence of the Serapis monachism of Egypt, referred to above. It is true that Christian monachism in some sections may have felt to a greater or less degree the influence of one or another form of pagan monachism, but the causes to which it chiefly owed its rise are to be found not without but within the Christian Church. The tendency to the monastic mode of life, which has exhibited itself in so many peoples and under the influence of such various faiths, has proved itself largely independent of peculiarities in religious opinion, and is clearly due to a common human instinct. Though theoretically it would seem that only dualism furnishes a sufficient basis for it, it has shown itself in practice equally at home in pantheism (Brahmanism), atheism (Buddhism), and the strictest monotheism (Judaism and Mohammedanism). This being the case, the appearance of the tendency in the Christian Church need cause no surprise, and it is quite unnecessary to invoke the influence of pre-Christian forms in order to explain it; but there were peculiar reasons within the Church itself why monachism should find a congenial home on Christian soil, why it should there have the most remarkable and elaborate development it has anywhere enjoyed. Monachism is in fact a natural result of the ideal of the Christian life which prevailed in the Church almost from the beginning, and which had its roots in the teachings of Christ himself. Under the influence of their belief in the speedy return of Christ—a belief to which some warrant had been given by Christ himself in his eschatolog-

ical discourses—primitive Christians conceived of the Christian life as a heavenly, not an earthly, life. The present world was soon to pass away and the kingdom of heaven was soon to be revealed, and it was the duty of every believer to live as a pilgrim and stranger on the earth, to realize constantly his heavenly citizenship and destiny, to be separate from the world and superior to its interests and concerns, not because the world is evil, but because it is, at least in its present form, transient and unreal, and because it is soon to be replaced by new heavens and a new earth. It was inevitable that with this conception of the Christian life—a conception which has had a place in the Christian Church from the very beginning—the tendency should soon make itself felt to regard all that binds a man to this world—the ties of family, of friendship, of property, of citizenship—as hindrances to the highest spirituality, and hence to view them with suspicion and ultimately to repudiate them; but the conception of the Christian life which has been described led naturally to a peculiar emphasis upon individual purity and holiness as alone befitting the believer's heavenly calling, and this emphasis was greatly enhanced by the belief in the immediate and constant presence of the Holy Spirit, promised and sent by Christ, a belief which was universal and all-controlling in the primitive Church. Regarding their bodies as "temples of the Holy Ghost" in a most real and vivid sense, these primitive Christians must necessarily look upon fleshly sins with peculiar aversion. The result was that at an early day—even before the end of the first century—the ethical emphasis in Christian circles was transferred from active love for God and man, upon which Christ had laid chief stress, to abstinence from sin, especially from sin of a fleshly character. That asceticism should follow was inevitable. Another influence must also be recognized as contributing to the same general result. This was the growth of the conception of Christianity as a law which led naturally to the practice of penance, a practice which had begun to find a place within the Christian Church even before the middle of the second century. It was inevitable that as the belief in the necessity of penance rooted itself more and more firmly in the mind of the Church, Christians should seek to make amends for their breaches of the law by ascetic practices, by voluntary acts of self-sacrifice and mortification, just as the Hindus had done centuries before.

Early Asceticism.—Justin Martyr, writing about the middle of the second century, records that Christians were already beginning to abstain from flesh, wine, and sexual intercourse, and among various heretical sects of the same period, such as the Marcionites, Encratites, and some of the leading Gnostic schools, asceticism, often of a very severe kind, was made obligatory upon all. In the case of the Gnostics the ground of their ascetic practices is to be found in their dualism, but other sects, no less strenuous than they in their emphasis of asceticism—as, for instance, the Montanists—were not dualists in any sense, and only represented in an extreme form the same tendency which was making itself felt in the Church at large, and the growth of which has been described.

Anchoretic Life.—Out of this "asceticism in solution," as it has been called, this asceticism, practiced with ever-increasing zeal in the midst of society, grew naturally in course of time the earliest form of monachism proper, the anchoretic or eremitic life. It was soon found that the "separateness" from the interests and concerns of the world which the prevalent Christian ideal demanded of all Christians was not easy of realization in the midst of society, where those interests and concerns were constantly pressing themselves upon the attention of Christians as well as of others. It was natural that those who were in earnest in their desire to realize that ideal should flee from the distractions of society, and should endeavor in solitude to live the life of the Spirit, which they found it increasingly impossible to live to their satisfaction in the midst of the world. The necessity of flight from the world became increasingly pressing as the Church grew in numbers and influence, and in its effort to conquer and win the world became more and more secularized, more and more of a world-church. It was natural, too, that such flight from the world should be regarded by many not simply as a means of escape from its distractions, but also as the consistent realization of the Christian ideal which has been described—the ideal of world-renunciation. To renounce the world not simply in part, but wholly—to be not simply ascetics, but hermits—must be increasingly the desire of such as wished to make earnest work of the matter. Thus a double impulse—on the one hand to escape from temptation, on the other hand to give completer realization to the Christian ideal—the fruit on the one hand of a conscious sense of weakness, on the other hand of a conscious sense of strength—drove men into the desert; and thus was promoted the conception—itself as old as the second century—of a double standard of holiness, the one for the ordinary Christian, capable of realization in the midst of the world, and without the violation of the ties of family, the other for a select few, the spiritual aristocracy of the Church—capable of realization only in the desert, away from the haunts of men. With the general recognition by the Church at large of this double standard of holiness there was created a permanent place for Christian monachism, and its permanent influence and popularity were assured.

St. Anthony.—The earliest Christian hermit known to us is St. Anthony of Egypt (Jerome's account of Paul of Thebes, whom he calls *auctor vitæ monasticæ*, is without doubt purely legendary), whose life and personality are depicted in the pages of Athanasius's *Vita Antonii*, a work which is rather a romance than a sober biography, but which is doubtless based upon fact. The Athanasian authorship of the *Vita Antonii* has been denied by many scholars, with especial vehemence by Weingarten, but it is testified to by Gregory Nazianzen, Rufinus, and others, and can hardly be successfully impugned. (See especially Eichhorn's *Athanasii de vita ascetica testimonia*, 1886.) Born about the middle of the third century, Anthony was led in early life, under the influence of the Gospel story of the rich young man, to give all his property to the poor, and finally to retire to the desert in order to devote himself to unceasing communion with God and to the undivided contemplation of spiritual things. He lived in solitude until a great age a life of the most rigid asceticism. The fame of his holiness spread throughout Egypt, and his example was followed by many others, so that before his death, which took place about the middle of the fourth century, the deserts of Upper Egypt had become the home of a large multitude of Christian ascetics. At an early date, moreover, possibly even before the close of the third century, the eremitic life had found a home in Palestine, and it soon spread throughout Syria, and before the middle of the fourth century even beyond the confines of the empire toward the East. (Compare the sixth and eighteenth homilies of the Syrian Aphraates.)

Cœnobitic Life.—Originally living in the strictest solitude these anchorites gradually and quite naturally got into the habit of gathering about some especially famous and sainted hermit, in the hope of learning from him and of receiving in converse with him blessings greater than they could enjoy alone. Thus grew up λαῦραι, or villages of monks, each monk living in his own separate hut, but enjoying at will more or less intercourse and fellowship of worship with his companions. Such colonies grew rapidly by accession from the world-church, and were very numerous in Egypt, Syria, and Mesopotamia during the fourth century. The next step in the development came with the μοναστήριον, or common dwelling-house, which followed naturally when the advantages of association had made themselves felt. With the establishment of such houses the second or cœnobitic stage of monasticism proper was fairly launched, and monasticism in general speedily took on this form.

Pachomius and his Rule.—Such association within a common house made possible and at the same time necessitated some regulation of the life of the monks so associated. The first one, so far as we know, to draw up a definite set of rules for the government of the monastic life was Pachomius of the Thebaid, who built a monastery on the island of Tabennæ in the upper Nile before the middle of the fourth century. Pachomius also built a convent for his sister and her companions near his monastery, and thus became one of the earliest promoters, if not the founder, of female monachism. The historic significance of Pachomius does not lie, as is commonly supposed, in the fact that he was the founder of the cœnobitic life, for it certainly existed before he built his monastery (even before the end of the third century the Origenist Hieracas had gathered about himself at Leontopolis a band of disciples who led a common life of strict asceticism and joined with him in the pursuit of theological studies, as we learn from Epiphanius, *Haer.* 55, 67, 69), but in the fact that he formed rules for the government of that life, thus giving Christian monachism organization and law. His monastery was a large and important one, and the influence of his rule was not long in making itself felt in monastic circles everywhere. The form and details of Pacho-

mius's rule are no longer known, for the alleged longer and shorter recensions of it still extant are no longer considered authentic.

The Rule of Basil.—The next great figure in the history of Eastern monachism is Basil the Great, Bishop of Cæsarea in Cappadocia in the latter part of the fourth century. He was an ardent admirer of the monastic life, having himself indeed spent some years as a monk, and he did much when he became a bishop to promote its influence and at the same time to bring it under proper regulation. He approved rather of the cœnobitic than of the anchoretic life, and published a code of rules which gradually supplanted all earlier and local rules, and has remained substantially until the present day the monastic code of the Eastern Church. Basil's monastic rules are embodied in substance in his ascetic homilies, and two alleged recensions of them are still extant. Of these neither is the work of his own hand, though the shorter one is probably a fairly accurate reproduction of his original code. According to Basil's rule, a monk takes the three vows of chastity, poverty, and obedience, but the vows are not perpetual and irrevocable.

Since Basil's day monachism in the East, though always widespread and religiously influential, has remained practically stationary, and has had no such varied and interesting history as it has enjoyed in the Western Church. It has, moreover, never been so well and thoroughly organized, nor so great a social and political power in the East as in the West.

Western Monachism.—Knowledge of the new mode of life, which was already widespread in the East and which was gaining rapidly in favor among all classes of Christians, is said to have been first brought to Rome by Athanasius about 340 A. D. Whether the report be true or not, monachism, of which we have no traces in the West before this time, began to acquire a considerable hold in Italy and Southern Gaul before the end of the fourth century. Early in the fifth century John Cassian founded a monastery in Southern Gaul, and wrote two famous treatises (*Collationes Patrum* and *De institutis cœnobiorum*) which did much to spread among his countrymen a knowledge of Eastern monachism and to form the character of the monastic life of the entire West.

Contrast between Eastern and Western Monachism.—A marked difference between Eastern and Western monachism is apparent almost from the beginning, a difference due both to climate and to race constitution. Such exposure and such severe austerities as marked the lives of Eastern monks were impossible in the more rugged climate of the West (the West, for instance, boasts no "pillar saints" like Symeon Stylites of Syria, who, in the fifth century, won for himself fame by living thirty years on the top of a pillar); and a life of mere contemplation and of bodily inactivity could never find the same favor among Europeans as among Asiatics. The result was that Western monks have always satisfied themselves with a less extreme asceticism than their Eastern brethren, and in their restlessness and activity have always done more work and taken a more active part in the affairs of the world than they. The monastic ideal, to be sure, remained at least for a long time the same in the West as in the East, but a modified method of attaining that ideal was distinctly sanctioned by Cassian and adopted by the West at large.

Benedict of Nursia and the Benedictine Order.—The greatest figure in the history of early Western monasticism is Benedict of Nursia, who in 529 founded the famous monastery of Monte Casino, the parent monastery of the great Benedictine order. The historic significance of Benedict lies in the fact that he founded the first regular monastic order, and that he gave to his order, and through it to Western monachism in general, a definite rule which in time supplanted all others and gave permanent character to the monachism of the West.

Benedict's rule requires of all members of the order a threefold vow: *Stabilitas loci*, or permanent adherence to the order; *conversio morum*, involving poverty and chastity; and *obedientia*, not only to the rules of the order but also to one's superiors in the monastery. Labor is emphasized and made mandatory upon all. Asceticism is of course enjoined, but of a moderate, not a severe, type. Each monastery is to be thoroughly organized with an abbot at its head, elected by the unanimous vote of its inmates, but no federation of monasteries is proposed. The rule of Benedict speedily found favor in all parts of the West, and in the time of Charlemagne nearly all the monasteries of Western Europe were Benedictine.

Influence of Gregory the Great and of Cassiodorus.—Although Benedict made much of the element of labor, he did not propose any change in the prevalent monastic ideal, but Gregory the Great, himself a Benedictine monk, who became Bishop of Rome in 590, conceived the idea of employing monasticism as a great missionary agency for the spread of Christianity among the barbarians. Thenceforth the passive ideal of Eastern monachism was supplemented, and in many cases replaced, by the active missionary ideal, and the monks became the chief agents in the Christianization and civilization of barbarian Europe. Another important step was taken in the latter part of the sixth century by Cassiodorus, who made his own monastery of Vivarium a center of classical and theological learning, and thus gave to Western monachism an intellectual impulse which it never lost. Throughout the earlier Middle Ages the monasteries were the centers of learning, and the only theological seminaries the Western Church possessed. Even after the rise of the universities their teachers were for a long time taken from the ranks of the monks.

Rise of Clerical Monachism.—Originally monks were laymen, but for many and obvious reasons a transformation gradually took place, the result of which was that before the end of the ninth century nearly all monasteries were clerical establishments, and a regular monastic clergy was growing up alongside of the parish or secular clergy.

Change from Episcopal to Papal Jurisdiction.—During the next two centuries, moreover, the monasteries, which had hitherto been to a greater or less extent subject to the bishop in whose diocese they were situated, were gradually freed entirely from episcopal supervision and brought under the direct control of the pope, very much to the enhancement of the papal power.

Growing Corruption.—During the troublous Merovingian period the monasteries fell into a shameful state of corruption, many of them becoming practically the private property of this or that violent and avaricious prince or noble, and being transformed from religious institutions into fortresses and military camps, or still worse, into dens of vice, in the practice of which the monks themselves had their full share. In the latter part of the eighth century strenuous efforts were made by Benedict of Aniane to bring about a reformation, and his efforts were seconded by Charlemagne with some success.

The Clugniac Reformation.—The great reformation, however, came with the establishment in 910 by William of Aquitaine of the monastery of Clugny. This monastery was put under the immediate jurisdiction of the pope, the Benedictine rule was adopted and rigorously enforced, and the influence of the new foundation was speedily felt far and near. A number of other monasteries—newly founded or reorganized—soon united with Clugny to form a society known as the Congregation of Clugny, with the Clugniac abbot at its head as arch-abbot. This was the first instance of the federation of separate monasteries—a practice which later became quite common.

The aim of the Clugniac reformation was threefold: In the first place, the renovation and rejuvenation of monasticism—an aim which was successfully accomplished during the tenth century; in the second place, the extension of the monastic principle to the life of the secular clergy—an aim which was carried out by Gregory VII. when he forced celibacy upon the latter; and in the third place, the complete subjugation of the lay world to the reformed clergy—an aim which was realized in the papal supremacy of the twelfth and thirteenth centuries. Monasticism, which had been in the beginning a flight not only from the world, but also from the world-church, was brought by Gregory and his successors—consistent representatives of the Clugniac spirit—into the service of that church, and those who had renounced the world now came back into the world to subdue and control it. Monachism was thus given a new mission which it has never lost sight of.

Formation of New Orders.—In the latter part of the eleventh century, under the influence of the spirit which found voice at Clugny, began the formation of new monastic orders in great number, all of which put themselves at the service of the Church, and constituted an admirable and ever-growing standing army. Among them were the Cistercians, a reformed Benedictine order founded in 1098, and boasting as their greatest light St. Bernard of Clairvaux; the military orders, chief among which were the Knights of St. John (1118), the Knights Templar (1119), and the Teutonic Knights (1192); and finally the mendi-

cant orders—the Franciscans (1208) and the Dominicans (1215).

The Mendicant Orders.—The formation of the mendicant orders marks an epoch in the history of Western monachism hardly second to the foundation of Clugny. The chief impulse came from Francis Bernardone of Assisi. Fired with the desire of imitating the life of Christ, he adopted for himself, and later made the basis of his new monastic order, a threefold watchword—humility, love, and obedience—the first to be realized by a life of absolute poverty, corporate as well as individual; the second by a life of self-sacrificing devotion to the good of others; and the third by willing and complete submission to the Catholic Church. The Dominican order, founded about the same time by Dominic Guzman, with the especial aim of preaching the orthodox faith, early borrowed the mendicant principle of the Franciscans, and the members of the two orders, inspired by the gospel of St. Francis and fired with his zeal, became the great preachers and evangelists of Europe. These mendicant friars went everywhere as preachers and confessors, carrying the principles of St. Francis into the homes of the people, until there resulted a religious reformation of the entire Western Church, the effects of which were felt for a century and a half.

Decline of Monachism.—The thirteenth century was the golden age not of monachism alone, but of the Roman Catholic Church; but in the fourteenth century began a decline which affected all the monastic orders, the Mendicants included. Corruption took the place of purity, indolence of industry, selfishness of devotion to the good of others, and the church and monasticism gradually fell into disfavor and contempt, which the general skepticism attendant upon the great intellectual awakening of the dawning modern age served only to emphasize.

Monachism since the Reformation.—Protestantism, of course, was anti-monastic in its tendency, but the Protestant Reformation led to the formation of several new orders among the Catholics, chief of which were the Jesuits, founded by Ignatius Loyola in 1534, an order which subordinated everything, even personal holiness and growth in grace, to the advancement of the interests of the Roman Catholic Church, and thus departed as far as it was possible to depart from the early monastic ideal of world-renunciation.

The centuries since the Reformation, while they have seen the establishment of many new monastic orders, have been unfavorable to the growth of the monastic spirit and to the extension of monastic influence. This is especially true of the eighteenth century with its liberalizing and rationalizing tendencies. From the effects of that century, which culminated in the French Revolution, monachism has never recovered. With the exception of the Jesuits, the orders have little influence in Europe, and in some countries are not even allowed to exist, as, for instance, in Spain, Portugal, and Italy. In the U. S., on the other hand, a number of orders have found a home, and as many of them devote themselves wholly or chiefly to missionary and philanthropic work, they constitute an important agency in promoting the growth of the Roman Catholic Church.

Bibliography.—The literature upon the subject of Christian monachism is very extensive, and only a few works can be mentioned here. Weingarten, *Ursprung des Mönchthums* (1877); Harnack, *Das Mönchthum, seine Ideale und seine Geschichte* (3d ed. 1886); also *Die Pseudo-Clementischen Briefe de Virginitate und die Enstehung des Mönchthums* (S. B. der Berliner Akad., 1891, p. 361, *seq.*); Bornemann, *In investig. Monach., orig.*, etc. (1885); von Biedenfeld, *Ursprung und Gesch. sämmtlicher Mönchsorden im Orient und Occident* (3 vols., 1837); de Montalembert, *Les Moines d'occident depuis Saint-Bénoit jusqu'à St. Bernard* (Paris, 1860, *seq.*; translated into English, *The Monks of the West*, 2 vols., 1861). For literature upon special orders and monasteries, see special articles. A. C. McGiffert.

Monaci, mō-naa′chĕ, Ernesto: scholar; b. at Loriano, Italy, in 1844. He obtained his doctorate in 1872, and has since devoted himself to Romance philology, becoming one of the chief representatives of this science in Italy. In 1872 he founded with Stengel and Manzoni the *Rivista di filologia romanza*, which continued till 1876. In that year he was made Professor of Romance Philology in Rome. In 1878 he founded the *Giornale di filologia romanza*, which came to an end in 1884, and was followed by the series of studies called *Studj di filologia romanza*, still directed by him. Besides these useful labors, he has published numerous studies on subjects in the field of the Romance languages, texts, etc. Of these may be mentioned *Uffizj drammatici dei Disciplinati dell' Umbria* (in *Riv. di fil. rom.*, i., 235, and ii., 29); *Il Canzoniere portoghese della Biblioteca Vaticana* (Halle, 1875); *Il Canzoniere chigiano* (Bologna, 1878); *Crestomazia italiana dei primi secoli*, fasc. i. (1889). A. R. Marsh.

Monaco, mō-naa′kō: the smallest of the independent principalities of Europe; on the Mediterranean, nearly surrounded by the French department of Alpes-Maritimes; 9 miles E. of the city of Nice (see map of Italy, ref. 4–A). Area, 8 sq. miles. Up to 1861 it had an area of 72 sq. miles, and included Mentone and Roccabruna. It now consists of Monaco, the capital, Condamine, and Monte Carlo, the three towns having (1890) populations of 3,292, 6,218, and 3,794 respectively. Besides its sovereign prince, Albert (b. 1848), it has a governor-general and a council of state. There is a "guard of honor" and an army consisting of five officers and seventy men. There is a court of first instance and a juge de paix's court. Two judges from Paris, appointed by the prince, act as a court of appeal when necessary. The principality has its own coinage, which is current in all the states of the Latin Union, and its own postage-stamps. The revenue is derived from the gaming-tables and from the exportation of olive oil, oranges, citrons, and perfumes. The capital is situated on a rocky promontory on the port of Monaco, and is surrounded by ramparts. It is the see of a bishop, and contains among its public buildings a palace, a cathedral, and a museum. Condamine has manufactures of liqueurs and perfumes. At Monte Carlo is the Casino, a group of handsome buildings situated in a beautiful park, besides hotels and villas for the accommodation of visitors (about 400,000 annually) to the gambling-rooms in the Casino. For 500 years Monaco has belonged to the Grimaldis, a Genoese family. It was annexed to France in 1793; was restored to the Grimaldis by the Treaty of Paris (1814); was placed under the protection of Sardinia by the Treaty of Vienna (1815); and in 1860 came under the protection of France, which in 1861 bought from the Prince of Monaco Mentone and Roccabruna.

Mon'ad [from Lat. *mo'nas, monadis* = Gr. *μονάς, μονάδος*, unit, deriv. of *μόνος*, alone]: a philosophical term. It does not seem to have been used with any technical meaning by the ancients. It obtained such first in the writings of Giordano Bruno (1548–1600), who used it to designate the primal elements of all existence, spiritual as well as material. (See his *De Monade, Numero et Figura.*) The monads, which are minute spheres, contain the potency of all the forms of life. The soul is a monad, and God is the monad of monads. Probably it was the doctrine of Giordano Bruno that gave Leibnitz the fundamental thought of his *Monadology*. In that work Leibnitz lays down his doctrine of monads, which he elsewhere defines as "metaphysical atoms, destitute of parts and incapable of being produced or destroyed naturally" (i. e. without a creative or annihilating act of the primal monad or God). They all differ from each other, and are subject to continual automatic change, involving, of course, the existence of something that changes and something that remains—in other words, multitude in unity, which again involves appetite and perception. They are indeed "entelechies" (not in the Aristotelian sense) or potential souls, existing in a state of unconsciousness. They are created by God, the primitive Unity, who is the absolutely infinite and perfect Being, toward which they all tend, and which they all symbolize and more or less confusedly represent through their more or less numerous relations. Thus every created monad represents the entire universe. (See *Journal of Speculative Philosophy*, vol. i., pp. 132, *seq.*; cf. Coleridge, *Religious Musings*, "Believe thou, O my soul," etc.) The profundity of the *Monadology* has seldom been recognized. Kant propounded a doctrine of monads, which, however, he regarded as extended though simple. They exert attraction and repulsion through space, and are perfectly elastic. (Cf. Kant. *Monadologia Physica.*) He suggested, in his *Critique of Pure Reason* (*Amphibolie der Reflexionsbegriffe*) a doctrine somewhat similar, but approaching more nearly to that of Leibnitz. He holds that what to our external sense is objective may be, to its own internal sense, subjective—that the material is but the outside aspect of thought. Since then Hermann Lotze (*Medicinische Psychologie*) propounded a doctrine of spiritual monads or simple unextended beings, each of which is a modification of the absolute. (Cf. the *Song of the Norns*

in Jordan's *Nibelungen*.) There is no clear line of demarkation between monad and Atom (*q. v.*); but the former connotes rather the dynamic, the latter rather the material, side of the primitive elements. Thomas Davidson.

Monadnock: See Grand Monadnock.

Monads: a group of flagellate Infusoria (*q. v.*) embracing a number of minute forms occurring in stagnant water, a few being parasites in man and other animals.

Monagas, mō-naa'gäs, José Tadeo: general and politician; b. near Maturin, Venezuela, Oct. 28, 1784. He served with distinction under Bolivar 1813–21, attaining the rank of general of division in the latter year. Subsequently he lived in retirement until 1831, when, for a short time, he led a fruitless attempt to re-establish the fallen republic of Colombia. President Soublette gave him high military commands, and supported him as presidential candidate in 1846; the liberals, who were in opposition, claimed to have carried the elections, but congress adjudged it to Monagas, who was inaugurated Mar. 1, 1847. A revolt of the liberals which followed was suppressed, but Monagas, by his equivocal course, lost the support of his own party; in Jan., 1848, he dissolved congress by a *coup d'état*, and assumed dictatorial powers. Paez, who had declared against him, was defeated and imprisoned in 1850. He was succeeded in 1851 by his brother, and took command of the army. He was re-elected to the presidency for the term beginning 1855, but after the adoption of a new constitution in 1857 a revolution broke out, and he was forced to resign Mar. 15, 1858, and left the country. In 1868 he led the revolution which deposed Falcon, and was elected president by congress, but before he could assume office he died (near La Guayra, Nov. 18, 1868). H. H. Smith.

Mon'aghan: county of Ireland; in the province of Ulster. Area, 500 sq. miles. The surface is hilly, in the eastern part even mountainous. The principal range is that of Slievebeagh, which extends into Fermanagh, and, in its highest point, rises 1,254 feet above the level of the sea. The county was formerly densely wooded, but is now nearly bare of trees. The numerous small lakes and streams form a peculiar feature of the landscape. In the more level portions the soil is fertile, but on the hills it consists of a stiff clay difficult to handle. The main crops are oats, barley, flax, and potatoes. The only important manufacture is that of linens, and it has for several years been on the increase. Pop. (1891) 86,206. Principal town, Monaghan, named from a monastery very early founded there (see map of Ireland, ref. 6–H).

Mon'archy [from Lat. *monar'chia* = Gr. *μοναρχία*, deriv. of *μόναρχος*, monarch; *μόνος*, alone + *ἄρχειν*, rule]: government of a state by one chief only. Succession to the throne has generally been determined by heredity, but in some monarchies, as, for example, in the former kingdom of Poland, the elective principle has been recognized. Where the will of the monarch is supreme over all other authorities in the government there is an absolute monarchy. Such a government as that of Great Britain is called a limited monarchy, from the fact that the power of the crown is subjected to constitutional limitations, and is held in check by other authorities. Absolute monarchies, which as the world advances toward freedom are becoming rarer, are now found in perfection only in the East, where were the five great monarchies of the ancient world—namely, Chaldæa, Assyria, Media, Babylonia, and Persia. In Europe the rise of the absolute monarchy marks the transition from the mediæval to the modern age. The latter part of the fifteenth century saw England, France, and Spain under the dominion of absolute rulers, whose government was in general a great improvement on the petty tyranny of feudal magnates, but the revolution of 1688 in England and the changes on the Continent resulting from the French Revolution transformed the European absolute monarchies into the constitutional governments of the present. See Government. F. M. C.

Monasticism: See Monachism.

Monastir: chief town of vilayet of Monastir, European Turkey; important military post (see map of Turkey, ref. 4–B). It carries on large transit trade in wheat and skins; manufactures carpets and gold and silver ware. Pop. 50,000.

Monbod'do, James Burnet: lawyer and author; b. at Monboddo, Kincardineshire, Scotland, in 1714; educated at Aberdeen, Edinburgh, and Groningen; practiced as advocate in Scotland in 1767; became a judge, with the title of Lord Monboddo. His *Dissertation on Language* (6 vols., 1773–92) expresses his theory of the origin of the human race from the monkey, which he further elaborated in *Ancient Metaphysics* (6 vols., 1779–99). D. in Edinburgh, May 26, 1799.

Monck, Charles Stanley, G. C. M. G.: Fourth Viscount; statesman; b. at Templemore, Ireland, Oct. 10, 1819; educated at Trinity College, Dublin, and called to the bar in 1841; succeeded his father in 1849; entered the House of Commons 1852; was a lord of the Treasury 1855–57; was Governor-General of Canada 1861–68; received a seat as a baron in the House of Lords 1866; became in 1871 a commissioner of the Irish Church temporalities, and was land commissioner in 1882–84. D. Nov. 19, 1895. During his service in Canada the Dominion was established.

Moncreiff, mon-kreef', Sir Henry Wellwood, D. D.: clergyman and author; b. at Blackford, Perthshire, Scotland, Feb. 6, 1750, being eldest son of Rev. Sir William Monereiff; was educated at Glasgow and Edinburgh Universities; was ordained a minister of the Church of Scotland 1771; was for some time his father's successor as minister at Blackford; became pastor of St. Cuthbert's, Edinburgh, 1775, and moderator of the General Assembly 1785; was a popular preacher; "succeeded Dr. John Erskine in the chieftainship of the Whig party in the Kirk of Scotland"; took an active part in the ecclesiastical controversies of his time, and late in life assumed the name of Wellwood. D. in Edinburgh, June, 14, 1827. He was the author of *Discourses on the Evidence of the Jewish and Christian Revelations* (1815); *An Account of the Life and Writings of John Erskine, D. D.* (1818); of many pamphlets on ecclesiastical topics; and of several volumes of *Sermons*. His *Posthumous Sermons* (3 vols., 1829–31) were selected by Dr. Andrew Thomson, and edited, with an *Account of the Author's Life*, by his son, Sir James Wellwood Moncreiff (1776–1851), who became a judge of session and a lord justiciary, known by the courtesy title of Lord Moncreiff.

Moncton: town of Westmoreland co., New Brunswick; on the bend of the Petitcodiac river, a remarkable tidal stream flowing into the upper end of Shepody Bay, the western arm of the Bay of Fundy (see map of Quebec, ref. 5–I). It is a railway center, junction on the Intercolonial Railway, 89 miles N. E. of St. John and 186 miles N. W of Halifax, and terminus of the Moncton and Buctouche Railway, 32 miles long. It is a prosperous and rapidly growing place, having a sugar-refinery and cotton-factory, and surrounded by a flat and fertile farming region. The extreme range of tide in the Petitcodiac is 70 feet, and the bore passes up the river in a wall 4 to 6 feet high. The immense salt-meadows alternately covered and uncovered can be reclaimed, and are very rich in fertile soil. Pop. 8,765. M. W. H.

Monday [M. Eng. *moneday*, *monenday* < O. Eng. *mōnandæg*, liter., the day sacred to the moon; *mōna*, moon + *dæg*, day. Cf. Germ. *Montag*; *mond*, moon + *tag*, day]: the second day of the week.

Mondo'vi (anc. *Monsvi'ci*, *Monsrega'lis*, or *Vicodunum*): town in the province of Cuneo, Northern Italy; about 42 miles S. of Turin and about 1,600 feet above the sea-level (see map of Italy, ref. 3–B). It is surrounded by ancient walls. The episcopal palace is a very fine building, and the cathedral and other churches are of considerable interest. About 2 miles from Mondovi is the great sanctuary of the Madonna di Vico, adorned with interesting works of art. In 1796 occurred in this neighborhood the engagement known as the battle of Mondovi, in which Bonaparte defeated the Piedmontese army, and thus prepared the conquest of all Upper Italy. In 1799 the town was sacked by the French, and nearly destroyed. Pop. about 10,300.

Monera [Mod. Lat., from Gr. *μονήρης*, single, from *μόνος*, single]: a name given by Haeckel to a supposed group of Protozoa, which differed from all others in the lack of a nucleus, each individual being a living mass of undifferentiated protoplasm. Since the group was named various members have been found to possess a nucleus, and have consequently been referred to the Rhizopoda (*q. v.*). It is possible that in the forms that remain the absence of a nucleus is apparent rather than real, and the essential nuclear substance (*chromatin*, etc.) is scattered through the cell instead of being concentrated in one place. J. S. K.

Monet, mō'nā', Claude: landscape-painter; b. in Paris; contemporary. He is the chief of the modern impressionist landscape-painters in France, and his works are notable

for their luminosity, frank truth to nature in respect to light and air, and for original color schemes. His methods have been used by many imitators, most of whom fail to get more than the superficial qualities of his work in their own, but his influence has been beneficial in that it tends to draw attention to the supreme importance of light and atmosphere in landscape-painting. He paints many of his pictures near Giverny, a village of Normandy, where he has a studio and is surrounded by an enthusiastic group of followers. He does not exhibit at the Salon, but his works are often seen at various small exhibitions in Paris, and many of them are owned in the U. S. Four excellent ones are in the collection of William H. Fuller, New York.

WILLIAM A. COFFIN.

Monetary Standards: standards of *value*, i. e. exchange value, embodied in some form of money. Three such standards are now familiar to men's thought, gold alone, silver alone, and gold and silver used together, forming a bimetallic standard (not "double standard," a sad misnomer) and the basis for a system of bimetallism. In most or all countries having the sole gold standard silver is also used in some subordinate relation, either for full legal-tender money, as in the U. S., Germany, and France, or for subsidiary coins alone, as in Great Britain. Most countries having the silver standard employ more or less gold for trade with gold lands, buying and selling it as a commodity.

BIMETALLISM.—Bimetallic money is money constituted by admitting both gold and silver to free coinage, and making each an unlimited legal tender at a certain relation in value to the other. This system must be carefully distinguished from the mere use of full legal-tender silver along with gold (legal-tender tokens), as in the U. S., Germany, and France. That does not constitute bimetallism, because silver is not in those circumstances open to free coinage. A single nation may, of course, adopt bimetallism, but it is doubtful whether any nation by itself could now permanently maintain it. If bimetallic money is possible, i. e. if it is feasible to keep the two metals at a fixed value in relation to one another (see below), a bimetallic system of money must possess eminent superiority over any other system. 1. Bimetallic money guarantees to the value of the dollar, or other monetary unit, a *steadiness* attainable in no other system. The importance of this quality in money, preventing general prices from either rising or falling, is incalculable. Monometallists greatly underrate it, thinking too much of money as a mere means of effecting exchanges; whereas, in the present condition of the world's business, the vast bulk of time contracts and deferred payments renders paramount the character of money as a just *standard of value*, making general prices steadfast through periods of time. Fluctuations in the value of the money unit in any system will be slight, nearly in proportion to the whole volume of (unwrought) standard money metal contained in the system. Gold and silver freely coined together would make such volume not far from twice as vast as either could furnish alone. Even if the whole volume of money metal were the same in both cases, a bimetallic money unit would have a less variable value than a unit realized in a single metal, because fluctuations through extraordinary discoveries or losses, exportation, or new uses or disuses in the arts, are less likely to occur in both metals at the same time than in one alone. The vice of money with an unsteady value is manifest in gold countries, where, at present, owing to the progressive scarcity of gold available for monetary uses, a fall of prices is going on, to which no end is visible without an abandonment of the sole gold standard. The preciousness of gold, through military and other hoarding, will drive more and more nations to paper money, whose depreciation, acting as a premium on the exportation of products from these to gold countries, must depress in these latter the prices of international commodities, and to some extent all prices. As paper money, when it has displaced gold, almost inevitably works an increase in its own volume, leading to repeated elevations in prices, the process named bids fair to be endless. 2. A solid bimetallic monetary system would establish a common measure of value, a fixed par of exchange, not only between the different states uniting to sustain it, but between every pair of countries on earth. It would make the commercial world into the most perfect possible unity for purposes of trade. Such unity always existed till 1873, when silver was demonetized. Exchange processes between India and Great Britain, for instance, were then as simple and easy as they are now or ever were between any two separate sections of the earth. Between the money of London and that of Calcutta, in spite of the fact that one was gold and the other silver, there was practically a fixed par, as there is to-day between dollars and sovereigns, rates of exchange oscillating in the one direction or the other from this par as the balance of trade might swing, but never beyond the percentage required for the shipment of specie, and always in a way more or less calculable beforehand according to the season of the year. Merchants in one country could place orders for the other's products long beforehand. Contracts might be in gold money or in silver, in sterling or rupees, indifferently, for it could be foreseen almost to the penny how much a sum of either would mean in terms of the other at the date when they were to mature. After the demonetization of silver in 1873 all this was changed. The tie that had bound the two metals together at the relation in value of 15½ to 1 was gone. Nothing like fixity of par between East and West has since existed. The London trader can no longer with safety offer former or any silver prices for Indian products, since he can not tell a day or an hour beforehand what that sum of silver may soon equal in gold. Merchants in India are in like case if they wish British goods. This evil, which works against international *loaning* as well as against international *trade*, can never be remedied save by international bimetallism. The serious question is whether the two metals can be so united as to continue for, say, a century at the same value in terms of one another. Many respected writers still deny this possibility, but clearly they do not consider the whole case. All the members of the Royal British Gold and Silver Commission of 1886–88 (six of them then being gold monometallists, though one of these, L. H. Courtney, M. P., is now an ardent bimetallist) declare their belief that it is possible to bind the metals together in the way named. Jevons, Lexis, and Léon Say, among other eminent authorities not bimetallists, have expressed the same belief. A considerable list of eminent monetary writers could be given, who at first opposed bimetallism, but after examination embraced it. Moreover, bimetallism did actually work in France from 1803 to 1873, and that though conditions were far less favorable to it than they have ever been since, or ever could be under a careful international agreement. The argument for the feasibility of bimetallism is briefly as follows: 1. Were both gold and silver freely coined the monetary demand and supply of them would, in fixing the value of given quantities of them, have far more influence than the commodity supply and demand would have. 2. A legal-tender and debt-paying value ratio between a given quantity of gold and a given quantity of silver can be established by statute in any state and by treaty throughout any number of states. 3. Since men discharge their pecuniary obligations as easily as they can, the existence of such a legal value ratio would, if this ratio ever for any reason failed to match the commercial ratio, stimulate demand for the metal that was commercially the cheaper, lessening at the same time the demand for the dearer, and so tend to bring the bullion value ratio back to the legal value ratio. 4. If the field of the legal arrangement is large, so as to cover a third of the world's gold and silver, unless the legal value ratio determined upon is widely different from the ratio in quantity between the total stocks of the two, the stimulus of demand for the cheaper will overbear every tendency to part the parities named, and maintain the unit quantity of gold and the unit quantity of silver perpetually at the same value. This theory in no sense traverses the law of supply and demand. Bimetallist legislation is expected to bring the above result to pass, not in defiance of economic forces, but by setting free certain economic forces now latent and giving the proper direction to those already working.

LITERATURE.—*Reports* of Royal Gold and Silver Commission (1886–88); Nicholson, *Money and Monetary Problems*; Walker, *Money, Trade, and Industry*; H. H. Gibbs, *Colloquy on Currency*; Horton, *The Silver Pound*; Suess, *The Future of Silver* (Senate document); Andrews, *An Honest Dollar*; publications of British Bimetallic League.

E. BENJ. ANDREWS.

MONOMETALLISM is the use of only one metal as money of full legal tender, either gold or silver. In the seventeenth and eighteenth centuries most, if not all, civilized countries employed both gold and silver as money of full legal tender, intending to use them simultaneously, but really using them alternately. The use of two metals requires the establishment of a legal ratio between them, giving debtors the option of paying, for example, either 1 oz. of coined gold or

15½ oz. of coined silver for an equal sum, the mints of the country being open at all times to the coinage of either metal in unlimited amounts for private persons. Concurrent circulation of the two metals can continue only so long as the market ratio coincides with the legal ratio. When 1 oz. of gold, as in the example cited, comes to be worth a little more than 15½ oz. of silver, gold will be exported or withdrawn from general circulation. If the market ratio turns the other way, silver will be exported and gold will be retained. The monetary history of nations consists mainly of these changes and of the recoinages to which they led. There were twenty-six changes of the ratio in France between 1602 and 1773. Prior to the year 1871 the only countries that had the single gold standard were Great Britain and her colonies, Portugal, Turkey, Persia, Brazil, and the Argentine Republic. Those which had the single silver standard were Germany, Holland, the Scandinavian countries, Austria, Russia, Egypt, Mexico, Japan, India, China, Central America, Bolivia, Ecuador, and Peru. All the countries not named in either of these lists had the bimetallic system, or double standard, although some of them did not have any silver of full legal tender in actual circulation. The U. S. was in this category. The single gold standard was legally adopted by Great Britain in 1816, but it had been practically adopted in 1774, when an act was passed limiting the legal tender of silver coins to £25. Both silver and gold had been full legal tender up to this time, the ratio being a little less than 15¼ to 1. The legal and the market ratios did not coincide. There was a tendency to export silver, the new pieces of full weight being chosen for exportation and the old ones of light weight retained for home circulation. The reason for passing the act of 1774 was that the silver in circulation was so much worn that it was no longer worth its face value. This act limiting the legal tender of silver was in force with only a brief intermission more than forty years before the single gold standard was formally adopted. When the new German empire was formed one of the first questions that came before it was the disordered state of the currency, which consisted of seven different systems of legal-tender silver coins, besides a variety of gold coins, German and foreign, passing as commercial money, and also state notes and bank notes passing at varying rates of discount. The reasons offered to the Reichstag by the Minister of Finance for the adoption of the gold standard were that silver was too bulky and inconvenient for the needs of modern commerce, and that it had on this account created an artificial demand for bank notes and prevented any rational regulation of the banking system of Germany. Accordingly, in 1871 the Reichstag passed a law for the adoption of the gold standard, which was more effectually carried out in 1873. The Scandinavian countries immediately followed the example of Germany. In the meantime two officials of the U. S. Treasury, John Jay Knox and H. R. Linderman, had been charged by Secretary Boutwell to prepare a bill for revising and consolidating the coinage laws of the U. S. At this time the country had no gold or silver money in circulation, being still on the paper basis of the war period. Mr. Knox and Dr. Linderman, observing that gold had been the only metallic money of full legal tender in actual use since 1834, and that the silver dollar was worth as metal 2½ cents more than the gold dollar, omitted the silver dollar from the list of U. S. coins as an obsolete thing. In 1873 Congress passed the law, but it is not true that it was passed surreptitiously, or that the omission of the silver dollar from the list of coins was unnoticed. The effect of the measure was to make the U. S. monometallic in law as it had been in fact during a whole generation. The legal ratio in France was 15½ to 1. In 1873 the market ratio had risen to 15·75, in consequence of which there was an extraordinary flow of silver to the French mint, accompanied by an exportation of gold. A treaty had been formed in 1865 between France, Belgium, Switzerland, and Italy, by which their monetary systems had been assimilated. This association, called the Latin Union, is still in existence. The members were called together to take action in reference to the outflow of gold, and it was decided to stop it by restricting the coinage of silver to a fixed sum for each country. In 1876 it was stopped altogether in all those countries. In Holland the same policy was adopted for the same reason. Austria had an irredeemable paper currency, but she too became alarmed at the decline of silver. In 1879 the market ratio to gold had reached 18·30 to 1. The Austrian Government in that year ordered its mints to be closed to silver, and in this way checked the decline of its paper currency which was redeemable in silver. In 1892 Austria prepared to resume specie payments on the basis of the single gold standard. The arrangement is not yet (1894) fully completed, but will not be long delayed. Roumania changed her system from silver to gold about the same time. In 1893 British India took the first step to the introduction of the gold standard by closing her mints to silver. In 1894 the republic of Santo Domingo changed from silver to gold. The coinage of silver on private account in Russia has been stopped, although that country is still on a paper basis. The only silver monometallic countries of importance now are China and Mexico. There are no bimetallic countries, unless Japan may be called such, that country being actually on a paper basis. The advocates of the single gold standard contend that the monetary changes here enumerated have been the result of natural selection, being in this respect akin to all the other great improvements that have taken place in human affairs. The burden of proof to show the contrary is on those who would oppose a natural movement by artificial means. Three ineffectual attempts have been made to turn mankind back to bimetallism by international agreement. These were the two monetary conferences held at Paris in 1878 and 1881, and the one at Brussels in 1892. The only country in Europe that declared itself in favor of bimetallism in the Brussels conference was Holland. Bimetallists say that these changes in the monetary systems of nations have not been brought about naturally, but by the action of men, by the laws and decrees of governments. Of course, all changes which need to be expressed in laws and decrees are made by men and governments. Nobody contends that they grow on bushes, but the fact remains that they came to pass without outside compulsion. Germany, for example, was under no outside compulsion to change to the gold standand in 1871. She found it to her advantage to do so, and that is all that is meant by the word "naturally." The same may be said of all the other countries that have followed Germany's example. Germany did not compel France in any other sense than that of offering France a large amount of silver at the ratio which France had voluntarily chosen. This can hardly be called compulsion, but if it had been compulsion it is not easy to see what else could have been done if France preferred gold to silver. It is said that France held the two metals steady at the ratio of 15½ to 1 from 1803 to 1873. That is a mistake. The market ratio varied during that period between 15·40 and 16·25, with the result of driving gold and silver alternately out of circulation. If France had really held the ratio of the two metals steady for seventy years, of what consequence would that fact be if she failed on the seventy-first? Bimetallists say that gold monometallism has caused a fall of prices. If this were true a fall of prices is not necessarily harmful. It may be advantageous, and must be so if the money income of the larger part of mankind has increased or remained stationary during that period. As money wages have advanced materially in this country since 1873 this reasoning has no force. Space does not suffice to pursue all the arguments of the bimetallists. The main contention on the other side is that the gold standard has been adopted by governments because gold is universally acceptable to individuals, while silver is not; that money is an instrument of trade, and that no system is possible which neglects or runs counter to the preferences of traders; and that international bimetallism is impracticable.

The literature of this subject is vast, but is mostly found in government publications, such as the official reports of the three monetary conferences referred to, speeches in Congress, and public investigations. The pamphlet and magazine literature is very large. See Laughlin's *History of Bimetallism in the United States* (New York); Giffen's *Case against Bimetallism* (London); Bamberger's *Stichworte der Silberleute* (Berlin). HORACE WHITE.

Mon'ey [from O. Fr. *moneie* > Fr. *monnaie*: Ital. *moneta*: Span. *moneda* < Lat. *mone'ta*, mint, coin, money. See MINT]: a standard by which wealth is measured, and an instrument by which one kind of wealth can be exchanged for another. Money differs from currency; while currency is anything with which commodities can be bought and debts canceled, it does not always have an intrinsic value, but may be, as in the case of bank-bills or government notes, merely a voucher or representative of value, in which case it is not money. Money is that kind of currency which has an intrinsic value, and which thus, if not used as currency, would still be wealth.

Different Commodities Used as Money.—Any article of wealth—i. e. anything which has value—may be used as money. Tin was thus employed in ancient Syracuse and Britain, while to the same purpose we find iron in Sparta, cattle in Rome and Germany (*pecunia*, from *pecus*, cattle), a preparation of leather among the Carthaginians, platinum in Russia, lead in Burma, nails in Scotland, pieces of silk among the Chinese, cubes of pressed tea in Tartary, salt in Abyssinia, cowrie-shells on the coast of Africa. slaves among the Anglo-Saxons, tobacco in Virginia, codfish in Newfoundland, bullets and wampum in the early history of Massachusetts, logwood in Campeachy, sugar in the West Indies, soap in Mexico, etc.; but from the time of Abraham, when he paid (Gen. xxiii. 16) to the children of Heth 400 shekels of silver, "current money with the merchant"—the earliest historical record of a purchase with money—till now, gold and silver have been the money of the world with civilized and commercial people.

These metals possess some singular advantages which explain why they are used as money. They are intrinsically valuable, everybody in the civilized world desiring gold and silver, not simply as money, but for ornaments, for plate, and other uses, and no one being able to obtain them without labor. They have both the elements, therefore, of true value. Besides this, they wear out very slowly; they are very easily divisible and malleable, and can be readily alloyed and refined; they are largely distributed over the globe, and are yet of sufficient scarcity; they are of the same quality wherever found, and are subject to fewer fluctuations in value than any other commodity known. This last quality is a prime requisite in money. In exactly the degree in which the value of money were unstable would it cease to be a trustworthy standard of value, while in the same degree exchanges would be made difficult and contracts uncertain.

In order that money may be a standard of value as well as an instrument of exchange, its own value must be invariable—a condition to which gold and silver better conform than any other commodity, but in which any currency not convertible into these necessarily fails. When bank-notes or government notes become currency without a corresponding basis of money, nothing has ever been able to prevent their fluctuation in value and the consequent effect upon all other values. The temptation to increase these issues according to the fancied interest of the bank or the government is always likely to prove irresistible, in consequence of which the community employing them finds itself flooded with a currency upon which all values float with an unsteady motion, and any standard of value is out of the question. See COINAGE, CURRENCY, and MONETARY STANDARDS.

Revised by A. T. HADLEY.

Monge, GASPARD: mathematician and physicist; b. at Beaune, France, May 10, 1746; studied at Lyon and Mézières, and, having made several important discoveries in the science of engineering, was called in 1783 to the chair of Hydrodynamics in the Paris Lyceum. During the Revolution he became Minister of Marine, but resigned that position soon after the execution of Louis XVI. and took charge of the manufactories for supplying the army with arms and gunpowder. Under the Directory he founded the École Polytechnique, but, after holding for a time the chair of Mathematics in that institution, was sent to Italy to take charge of the removal of the captured art treasures to France. While in Italy he formed a close friendship with Napoleon, whom he afterward accompanied to Egypt, assuming the direction of the Egyptian Institute. On his return to France he resumed his duties in the École Polytechnique; was chosen senator in 1805, and in the following year received the title of Count of Pelusium. After the second restoration he lost his positions, and died July 18, 1818. In addition to several important discoveries in physics, he invented the method of descriptive geometry and left valuable treatises on that subject: *Leçons de Géométrie Descriptive* and *Application de l'analyse à la Géométrie* (1795). He also wrote a *Traité élémentaire de Statique* (1788).

F. M. COLBY.

Monghir, or **Mungir**: a city of Bengal, India; chief place of a district of the same name, on the right bank of the Ganges; lat. 25° 22′ N., lon. 86° 30′ E.; terminus of a short branch railway connecting with the main line along the south bank of the Ganges (see map of N. India, ref. 7–H). The city consists of a rocky bluff, on which is a fort now occupied by administrative offices, and a lower part stretching along the Ganges for over 6 miles. It is a manufacturing city, and has long been celebrated for its manufacture of arms and objects in iron. The products of this industry are more recommended by their cheapness than their excellence, and the industry is in decadence. There are also factories of textiles, dyes, soaps, glassware, boxes, furniture, shoes, and idols. Much *ghi* or native butter is exported. The city was formerly a Mahommedan center, but the population is now mostly Hindu. Pop. 57,877.

M. W. H.

Mongo'lia: the land of the Mongols: a Chinese possession in Central Asia; bounded on the N. by Siberia, on the E. by Manchuria, S. by China proper, and on the W. by Chinese Turkestan; area, 1,288,000 sq. miles; population about 2,000,000. There is no natural boundary between Manchuria and Mongolia. A line of palisades (still shown on some maps) formerly marked the dividing-line, but it no longer exists.

A large portion of Mongolia is occupied by the great Desert of Gobi, a desolate and sterile tract of almost treeless country, extending N. E. and S. W. between the 90th and 120th meridians of E. lon., in some places exhibiting a considerable depression, and in some parts more than 200 miles in breadth. Generally this desert is a level land, and though, on the whole, at an average elevation of 2,600 feet above the sea, there are but few hills of any altitude. On the other hand, the Alashan country to the S. is mountainous and well wooded. On the western side of these hills the great river Hwang-ho runs for nearly 400 miles, and some peaks, beyond where the Hwang-ho forces its way eastward, are covered with perpetual snow, and are probably not less than 10,000 to 12,000 feet high. To the N. and N. W. chains of high mountains separate Mongolia from Siberia, the range of Altai being the most famous. This, which is the richest portion of Mongolia, is chiefly in the hands of the Buddhist monks, the high priest himself residing at URGA (*q. v.*). Though better watered than other parts of Mongolia, and the source of some considerable rivers, such as the Amur and the Orkhon (which flows into the Siberian lake Baikal), the intense winter cold renders the rearing of even the commonest and hardiest vegetables almost impossible.

There are three principal divisions of Mongolia: (1) *Inner Mongolia*, lying S. of the desert and N. of the Great Wall; (2) *Outer Mongolia*, between the desert and the Altai Mountains, and reaching from the inner Khingan to the T'ien Shan peh-lu; and (3) KOKONOR (*q. v.*), which is separated from the rest of Mongolia by the province of Kansuh. The inhabitants of Inner Mongolia are divided into 6 corps and 24 tribes, ranged under 49 koshun, or banners, each of which is commanded by a hereditary prince. The principal tribes are the Kortchin and the Ordos. The Tsakhars, who occupy the region immediately N. of the Great Wall, are governed by a tu-tung, who resides at Kalgan. Their pasture lands are now included in the extended boundaries of the province of Chihli, just as those occupied by the Tumets are included in Shansi. This portion of Inner Mongolia is being rapidly filled up by Chinese settlers. *Outer Mongolia* is divided into four circuits, or khanates (Tushetu, Tsetsen, Sainoin, and Jesaktu), the tribes belonging to one khanate being forbidden to migrate into another. These are politically under the rule of two Manchu residents at Urga. The four khanates constitute one aimak, or section, subdivided into 86 koshun, or banners. In the whole of Mongolia there are 33 aimaks and 172 banners.

Owing to the peculiar character of their country, the Mongols are now, as they have ever been, essentially nomadic. By far the largest number of the population dwell in tents, and their chief possessions are large herds of camels, horses, sheep, asses, and mules.

The Mongols are middle-sized, strong, and active; their skin of a dark-yellow hue; their faces broad, with flat noses and projecting ears. They have little beard, and generally shave off what they have except one tuft. They belong to the great group now often called Turanian, and are thus allied to the Chinese, Tibetans, and the Japanese, and more remotely to the Esquimaux, Samoyedes, Lapps, Turks, and Magyars; in other words, to nearly two-thirds of the whole human race. In ancient history we find their ancestors under the generic title of Scythians or Cimmerians, and the founders of the Median empire, whose cuneiform writings we are even now only partially able to decipher; in later times they appear as the terrible and devastating Huns, and still later as the scarcely less ferocious warriors of Genghis Khan and Timour.

As they are of the same stock as the present Manchu rulers of China, similar interests as well as relationship insure their chiefs many favors from the Chinese Government; thus, some are married to princesses of the imperial house, so as to attach them more closely to the reigning family, while, as a rule, the rich gifts they receive far exceed the nominal tribute exacted from them. Unlike other nomadic nations, they have an alphabet (derived from the Syrian Nestorians) and a literature—of little value, however, being chiefly translations from Chinese works, or stories more or less fabulous of their great national hero, Genghis Khan.

Except as wandering hordes, overwhelming each country in its turn, and rather by their vast numbers than by knowledge of war as an art, we hear little of the Mongols till the time of Genghis Khan. Not long after the Kalkhas, under their khan, Kublai, conquered all China, and held the chief power there for about a century; and though, as is usually the case with empires so formed, that of the Mongols was soon broken up into a number of separate dynasties, the great Timour widely extended the already vast frontiers of the Mongol empire. Lastly, in the year 1519, Baber, a lineal descendant of Timour, founded by conquest a monarchy in Hindustan, popularly called the "Mogul" dynasty, and celebrated for the famous Akbar, a contemporary of Queen Elizabeth of England. To the invasion of Western Asia by the Mongol tribes we owe the establishment of many dynasties which became notable in history, partly owing to their conflict with the Franks during the crusades, and partly to the great ability in matters of government which these wild tribes from Central Asia exhibited as soon as they found themselves settled in the fertile lands of the West. Among the dynasties which owe their origin to the Mongol conquests may be mentioned that of the Moguls of Persia and Syria (A. D. 1157–1355); the Karakoiunbu (Turkomans of the Black Sheep), A. D. 1357–1496; those of the White Sheep (A. D. 1406–1502): and, connected with these, the Kipchaks of the Crimea, and of the Kazan, with the Usbeks of Bokhara, Samarcand, and Balkh.

A considerable trade passes through Mongolia to China on the one side and Russia on the other, with frontier marts at Kiakhta in Siberia and Maimaichin in Mongolia. This trade is carried on wholly by barter, money being either forbidden or (at least) seldom used. The caravans perform their journeys between October and the end of winter, bringing furs, woolen stuffs, and leather from the West, and conveying thither teas, silks, cotton, rhubarb, and sugar-candy.

Besides Urga, Kalgan, and Maimaichin, already mentioned, the other chief centers of trade are at Kobdo, on a plateau of the same name in the Mongolian Altai, Uliasutai, some distance to the E. of Kobdo; Saicha and Kukukhto, on tributaries of the Hwang-ho, near the border of Shansi; Dolanor, or Lama-miao, 150 miles N. of Peking; Jehol, near the border of Manchuria; and Hada, 60 miles E. of Jehol. See Huc's *Travels in Tartary, Thibet, and China* (2 vols., 1852); Wolff's *Geschichte der Mongolen* (Breslau, 1872): Prjevalsky's *Mongolia, the Tangut Country and the Solitudes of Tibet* (trans. by E. Delmar Morgan, 2 vols., London, 1876); Howorth's *History of the Mongols* (3 vols., London, 1876–88); and Gilmour's *Among the Mongols* (London and New York, n. d.). Revised by R. Lilley.

Mongoos: See Mungoos.

Monier-Williams, Sir Monier: Sanskrit scholar and Indologist; b. at Bombay, India, in 1819; studied at King's College, London, and at the East India Company's College at Haileybury; became Boden Sanskrit scholar at Oxford 1843, and graduated 1844; Professor of Sanskrit at Haileybury 1844–58, and at Cheltenham College 1858–60; was chosen Boden Professor of Sanskrit at Oxford Dec., 1860; visited India 1875–76. Raised to the knighthood 1886. Author of a *Sanskrit Grammar* (1846; 4th ed. 1877); an *English-Sanskrit Dictionary* (1851); *Kálidása's Sákuntalá*, with translation (1853); text-books in Persian (1858) and Hindustani (1859); *Original Papers illustrating the History of the Application of the Roman Alphabet to the Languages of India* (1859); *Indian Epic Poetry* (1863); *A Sanskrit and English Dictionary* (1872); *Indian Wisdom* (1875); *Hinduism* (1877); *Modern India and the Indians* (1878); *Religious Thought and Life in India* (1883); *The Holy Bible and the Sacred Books of the East* (1887); *Buddhism in its connection with Brāhmanism and Hindūism and its contrast with Christianity* (1889). D. in Cannes, France, Apr. 11, 1899. Revised by Benj. Ide Wheeler.

Monism: a philosophical term denoting a theory that holds one ultimate being in the universe. Dualism holds two ultimate principles, for example, mind and matter. Sir William Hamilton applies the term "monist" to the philosopher who "rejects the testimony of consciousness as to the ultimate duality of the subject and object in perception." The materialists may hold that the subject which thinks is material, like the object it perceives. The idealist may hold that the object it perceives is only a vision in the mind. The term "monism" has come into much use recently to indicate the doctrines of materialists like Haeckel, who holds "all matter to be ensouled or endowed with feeling and motion, or, better, the power of motion; on elementary attraction and repulsion is based every other psychical phenomenon, and consequently the highest developed soul-activity of man." W. T. Harris.

Monition: in the practice of the English ecclesiastical courts, the mildest form of ecclesiastical censure—simply an order admonishing the person complained of to do something specified in the instrument "under pain of the law and penalty thereof." Nevertheless, when duly and regularly served, disobedience to it entails the penalties of contempt of court. The other uses of the word are—(1) warning; (2) cautionary instructions or directions; (3) a formal letter or document issued from an archiepiscopal or episcopal court, ordering any person under the jurisdiction of the bishop to do, or to leave undone, some act or course of proceeding in which the bishop is interested.
Revised by W. S. Perry.

Monitor [from Lat. *mo'nitor*, warner, deriv. of *mone're*, warn. So called because thought to give warning of the approach of a crocodile]: name of a genus of large Old World lizards, some of which approach the size of alligators. The typical species, the Nile monitor (*M. niloticus*) attains a length of 6 feet, half of this consisting of the slender tail. The animal is gray with dark blotches. It is believed by the natives to be hatched from crocodile's eggs, but in reality these form a portion of its food. The *M. dracæna* of India and *M. gouldii* of Australia are also well-known monitors. The great lizards of the South American family *Teiidæ* are often called monitors, and indeed closely resemble the true monitors. Revised by F. A. Lucas.

Monitor [from *Monitor*, the (proper) name given the first vessel of this type]: one of a special class of nearly submerged armored vessels, invented by John Ericsson (*q. v.*), the principal features of which are a revolving turret protecting guns of large caliber, and an overhang deck protecting the propeller and rudder. Plans for such a vessel were submitted by Ericsson to Napoleon III. in 1854, but were rejected, and the first vessel of the sort ever constructed was built under contract with the U. S., for use in blockading Southern ports in the civil war of 1861–65. It was named Monitor by Capt. Ericsson, was launched at Greenpoint, Long Island, on Jan. 30, 1862, and went to sea Mar. 6 in command

Ericsson's Monitor of 1861.

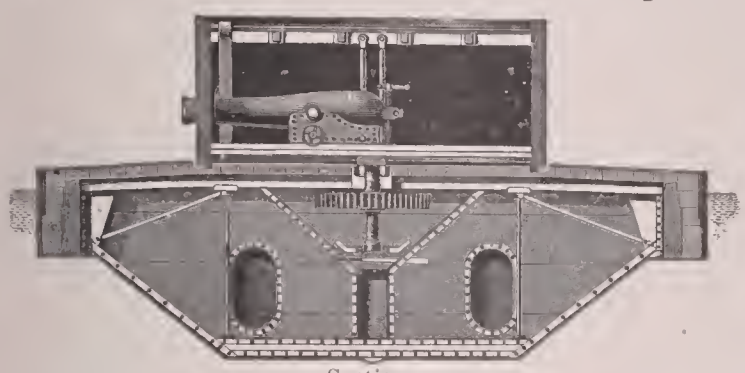
of Lieut. John L. Worden, U. S. navy, with a crew of forty-five men and twelve officers. The Monitor was an iron hull with wooden deck-beams and side projection, and of the following dimensions:

Extreme length	172 feet.
" breadth	41 " 6 in.
Depth of hold	11 " 4 "
Draught of water	10 " 6 "
Inside diameter of turret	20 "
Height of turret	9 "
Thickness "	.. 8 "
" of side-armor	.. 5 "
" " deck-plating	.. 1 in.
Diameter of propeller	9 "
" " steam-cylinders (two)	.. 36 in.
Length of stroke	2 " 2 "
Displacement	1,255 tons.

Armament, two 11-inch shell guns, each 15,668 lb.

The engravings represent a side elevation of the Monitor and turret, showing the position of the turret, pilot-house,

propeller, equipoise rudder, and anchor-well; also a transverse section. This vessel fought a memorable engagement with the Confederate ironclad Merrimack in the forenoon of Mar. 9, 1862, off Newport News, Va., neither being able to



Section.

destroy the other; but the Monitor was successful in protecting Union shipping, and the Merrimack was obliged to withdraw for repairs. There was no loss of life on either side. The Monitor foundered off Cape Hatteras Dec. 31, 1862.

During the civil war 54 monitors of various sizes were built, as follows: *Single turret*—10 of the Passaic class, 844 tons; 9 of the Canonicus class, 1,034 tons; 20 of the Casco class, 614 tons; and 5 for river service, 472 to 578 tons. *Double turret*—4 of the Winnebago class, 970 tons; 4 of the Miantonomoh class, 1,564 tons; and 2 seagoing monitors, Dictator and Puritan, of 3,000 tons, old measurement. Of these four were lost—the Weehawken by foundering at sea, the Patapsco, Milwaukee, and Tecumseh by explosions of torpedoes. In addition to the above there were begun four monitors of the Kalamazoo class, 3,200 tons, which the close of the war found upon the stocks unfinished. These with others, which by lapse of time had become no longer serviceable, were broken up later; a few were sold, and at present (1894) but eighteen remain on the list of vessels of the U. S. navy. Eight of these are of the Passaic and five of the Canonicus class, and all are laid up at some naval station. Of the remainder, four—Amphitrite (Tonawanda), Monadnock, Puritan, and Terror (Agamenticus)—are undergoing changes to meet the requirements of modern naval warfare; while one—Miantonomoh—has been completed and is in commission for service on the North Atlantic station,

Revised by C. Belknap.

Monitorial System: an educational system of importance in the history of pedagogy for the stir it made in the early part of the nineteenth century. The rival claims of Lancaster and Bell to the discovery of the system and the emulation developed between the two societies which they represented to carry out the principle did much to improve the English schools; still, neither really discovered the principle, since it had been advocated by Comenius 150 years before in the *Didactica Magna*. In Lancaster's own words, the distinct features of the plan are: First, that by his system of order and rewards, together with the division of the schools into classes and the assistance of monitors, one master is able to conduct a school of 1,000 children; second, that by printing a spelling-book or any other lessons for reading in large type, they may, when suspended with a nail against the wall, be read by a number of children, a method whereby one book will serve for a whole school; third, the introduction of slates and dictation, a method whereby 500 boys may spell and write the same word at the same instant of time; fourth, an entirely new method of instruction in arithmetic, whereby any child who can read may teach arithmetic with the utmost certainty; fifth, cheapness, three shillings a year for each child in a school of 300, and four shillings for a greater number. The system was founded on the assumption that a child who knows nothing of teaching, and scarcely more of the subject taught, can be a thorough instructor. The objections are too obvious to need relating. The last feature of the method as stated by Lancaster, namely, cheapness, was undoubtedly its main recommendation. See Sharpless, *English Education* (1892); *An Old Educational Reformer*, by J. M. D. Meiklejohn. See also articles Bell, Dr. Andrew; and Lancaster, Joseph. C. H. Thurber.

Moniz, Felipa: See Columbus, Christopher.

Monk: See Monachism.

Monk, George: See Albemarle, Duke of.

Monkey [from dimin. of Ital. *monna*, Span. *mona*, O. Fr. *monne*, female ape, woman, crone, contraction of *madonna*, lady]: a name applied in a general way to any of the order *Primates* except man, but generally understood to mean one of the smaller, tailed species of *Anthropoidea* in distinction to the larger apes and baboons on the one hand, and lemurs on the other. See Hominidæ, Primates, Simiidæ, Howling Monkey, Entellus Monkey, etc.

F. A. Lucas.

Monk-seal: popular name of a large seal (*Monachus albiventer*) found in the Mediterranean, and southward in the Atlantic to the Canaries. It is of a dark-brown color, dirty yellowish white beneath, and attains a length of 5 to 6 feet. An allied species (*M. tropicalis*) occurs in the West Indies, and these two are peculiar as being the only earless seals (*Phocidæ*) found in warm latitudes. F. A. L.

Monkshood: the common name of the European aconite (*Aconitum napellus*), also called wolfsbane. This, the most important species of the genus, is a perennial herbaceous plant growing in the mountainous regions of Europe, and cultivated somewhat in gardens as an ornamental flower. The root is tapering or spindle-shaped, and is sometimes mistaken for horseradish. The stem is erect, simple, rising several feet. The leaves are dark green on the upper surface, shiny, and are deeply divided. The flowers, which are borne upon a handsome terminal raceme, are large, of a violet-blue color, and with the upper of the five petals developed into a hoodlike appendage. The fruit consists of three small pods. All parts of the aconite are highly poisonous, but the root and leaves only are used in medicine. Their virtues depend on an alkaloid, *aconitine*, which is one of the most virulent poisons known. Aconite produces sensory and motor paralysis, and especially affects the heart, directly lessening the force and frequency of its beats. In fatal dose it kills by cardiac and respiratory paralysis, the symptoms resembling those of death by hæmorrhage. A peculiar effect of aconite is a numbness and prickling, which in moderate dose is felt about the lips, throat, and tips of the fingers, but in larger dose extends up the arms and legs. Aconite is used for much the same purpose for which bleeding used to be employed—namely, to moderate the heart's action in the early stages of acute febrile complaints. It also seems to have a special power over inflammations of the tonsils and throat. From its poisonous properties it requires to be used with caution. Digitalis is the physiological antidote to it. Preparations of aconite are also very useful applied externally to relieve local pains. The application produces at the spot the peculiar tingling above referred to. Revised by H. A. Hare.

Monluc, mōn'lük', Blaise de Lasseran-Massencome, Seigneur de: soldier and author; b. near Condom, 1502 (?), of an old, noble family. In his youth he was a page in the household of Antoine de Lorraine, soon began a military career as archer under Bayard, and was almost continually under arms for fifty-five years. He had reached great distinction in the wars of Francis I. and Henry II., having been knighted in 1544, when the civil wars broke out, in which he defended the Catholic cause with ardor. In 1574 Henry III. gave him the marshal's staff. D. in 1577. His memoirs, entitled *Commentaires*, dictated in the last years of his life, are a simple, frank, and very vivid story of his career, and of great historical value. They have been published by de Ruble for the Société de l'Histoire de France (5 vols.)

A. G. Canfield.

Monmouth: city; capital of Warren co., Ill. (for location of county, see map of Illinois, ref. 4–C); on the Chi., Burl. and Q. and the Ia. Cent. railways; 26 miles E. of the Mississippi river. It is in an agricultural and bituminous coal region: is the seat of Monmouth College; has 2 libraries (Monmouth College and Warren County) with over 30,000 volumes, 3 national banks with combined capital of $250,000, and 6 newspapers; and has manufactories of agricultural implements, sewer-pipe, paving-brick, and carriages and road-carts. Pop. (1890) 5,936; (1900) 7,460.

Monmouth, Duke of: See the Appendix.

Monmouth, Battle of: See the Appendix.

Monmouth College: an institution in Monmouth, Ill.; founded Jan. 1, 1856. It is under the control of the United Presbyterian Church, and is pronounced in its Christian character, but in no sense sectarian. Its first class graduated in 1858. Its three presidents have been Dr. D. A. Wallace (1856–78), Dr. J. B. McMichael (1878–97), and Dr. Sam-

uel R. Lyons (1898–1901). In 1900 there were 20 professors and 300 students. The college buildings are situated in a beautiful campus of 10 acres. Four courses of studies are offered, leading to degrees A. B., B. S., and M. B. of four years each, and B. L. of three years. J. B. McMichael.

Monmouthshire: county of England; bounded S. by the estuary of the Severn and the Bristol Channel. Area, 534 sq. miles. Along the coast the land is low and level, but the northern and northwestern parts are elevated and hilly, the highest point, the Sugar Loaf, rising 1,856 feet. Wheat, oats, and barley are grown, coal, iron, and limestone abound, and mines are extensively worked. Pop. (1901) 230,792. The county formed part of Wales until 1535, and the Welsh language is still in general use. County town, Monmouth.

Monnier, mō′ni-ā′, Marc: scholar and writer; b. at Florence, Italy, of a French father and a Genevese mother, Dec. 7, 1829. After studying at Naples, Paris, Geneva, Heidelberg (1851–52), he finally settled in Naples, remaining from 1855 to 1864. Then he removed to Geneva, becoming correspondent for several Parisian journals, notably the *Journal des Débats*, and soon after Professor of Comparative Literature in the university. His lectures were remarkably successful, and hearers came from all over Europe to his courses. He died at Geneva, Apr. 18, 1885. His earlier published works were mainly pamphlets and books concerning Italy, for which he had the keenest sympathy. One of these, *L'Italie est-elle la terre des morts?* (1830), made a sensation in Europe. Later he began to publish on purely literary subjects, *Les aïeux de Figaro* (1868), a brilliant study in the history of the drama; *Genève et ses poètes du XVI^e siècle à nos jours* (1874); *Les contes populaires en Italie* (1880). In his last years he was at work on an extensive *Histoire de la littérature moderne*, to be made up from the lectures he had been giving for so many years. He succeeded in publishing, however, only two volumes, *La Renaissance, de Dante à Luther* (1884) and *La Réforme, de Luther à Shakspeare* (1885). Besides these more serious labors we have from his pen several interesting lighter productions—a romance, *Les amours permises* (1861); a series of short plays for marionettes, published in 1871 under the title *Théâtre de Marionnettes*; and several volumes of verse, *Lucioles* (1863); *Poésies* (1872); *La vie de Jésus*, in verse (1875); a translation of Goethe's *Faust* (1876); and *Récits et Monologues, vers* (1880). A. R. Marsh.

Monobromate of Camphor: a substance used as a drug; made by heating together in a sealed tube camphor and bromine. It occurs in colorless crystals or scales, and has a mild taste resembling camphor. It is almost entirely insoluble in water, but is freely soluble in ether, alcohol, and chloroform. It is supposed to possess the combined powers of the bromides and camphor, and is used as a nervous sedative. H. A. H.

Monocen'tridæ [Mod. Lat., deriv. of Gr. *μόνος*, single + *κέντρον*, spine]: name of a family of fishes of the order *Teleocephali* and sub-order *Acanthopteri*, represented by a single known species, *Monocentris japonicus*, which is an inhabitant of the Chinese and Japanese seas.

Monochord [from Lat. *monochor'don* = Gr. *μονόχορδον*, liter., a thing with a single string; *μόνος*, alone, single + *χορδή*, string]: an instrument chiefly used for the computation of musical intervals and the adjusting of their respective ratios with reference to the scale. It consists of a single string stretched over a board or box. At each end the string passes over a bridge, and is fastened to a strong peg or wrench-pin. Underneath the string there is usually placed a scale with numerous divisions and subdivisions, at any of which the string may be stopped by means of a movable or sliding bridge, which serves to divide the string into two parts from any desirable point. The string of the monochord should be of equal thickness throughout, and strong enough to bear a moderately high tension. For practical use, a string of sufficient length to give the sound of C C with clearness will be found most convenient. Such a string, if stopped exactly in the middle by the movable bridge, will sound on either side the octave of the C C—i. e. the sound of the *half* length of the string is an octave above that of its *whole* length. When stopped at one-third of its length, the sound is an octave and fifth above that of the open string: and one-fourth of its length produces the C of the second octave, or two octaves above C C. The ratios of all the intervals may be found by pursuing the same process of division.

Monochrome: See Camayeu.

Monocotyledons [from Gr. *μόνος*, single, and *κοτυληδών*, cotyledon]: a sub-class of higher flowering plants (Angiosperms), characterized by having their leaves, from the first, alternate (the lowermost, or first leaf, *cotyledon*, is thus single), the veins of the leaves mostly parallel, the parts of their flowers commonly in threes, and the woody bundles in their stems separate, and arranged with seeming irregularity. Exceptions to all of these characters occur, but there is such a general agreement that there is little difficulty in recognizing the plants which belong to this sub-class. Characteristic Monocotyledons are the lilies, orchids, palms, and grasses, many of which are among the most useful and best-known plants in the vegetable kingdom. Eight orders of Monocotyledons are pretty well defined, including from thirty to thirty-five families. There are now known about 20,000 species. See Dicotyledons, Plants, Fossil; and Vegetable Kingdom. Charles E. Bessey.

Monod, mō′nōd′, Frédéric Joël Jean Gérard: theologian; b. at Monnaz, Switzerland, May 17, 1794; was educated at Geneva; succeeded his father, Jean Monod (1765–1836), in the pastorate of the National Protestant Church of the Oratoire, Paris, but seceded in 1848, and became the leader of the Free Evangelical movement. D. in Paris, Dec. 30, 1863.—His brother, Adolphe, succeeded him in the pastorate at Paris in 1847, and was an able orator and author of the orthodox school. He was born at Copenhagen, Jan. 21, 1802; died in Paris, Apr. 6, 1856. He published *Lucile* (1841); *Saint-Paul* (1851); *La Femme* (1862); and several volumes of sermons. His *Life*, by one of his daughters, appeared in English translation (London, 1885).
Revised by S. M. Jackson.

Monodelphia: See Placentalia.

Monogram [from Lat. *monogram'ma*; Gr. *μόνος*, single (i. e. together in one) + *γράμμα*, letter, thing written, deriv. of *γράφειν*, write]: a character made up of all or the more important letters of a proper name. This is the strict sense of the word: a character made up of two or three initial letters; as, for instance, J. Q. A. for John Quincy Adams is not a monogram, but a Cipher (*q. v.*). Moreover, the character &c., or, as modified, &c., standing for *et cetera*, is not a monogram because not made up of a proper name. It will be seen, therefore, that real monograms are very uncommon. The great number of ciphers used by engravers, book-printers, etc., in the sixteenth and seventeenth centuries include hardly a half-dozen real monograms. A perfect one is seen in Mr. Philippe Burty's stamp (see cut), put upon the prints of his fine collection. The best known monogram is that of the word Christ in its Greek form, ΧΡΙΣΤΟΣ.

The letters Χ Ρ do not necessarily form a monogram, but when combined thus ☧ they form one which has been in use for centuries. See Labarum. R. Sturgis.

Mono Lake: a body of water in Central California, E. of the Sierra Nevada. It is without outlet, and is variable in area. In 1883 it was 13½ miles in diameter from E. to W. and 11 miles from N. to S., and had an area of 85·5 sq. miles, a mean depth of about 61 feet, and a maximum depth of 152 feet. Its elevation is 6,380 feet above the sea. The mountains along its southern border rise from 6,000 to 7,000 feet above its surface. The water contains 53·47 grammes of various salts to the liter, of which 18·5 are sodium chloride, 22·6 sodium carbonate and bicarbonate, and 11 sodium sulphate. The high percentage of sodium carbonate and bicarbonate, amounting to 42·25 per cent. of the total solids in solution, makes the brine of commercial value; by estimate the lake contains nearly 200,000,000 tons of these salts. The water is so intensely saline and alkaline that it is uninhabited by fishes, but it swarms with the larvæ of insects and with small crustaceans known as brine shrimps. The lake was formerly 680 feet deeper than it is now, as is shown by ancient beaches, and had an area of 316 sq. miles. Israel C. Russell.

Monomania: See Insanity.

Monometallism: See Monetary Standards.

Monongahela City: city (chartered as a city in 1873); Washington co., Pa. (for location of county, see map of Pennsylvania, ref. 5–A); on the Monongahela river, and the Penn. and the Pitts. and Lake Erie railways; 21 miles S. of Pittsburg. It is in a coal, petroleum, and natural-gas

region, and has the only manufactory of carborundum in the U. S. The city has electric lights, brick-paved streets, thorough sewerage, 2 private banks, and 2 daily and 2 weekly newspapers, and paper, flour, and planing mills, machine-shops, foundries, ship-yard and docks, and the usual industries connected with coal-mining. Pop. (1880) 2,904; (1890) 4,096; (1900) 5,173.

EDITOR OF "DAILY REPUBLICAN."

Monongahela River: a stream which rises in Randolph co., West Va., flows N. 300 miles in a tortuous course and joins the Allegheny to form the Ohio at Pittsburg, Pa. It is navigable by slackwater improvements 106 miles to Morgantown, W. Va., and 200 miles for keel-boats. It flows through a fertile and highly prosperous region abounding in coal, timber, and various minerals. The navigable Youghiogheny is its most important tributary.

Monoph'ysites [from Gr. *μονοφυσίτης*, monophysite; *μόνος*, single + *φύσις*, nature]: persons adhering to the doctrine of monophysitism. I. The Monophysites were an Oriental sect originating in the fifth century in the views of EUTYCHES (*q. v.*), concurring in the main with them, though with certain specific differences. They held that though Christ is *of* two natures, which became conjoined at the incarnation, he does not subsist *in* two natures. (See CHRISTOLOGY.) There is in this sense but *one nature* after the union, though that nature involves and embraces two parts. The human is not annihilated, but is virtually lost, or virtually, though not essentially, absorbed in the divine —"like a little honey mingled with the ocean." The Nestorians virtually argued there are two natures, therefore there must be two persons; the Monophysites, there is but one persons, therefore there can be but one nature—both arguing in this way from a true premise to a false conclusion.

II. The spirit of the Monophysites was that of their era, fierce and bloody. Only internal harmony was needed to make them very formidable; but a system which originated in extravagance and confusion of thought ran out of necessity into a number of sects. These multiplied rapidly after the extinction of the hopes of the Monophysites to maintain themselves as the orthodox and catholic Church of the East. The sects which arose were as follows: (1) The Acephaloi; (2) the Julianists; (3) the Severians; (4) the Julianists; (5) from the Severians sprang the Agnoetists; (6) the Tritheists; (7) the Damianists; (8) the Cononites; (9) the Niobites.

III. The most important councils associated with the history of the Monophysites are—(1) the Council of Constantinople (448–449); (2) the "Robber Synod" at Ephesus, which restored Eutyches (449); (3) the Council of Chalcedon, the fourth œcumenical (451). It decided that the two natures are united without fusion, without mutation, indivisibly and inseparably—one Christ *in* two natures. It is remarkable, however, that the common Greek text reads "*of* two natures," which is the precise form preferred by the Monophysites. (See Münscher, *Handbuch d. Dogmen. Gesch.*, iv., 101.) These results were accepted universally in the Western Church, and very generally in the East, but were rejected with great violence, as Nestorianizing, wherever the Monophysites were in force.

IV. The struggle was violent and protracted between the parties. (1) In *Palestine* the diphysite bishops were expelled, and Theodosius was made Patriarch of Jerusalem. (2) In *Egypt*, under the presbyter Ælurus and the deacon Mongus, the Monophysites separated themselves. (3) In *Antioch*, Peter the Fuller, from whom the Monophysites are sometimes called Fullonians, attempted to introduce into the Trisagion the formula, "Thou (God) wert crucified for us," which the enemies of the Monophysites insisted must mean that the divine nature was crucified if Christ had but one nature, and called them Theopaschites. (4) The Emperor Zeno (482) put forth the *Henoticon* (agreement), which was designed to harmonize the contending parties. It used general expressions, which ignored the exact points at issue, avoided equally the phrases "one nature" and "two natures," condemned both Eutyches and Nestorius, and made an allusion to the Council of Chalcedon which was far from respectful. It widened the breach and inflamed the animosity. (5) Pope Felix III. (483–492) pronounced against the *Henoticon* and excommunicated Acacius, the Patriarch of Constantinople (484). This led to a suspension of communion between the Western and Eastern Churches for thirty-four years. (6) The Emperor Anastasius I. (491–518) at the beginning of his reign held fast to the *Henoticon*, with an evident leaning to the Monophysites. (7) In addition to the doctrinal interests there was a struggle between Rome and Constantinople for supremacy. Rome and orthodoxy came forth triumphant. Justin I. (450–527), with Pope Hormisdas (514–523), effected the reunion of the Greek and Latin Churches (518), the *Henoticon* was set aside, the decisions of the Council of Chalcedon were established, the bishops deposed by the Monophysites were restored, the formula of faith demanded by the pope was acknowledged, Severus and his followers were condemned, the names of the obnoxious patriarchs of Constantinople were stricken from the DIPTYCH (*q. v.*), and the names of Leo the Great and of Euphemius and Macedonius, the patriarchs of Alexandria, were inserted in them (519). (8) The Monophysites were now branded as heretics both by the state and the dominant Church. A thousand of their bishops and other clergy were deposed, imprisoned, and outlawed. Prominent among these was Xenayas (Philoxenus, d. 522). (9) The strength of the Monophysites in Egypt was so great that they were able to find in it a refuge in the time of the terrible storm which had broken on them (Timotheus, Ælurus, Severus, Julian).

The sphere of the Monophysites was the East, where local and political jealousies intensified the disputes which arose with the Church of the West.

(1) Monophysitism was influential in Egypt, from Alexandria as a center. In that land it continues to this day. (See COPTIC CHURCH.) (2) In Syria, Mesopotamia, Asia Minor, Cyprus, and Palestine, under the Patriarch of Antioch, the Monophysites take their name from their organizer and restorer, the monk and presbyter Jacob Baradai, and are known as JACOBITES (*q. v.*).

The ARMENIAN CHURCH (*q. v.*) is nominally monophysite. The total number of the Monophysites is probably about 9,000,000. See Dorner's *History of the Doctrine of the Person of Christ* (1861–63). Revised by S. M. JACKSON.

Monop'olies [from Lat. *monopo'lium* = Gr. *μονοπώλιον*; *μόνος*, alone, sole + *πωλεῖν*, sell]: The possession by an individual or by a group of individuals of the exclusive right or the exclusive power to supply or to demand some special kind of goods or services is a monopoly. The word is often used to include special personal gifts, e. g. those of a great musician or artist, or possessions that from their nature are strictly limited in extent, as special tracts or pieces of land. (See RENT.) In its ordinary broad meaning, however, the word is applied only to a branch of business which, from whatever cause, is practically—not necessarily entirely or legally—controlled by one executive head.

From various points of view monopolies have been classed as natural and artificial, public and private, general and local, permanent and temporary, productive and trade monopolies, monopolies of purchase and of sale, etc. For the purposes of this article it is best to recognize (1) legal monopolies; (2) natural monopolies; (3) capitalistic monopolies, with various kinds under each. It will be noted, too, from the course of the discussion, that these titles are not necessarily exclusive, but that they rather serve only to emphasize important characteristics of origin or nature.

LEGAL MONOPOLIES.—(*a*) *State Monopolies.*—Simon Sterne calls attention to the fact that the greatest of state monopolies is that of government itself. We are apt to overlook the fact that the functions of the state are monopolistic, or else to think that these functions are clearly limited and peculiar in their nature. A brief consideration, however, shows us that the sphere of the state's monopolistic activity may be confined to the protection of the state from external attack and internal revolution, or it may be extended to include more and more of the duties usually left to private enterprise until we reach the socialistic state, in which the government, the one monopolist, controls all business.

With some differences, however, the practice of the great modern states is to monopolize only those lines of business that are of vital interest to the people, and in whose management the people must have confidence. For example, the education of children, the coinage of money, the care of highways, the postal service, the police service, are generally cared for by the states and are usually monopolies.

A chief purpose of many state monopolies, especially in early times, has been to procure revenue. Regular taxation, in the historical development of nations, is a late expedient for raising revenue, early states being compelled to rely upon income from state lands, mines, and claims and rights of various kinds. Ancient Greece and Rome furnish examples

of monopolies of salt and other mines, though corruption of the lessees sometimes made them unprofitable. The Middle Ages furnish numerous instances. The Emperor Frederick II. is said by Cibrario to have established in Naples early in the thirteenth century monopolies of iron, salt, copper, raw silk and wine, while salt was a state monopoly also in Venice, Pisa, and Zurich, and a century later in France; and in his account of the Italy of Dante's time he tells us of a monopoly of guardianships, from which large sums were obtained for permission to marry. The development of the monarchical system in the sixteenth and seventeenth centuries, with the mercantilistic doctrine of the same period, however, gave a great impulse to state activity and state interference in industry, and in this period state monopolies for revenue purposes especially flourished. In Spain, Italy, Germany, France, and elsewhere, such objects as coffee, powder, wheat, playing-cards, and alcohol were monopolized by the state. Colbert introduced the monopoly of tobacco into France in 1674, the business being farmed out. Austria introduced it in 1670.

At present we find state monopolies for fiscal purposes in many states: e. g. salt in Austria, Italy, Greece, Roumania, Servia, Turkey, and in part in India, while the production is so controlled in Prussia that an enormous tax can be collected from it; tobacco in Turkey, France, Italy, Austria-Hungary, and Spain; opium in Turkey and parts of India; watches and gunpowder in France; alcohol, since 1887, in Switzerland, in Russia until 1862. The purpose of the alcohol monopoly in Switzerland is also in part to reduce the consumption of alcohol and lessen alcoholism. The same purpose is aimed at in the Gothenburg system in Sweden, which is a monopoly of the sale of spirits farmed out to a private company. South Carolina in July, 1893, put into effect a law making the sale of alcoholic liquors a State monopoly. After some riots, brought about by the vigorous efforts of Gov. Tillman to enforce the law, the courts finally declared the law unconstitutional.

Quite opposed to these laws in spirit is the monopoly of the state lottery in Prussia, Saxony, Hamburg, Spain, Austria, and Italy, from which large sums are put into the state treasury by encouraging a popular vice.

Many of these monopolies, especially that of tobacco, have proved very satisfactory from the fiscal standpoint, while some authorities are of the opinion that whenever a common necessity like salt becomes a natural monopoly it ought for the safety of the public to be made a state monopoly.

(*b*) *Private monopolies granted by government* became very common in the sixteenth and seventeenth centuries. They had at times a fiscal aim, as they were often sold; but so many and so important kinds of business, including salt, leather, coal, soap, cards, beer, wine, etc., became thus monopolized, largely through gifts to courtiers in England in the reigns of Elizabeth and James I., that Parliament had to protest vigorously, and Sir Edward Coke, in 1602, in the famous case of *Darcy* vs. *Allin*, decided that while the king could grant a temporary monopoly, thus recognizing the value of patents, all grants in restraint of trade were illegal. In 1625 an act of Parliament limited this power to the granting of patent rights.

Monopolistic grants, however, to great commercial and colonizing companies from different states of that time may well be justified, e. g. such as were given to the East India Company, founded 1600; the Dutch East India Company 1602; Hudson Bay Company, 1670; John Law's Company of the West, 1717, afterward the Company of the Indies, 1719 (the Mississippi scheme); and many others. Though the last proved a gigantic speculative failure, and though even the first two did not prove so successful financially as had been hoped, yet the advantage of the monopoly of trade and government granted them seems clear. So large amounts of capital were needed to carry out the enterprises; the time that must elapse before any returns could be hoped for was so long; the risks, not merely of the business but also of capture of ships by hostile nations and by pirates, were so great; the necessity of dealing promptly and finally with semi-civilized, barbarous, and savage peoples was so imperative, that possibly no one could have been found willing to undertake the enterprises unless a monopoly of the trade and even of some of the prerogatives of government were granted in advance.

The abuse of power by the governments, as has been shown, led to a reaction against the monopolies, while the mercantilistic doctrines that had tended to foster them were greatly weakened in popular favor in the latter part of the eighteenth century, especially under the attacks of Turgot in France and Adam Smith in Great Britain. The era of free trade and *laissez faire* set in, and only since the rise of the socialistic movement has there been a vigorous effort made to strengthen and extend legal and especially state monopolies.

(*c*) A *patent right* given by the government of a state secures to the owner and his assigns the monopoly of the manufacture and sale of the patented article for a fixed term of years; in the U. S. seventeen years. The object is, of course, to stimulate invention, and no thinking person would deny either the right or the advisability of the state to secure to an inventor the fruits of his intellectual activity; but whether this justice to the inventor is best secured by a patent monopoly or not is doubtful. Some think that the desired end would be better gained by granting to the inventor a royalty on all the articles of his invention manufactured, while leaving free to any one on payment of this royalty the right of manufacture. Copyrights and trade-marks are of the same general nature and value as patent rights.

Natural monopolies have become in the most highly civilized states of greater significance, perhaps, than legal monopolies. Of these monopolies there are to be distinguished two chief classes, although the line between the two can not be sharply drawn: 1. The first includes those lines of business of which the output is closely limited by natural causes, with relatively speaking little reference to the amount of capital employed, as, for example, the mining of nickel, or the use of a water-power; or it might be the employment of the finest view-point near some natural wonder, as Niagara Falls. Wherever, from purely natural reasons, the possession and management of the business by one legal person excludes that of another, we have a natural monopoly of this first class. Generally speaking, these monopolies are relatively of little economic significance for the industrial world as a whole, though they may be of great local value, and have often been made state monopolies for revenue purposes. Were there but one or a few coal or iron mines in the world their owners would have a dangerous monopoly. As it is, it has been found that competition between the owners of different mines will generally prevent too gross exactions, although the anthracite coal mines in the U. S., acting in conjunction with railways, have at times proved oppressive. The private ownership of the land about Niagara Falls was oppressive to tourists, but it had little effect upon general economic conditions. It must be noted that these natural monopolies presuppose private ownership guaranteed by law. The natural monopoly of personal ability and of land ownership, properly classed here, may be passed with the mention of them.

2. The second class of the so-called natural monopolies includes all those lines of business that have been designated as "industries of increasing returns," i. e. industries that, when once firmly established, for an added amount of capital invested will give a product more than proportional to that on the first investment. The chief industries of this class are railways, the telegraph, telephone, tramways, gas and electric lighting works, water-works, etc., and are practically all modern. In Europe the railways are often state monopolies, the telegraph is uniformly so, and municipalities frequently own and manage the gas-works and sometimes the tramways. In the U. S. such enterprises are private generally, excepting water-works. After a railway has been once put into running order its carrying capacity can be doubled at an outlay of capital far less than the original one. Some of these industries are almost identical with the first class of natural monopolies, while others are more nearly like the capitalistic monopolies mentioned below. It is not practicable, even if it were profitable, for many competing tramway lines to be laid in the same street, owing to lack of space. The same principle holds regarding gas and water works. On the other hand, there is room enough in all country districts for many competing telegraph or telephone or even railway companies to do business if it were profitable. It is only the fact that such lines would not be profitable that prevents their construction. The nature of development of the business is the chief mark of distinction between these two classes.

Capitalistic monopolies is perhaps the best name for those industries that become monopolized simply through the business advantages that arise from the use of large capital. Only of late years has this kind of monopoly become prominent, and that chiefly in the U. S., but indica-

tions seem to point to its extension. The best-known examples of capitalistic monopoly in the U. S. are the Sugar-refineries Company (Sugar Trust), the Distillers and Cattle-feeders Company (Whisky Trust), and the Standard Oil Company, although the last mentioned, so far as it has had to do with the production or shipment of crude oil, either by railway or pipe-line, is in good part a natural monopoly also, and although, further, the Standard Oil Company achieved its power largely through the assistance of the railways, which are natural monopolies. The capitalistic monopolies can not always be sharply distinguished from the natural monoplies of the second class mentioned above; but, generally speaking, they are not to any noticeable extent industries of increasing returns, and the advantages that enable them to become monopolies are mostly of the nature of saving in cost of distribution of product or of management. For example, for a sugar-refinery to double its output would in many cases involve the outlay of nearly as much capital as did the original establishment, while for a street-railway to double its carrying capacity would probably involve only the purchase of extra cars and traction-power, the road-bed remaining the same. On the other hand, twenty sugar-refineries working in harmony under the same management could save in many ways, and be run for much less than if each refinery were managed independently.

A *trust*, as the word is applied to monopolies, is simply a form of business organization, usually of a capitalistic monopoly. As nearly all natural monopolies of the second class mentioned above and all capitalistic monopolies require the investment of vast capital, nearly all have been organized as corporations. The trust is a device to combine into one compact harmonious working whole any number of different corporations with differing interests.

As the writer of this article stated in *The Economic Journal* of Mar., 1892, "to accomplish this result it is necessary—(1) That the interests of the different corporations be made common. (2) That the management of the different corporations be made harmonious. (3) That no corporation or individual have it in his power to withdraw from or to break up the organization, as is done under pooling systems. In forming the trust to accomplish these ends: (1) The majority of the stockholders of each corporation interested (in the case of some of the trusts—as the Cotton-oil Trust and the Sugar Trust—*all* the stockholders) surrendered in trust their shares of stock to a board of trustees of nine or eleven men; i. e. they gave to this board an irrevocable power of attorney or proxy, by virtue of which this board held a majority of votes in each one of the corporations, and could therefore elect its officers and direct its policy. This naturally harmonized the actions of all, and, the trusteeship being irrevocable, no individual can make trouble. (2) To protect the stockholders and make their interests common, this board of trustees issues to the stockholders, in lieu of their surrendered stock, trust certificates. The profits of all the various corporations are put into one common fund by the trustees, and then divided among the holders of the trust certificates *pro rata*. The holder, therefore, of each certificate receives the same dividend, whether the corporation whose stock he surrenders pays a high or a low profit, or even is closed and makes no profit at all. It is readily seen that this arrangement makes it to the interest of each trust-certificate holder that those establishments be run that make the best profits, whether these include his own establishment or not, and that the poorer ones be shut down if they are not needed. The plan has been uniformly successful in attaining its ends. In practice it has generally been found advisable to leave the management of the individual corporations in the hands of their former officers, and they have exercised their power at discretion; but in every case the power of removal is of course in the hands of this board of trustees, so that their judgment will be followed, and any lack of success in management is sure to meet its penalty."

The trust may easily be put back into the corporation form by issuing to each trust-certificate holder a corresponding amount of capital stock, giving him an undivided interest in all establishments represented. This plan has been followed by some of the trusts under the pressure of hostile decisions by the courts.

THE CAUSES OF INDUSTRIAL AS DISTINCT FROM STATE MONOPOLY may be said to lie in the modern form of industrial organization itself, the form that was the outcome of the steam-engine, the power-loom, the railway, the telegraph, and the other great inventions of the age. Of course, in this whole discussion the ordinary economic motives on which demand for products depends, and in accordance with which demand fluctuates, are assumed. The necessity of doing business on a great scale has altered the nature of competition itself; and from excessive competition, where competition is possible at all, springs the great combination of interests that results in practical monopoly; and yet this competition manifests itself in different ways. It has already been noticed that in some natural monopolies, as street-railways, no competition is possible, because the nature of the business does not permit two companies to work in the same place. In the case of railways a would-be competitor may lay another track beside the original one, and enter into competition; but the principle of increasing returns that applies to such a business shows us that the increased work, if any, accomplished by the two railways might have been far more cheaply done by increasing the plant of the first one. If competition begins between the two railways, and each is able to do all or nearly all the business, rather than lose its traffic each can afford to carry freight at any price above the running cost, thus losing the interest in part or whole on the original investment. Experience shows that in the case of parallel railways competition often actually does continue, until both railways carry freight at losing rates, or combination is effected by means of a lease, or pool, or other device. Parallel railways are at times built for the mere purpose of forcing the original railway to purchase or lease them, in order to avoid the excessive competition.

The case of great manufacturing establishments, e. g. sugar-refineries, distilleries of alcohol, cotton-factories, which are not natural monopolies, and which are subject to the principle of increasing returns to no such extent as are railways, is nevertheless, as regards competition, not materially different. Although a new rival factory might perhaps be built nearly as cheaply as the original one could double its capacity, yet if two factories representing large investments of capital come into competition, it often happens that, rather than lose trade, or shut down, to the certain destruction of much of the capital, both companies will run, perhaps must run, when their gains are not enough to pay fair interest on the capital invested, in addition to the running expenses. The only remedy is combination, either tacit, with a common ceasing to cut prices, or formal, through a pool, or trust, or purchase. To be sure, competition may ruin the weaker establishment, leaving the fittest to survive; but where large capital is invested, and the competitors are fairly evenly matched, this result is not so easily reached as is a combination, nor in many cases is it economically desirable. In the early days of the civil war in the U. S. the Government, by raising the internal revenue tax on alcohol to 20 cents a gallon, then to 60 cents, then to $1.50, then to $2.00, with in each case a considerable interval of time intervening before the higher rate was imposed after it had been announced, so increased distillers' profits that a large number of new distilleries were built, far more than enough to supply the normal demand for alcohol. The result of the fierce competition that ensued was the ruin of some distillers, but nearly all the larger establishments survived, though there was relatively little or no profit in the business for most of them. To improve their condition they found it necessary to unite in a pool, to limit their production, and at times even to tax themselves to export alcohol at a loss in order to secure better prices on the home market. The tenacity of invested capital and the fierceness of the competition which finally led to the combination into the Whisky Trust, which, under various names and forms of organization, has been able to secure monopoly prices, are shown by the fact that at one time all the distillers in the pool, some eighty in number, agreed to run their distilleries at only 40 per cent. of their normal capacity for one year, and later, another year, at only 28 per cent. of this capacity; and also by the further fact that, after the formation of the trust, twelve of the best distilleries running to the full extent of their capacity produced as much alcohol as had the eighty distilleries before, and also paid good returns on the capital invested in them all. Similar facts, though perhaps not so striking, in the history of the salt, white-lead, cotton-oil, and cotton-bagging manufacture, as well as, in a less prominent way, the associations of lumber-dealers, millers, steel-manufacturers, etc., and the many local associations in all lines of business, a main feature of whose existence is the effort to keep up prices by hindering competition—all lead to the conclusion that, when business is done on a

large scale, so much is at risk that, with exceptions here and there, too fierce and yet neeessary competition is the force that drives competitors into combination more or less complete with the purpose of securing prices that are, in fact, monopoly prices, though they may not be high enough to yield great profits. To say that the combinations are made for the purpose of securing large capital in order to effect the saving made by more complete organization, is to state the same fact from another standpoint.

Some of the strongest combinations, notably the Standard Oil Company, have been aided in their growth to monopoly by the special freight rates granted them by the railways. In this way one company may have succeeded in crushing or absorbing its competitors instead of being forced to unite with them on equal terms; but in this ease as before the fierceness of competition springing from modern methods of production with large capital has produced the monopoly, whieh is powerful enough to prevent, within certain limits, effective competition.

The benefits of monopolies—if by that term we understand the great business organizations that, by virtue of their strength, are often enabled to put down smaller eompetitors almost at will, and that obtain prices higher than would be possible under a system of equal competition, although they may not be entirely without competition—are often great, both to the owners and to the community, though sometimes the benefits to the community may be more than offset by accompanying disadvantages:

1. When competition becomes fierce, there is frequently upon the market a supply of goods so great that it can not be sold at remunerative prices. Either the amount produced by each must be lessened, or some of the competing establishments must stop business entirely. In actual business it frequently happens that competitors agree to limit each his output to less than his producing capacity, of course at a waste of invested capital. If now all combine into one great institution with harmonious interests, a great saving will be effected by working the best plants at their full capacity, and stopping the others entirely, turning them to other purposes to the best advantage possible. The monopoly then saves to soeiety capital and labor that would otherwise be unprofitably employed; or, assuming that no combination is made, and many fail in business, the monopoly might have saved much of the capital thus lost by being forced out of business. 2. The saving in industrial energy obtained by putting all production in any one line under the management of the leading experts is almost inealculable. 3. A great organization with branches in various parts of the country saves much in transportation. Each customer is served from the establishment nearest him. In the case of bulky articles, such as salt, sugar, or oils, this saving is very large. 4. The saving in a large establishment from side products that in a small one must needs be wasted is great. The solicitor of the Standard Oil Company writes that in this way "the cost of manufacture of lubricating oils and wax in connection with the refining of petroleum has been reduced by improved methods and constant attention, and the price has been constantly reduced, averaging to-day (1889) 50 per cent. less than in 1878." 5. A cheapening of manufacture is often made in materials also from careful study by experts and from a complete organization, neither of which would be possible in a small establishment. According to the experience of the Standard Oil Company: "In 1872 barrels cost the trade $2.35 each. They are now manufactured at our own manufactories at a cost of $1.25 each. About 3,500,000 barrels are used per annum. This single item amounts to $4,000,000. In 1874 cans cost 30 cents each. They are now made by our manufactories for less than 15 cents. Thirty-six million cans are used each year, and this one item of saving amounts to $5,400,000 each year." The same cheapening process he shows in wooden cases, pumps, stills, tanks, and everything used in the business. Of course, many or all of these articles would have been cheapened within that time if made by others for the use of smaller establishments, and it is probable that the difference in the money standard was not fully taken into account. Still it holds true that this may well be a great source of saving to the community, made by the monopolies. 6. In addition to the advantages mentioned, the managers of the great monopolies claim a lowering of prices and a steadying of prices, both of which claims are commonly denied. It is charged also against them that their power enables them to force down unduly the prices of raw material and wages.

Their influence on prices may profitably be considered in detail. The fixing of prices by all who have goods to sell is for the purpose of making the highest possible profits, whether the business be a monopoly or be carried on under a system of free competition. Such a truism seems neeessary as a reply to the feeling often exhibited against monopolies. The feeling and purpose of a monopolist is the same as that of any other business man. Their circumstances differ. The monopolist puts his price as high as he can without thereby lessening the demand for his goods more than enough to counterbalance his high profit on each individual sale. He seeks the greatest net profit. So with the other; but in the case of the monopolist the subjective feeling of the purchaser alone limits the sale, and hence the price; in the case of the other it is this feeling working in harmony with the desires of competitors to make sales that fixes prices. If the article to be sold is a luxury that people can readily do without, or especially if it is an article for which another can be easily substituted, the monopoly price will probably not differ much from that which would be fixed by free competition. It may even, owing to prejudice against monopolies, be lower at times than that. If, however, the article in question is a necessary of life, the monopoly priee may be, and probably will be, fixed much higher. In the case too of most of the so-called natural and capitalistic monopolies of which we have spoken another element enters in fixing price. These monopolies are rather partial monopolies. Nearly all of them have some few competitors who can not enter seriously into rivalry so long as the prices are not very much higher than competitive prices would be, but who would become dangerous rivals if prices became too exorbitant. On the whole, we might conclude *a priori* that we should find prices somewhat, but not very much, higher than competitive prices, and experience establishes the conclusion. The monopoly might fix its price below the competitive price, but it will not.

In the case of the sugar monopoly, the price of refined sugar began to increase before the formation of the trust, but that of raw sugar kept pace with it. When the trust was formed, however, the difference between the prices of raw and refined sugars increased from about one cent per pound and even more occasionally, showing that the trust was getting a monopoly price and gaining from 1 cent a pound upward more than would have been possible under competition. The lessened cost of refining that must have been made by the trust from its better organization as well as its greater power both as a buyer and seller, doubtless made its profits even more than the figures show; but even this comparatively small monopolistic price worked in part its own defeat. After some two years it was enough to bring about adverse decisions by the courts, involving great expense and a reorganization. A hostile public opinion, and especially the high profits, called into the field new refineries, notably those of Claus Spreckles in Philadelphia, capable of offering effective competition. Prices were thus forced down, until the difference in priee between raw and refined sugars was but very little greater than before the trust was formed. The greater gains, if any, were practically all from savings under the better organization. In Mar., 1892, the chief competing refineries were absorbed by the company, so that since then it has had a more nearly complete monopoly. The effect was seen at onee by an increased profit of one-half cent a pound within a month, which soon became an increased profit of nearly, and at times quite, 1 cent a pound.

The history of the alcohol refining in the U. S. since 1881 leads to like conclusions. Whenever a pool was formed prices went up, and the difference between the price of a bushel of corn and that of the alcohol made from it increased. When a pool broke, prices and profits fell and remained low till there was a new organization. After the formation of the trust prices were cut for a time to force in competitors. Again during 1889 and part of 1890 prices were held low, because it was found that the higher profits were strengthening competitors and calling new ones into the field. Then more distillers joined the trust, and prices went up again. So with other similar organizations, such as the Lead Trust, Standard Oil Company, Cotton-oil Company, Linseed-oil Combination, etc. A careful statistical study shows that when prices do not go up, the downward tendency previously existing from new inventions and improved methods seems to be checked. Though the increased profits coming from the sources of saving mentioned above may satisfy some of the stockholders, yet it is generally not enough. A

monopoly might often lower prices and still make as good profits as under free competition. It generally does raise prices.

A monopoly has probably a tendency to steady prices, though this tendency is not always clearly manifested, the less frequent changes in prices being counterbalanced by the more than corresponding extent of the changes when they do come. See *Political Science Quarterly*, Sept., 1894, for statistics of prices.

Evils of Monopoly.—Besides the evils incidentally mentioned in connection with the consideration of the effects of monopolies on prices, the following may be noted: (*a*) The speculation in their stocks deprives the market of a class of securities in their nature especially well adapted for safe investment. (*b*) Having a practically certain market and sure profits, the monopolists tend to become less enterprising, inventive, careful in business methods than those under the spur of competition. The economic loss from this slothful spirit can not be computed, but it must be great, and the social effect must be baneful. (*c*) The organization of industrial society on the feudal plan, through the crushing of weak establishments or their absorption into the few large monopolies that control industry, must affect society profoundly; and unless the influence of subordinate position is counteracted in some way not now foreseen, the effect will be to weaken the independence and enterprising spirit of business men. (*d*) The possession of enormous capital and great interests at stake leads sometimes, perhaps often, to political corruption, buying of legislators, and courts.

Authorities.—*The Economic Journal*, June, 1891, has an excellent article by Prof. Bastable, summing up the state monopolies employed for revenue purposes; Stourm, *Les finances de l'Ancien Régime*; Cibrario, *Economia Politica del Medio Evo* (lib. iii., ch. vi.); de Parieu, *Traité des Impôts* (iv., p. 471 ff.); Adam Smith, *Wealth of Nations*; Report of House Committee of Congress on Manufactures, Fiftieth Congress, No. 4,165; New York Senate Report on Trusts, 1888; Report of Canadian Legislature on Trusts and Combinations, 1888; W. W. Cook, *Trusts, The Corporation Problem, Stock and Stockholders and Corporation Law* (ch. xxix.); Beach, *On Private Corporations* (ch. xli.). The last two authorities cited give an excellent bibliography of trusts. *The Economic Journal* (English), Mar., 1892; *Political Science Quarterly*, Mar., Sept., Dec., 1888, June, 1889, Sept., 1894; *Atlantic Monthly*, Mar., 1881; John M. Bonham, *Industrial Liberty*; S. C. T. Dodd, *Combinations, their Uses and Abuses.* Jeremiah W. Jenks.

Monopter'idæ [Mod. Lat. from *monop'terus*, the typical genus; Gr. *μόνος*, single + *πτερόν*, wing]: name of a family of the order of eels or Apodes, containing a peculiar species of fish (*Monopterus javanensis*), found in the East Indian and Chino-Japanese seas. It sometimes attains the length of 3 feet or more.

Mon'otheism [Gr. *μόνος*, alone, single, one + *θεός*, God]: the doctrine or belief that there exists but one God, as distinguished from polytheism, which teaches the existence of more than one divinity. Judaism, Christianity, and Mohammedanism are the principal monotheistic religions.

Monoth'elites [Gr. *μόνος*, single + *θέλειν*, wish, will; cf. *θέλημα*, the will]: adherents of monothelitism, the doctrine that there is but one Will in the person of Christ. (See Christology.) It is opposed to diothelitism, the doctrine that each nature of Christ possesses a distinct will, both in faculty and exercise.

I. Though monothelitism proceeded from the Catholic side, it is yet an offshoot of the monophysitic influence on the Church policy of the Byzantine court. The monophysite struggles of the fifth and sixth centuries had been the sources of uproar and of anarchy throughout the empire. These at last assumed such a shape as to threaten its unity and perpetuity. There seemed to be special ground for the fear that Egypt, where monophysitism ruled almost without restraint, would cut itself loose from the orthodox court in Byzantium and form a separate kingdom. The dangers of the hour were heightened by the prolonged war with the Persians (620–628). Heraclius (610–641) sought to avert the threatening evils by removing the terrible schism which still divided the Church. In his interview with Paul, the monophysite Patriarch of Armenia, the expression "the one energy of Christ" had been used, and the impression it made on both sides—it is disputed by which it was first used—suggested that it might be made the basis of a compromise between the Catholics and the Monophysites. With the Catholics, and in accordance with Chalcedon, the two natures were to be asserted, and yet with the doctrine of one theandric energy, one volition, implying one will, virtual provision would be made for the sort of unification for which the Monophysites contended. Protracted conferences followed with the monophysite patriarchs, Arcadius of Cyprus and Athanasius of Hierapolis, subsequently of Antioch, and with the orthodox patriarchs, Sergius of Constantinople and Cyrus, who was placed by the emperor in the see of Alexandria. These men, representing the great divided parties, were willing to concur in the doctrine propounded by the emperor as one which would preserve the truth, for which on each side the contest had been protracted. The first fruit of the compromise was that, under the energetic efforts of Cyrus, the Severians of Egypt were brought back to the orthodox Church (633). The Monophysites, who were not satisfied, were yet forced into compliance.

II. (1) Sophronius, a learned Palestinian monk, who at the time of the union was in Alexandria, maintained, especially against the seventh proposition of Cyrus, that the doctrine was in conflict with orthodoxy. When (634) he became Patriarch of Jerusalem he caused it to be condemned by a synod, on the ground that two natures involve two natural energies of will, two operations, two wills, and that in Christ the energy of each nature, of each will, operates under the coenergy of the other nature, the other will, undivided and unmingled. (2) On the appeal of Sergius, Pope Honorius I. (625–638) advised that the whole question should be dropped as involving fruitless speculation. Nevertheless he decided in favor of the monothelite view (633). (3) On this declaration the emperor felt himself authorized to put forth a new creed, under the title *Ecthesis pisteōs* (exposition of faith, 638). Probably it was written by Sergius. Its language is ambiguous; it forbids all controversy on the question; and while it confirms the doctrine of Chalcedon, it maintains that we are to "ascribe all the operations in Christ, the human as well as the divine, to the Word incarnate. . . . Every operation proceeded from the same incarnate Word, without division or confusion. . . . Christ's body, though animated with a rational soul, produced no motion whatever of itself." (4) Meanwhile Sophronius had been keeping up a correspondence with Rome, but an end was put to all the negotiations in that direction by the Mohammedan invasion of Palestine and Egypt (637–640). While these events cut off Sophronius from connection with the rest of the Christian world, his adherents, Stephen in the East and the abbot Maximus in the West, worked in his spirit. (5) Pyrrhus, the successor of Sergius in the see of Constantinople (639), approved of the Ecthesis, but was led by Maximus (645) to renounce it. An African general synod (646) without a dissenting voice condemned monothelitism. After the death of Honorius (638) Pope Severinus declared against the Ecthesis. Pope John IV. (640–642) condemned the Ecthesis, and urged Constantine III., the successor of Heraclius, to withdraw it (641). Pope Theodore I. (642–649), at the appeal of the African Church (646), made the same demand of the Emperor Constans II. (630–668), threatening that if it were refused he would excommunicate the Church of Constantinople. He constituted at the same time Stephen, Bishop of Dor in Palestine, apostolic vicar, with orders to depose all the monothelite bishops and clergy. Hemmed in in this way, the Byzantine court yielded; Constans withdrew the Ecthesis (648).

III. (1) In place of the Ecthesis, however, the emperor set forth the "Type of the Faith"—the *τύπος τῆς πίστεως*. The Type forbade anew all contention on the will or wills of Christ; men were to be satisfied with the decisions of the five general councils: matters were to be put back to the point at which they stood before the strife; and those who attempted to renew the discussion were to be visited with the severest penalties, ecclesiastical and civil. (2) Principle and party zeal, however, alike made it impossible at this stage to suppress the matter in this way. The reply of Pope Theodorus was excommunication and anathema against Paul, Patriarch of Constantinople, who was supposed to be the author of the Tupos. Pope Martin I. (649–655) pursued the warfare against the emperor with yet greater vigor. At the First Lateran Synod (649) diothelitism was established as the Church doctrine; the defenders of monothelitism in general, the Patriarch of Constantinople in particular, and the two imperial edicts were put under the anathema. The course of the pope was treated by the emperor as treasonable. He was seized (653) by Kalliopas,

imperial deputy, and taken to Constantinople a prisoner. His life was spared only on the intercession of the dying Patriarch Paul, but he was sent into exile, where he died of his sufferings, firm to the end. The abbot Maximus was appealed to by every form of persuasion to acknowledge the Tupos, but he could not be moved. Finally his right hand was cut off, his tongue torn out, and he was sent into exile, in which, at the age of eighty, he died (662). (3) Such savagery would have power for a little time, but for a little time only. Pope Adeodatus (677) excommunicated the Greek patriarchs; the Greek Church in return excommunicated the pope; and the Eastern and Western Churches were again sundered. The rapid growth of the Mohammedan power made the healing of this perilous breach of the most urgent importance. Constantine IV. Pogonatus (668–683) entered into negotiations which led to the convening of the sixth general council (680–681), the First Trullan. (See TRULLAN COUNCILS.) A doctrinal writing from the hands of Pope Agatho (680) formed the basis of the conclusions reached. The Monothelites saw that nothing but a miracle could save them. The miracle was attempted, but the dead body would not rise, and the doctrine of one will lay dead with it. The council anathematized all Monothelites. Pope Honorius had been anathematized in the letter of Agatho; the council anathematized him again. It was decided that there is in Christ two natural wills and two natural operations, unseparated, immutable, undivided, unmingled—"two natural wills, not in antagonism, but the human will following, not resisting, but rather subject to, his divine and almighty will." The Church of the West had stood firm for the faith, even at the price of the dishonor of her dead pope. The decrees of the council were confirmed at Rome, and by the Second Trullan Council (692), known as the Quinisextum. (4) The Emperor Philippicus (Bardanes) brought about a temporary triumph of the Monothelites at a council held at Constantinople (711), which reversed the decisions of the sixth general council, but at his downfall (713) monothelitism lost the little influence which had been left it, and vanishes out of history. A doctrine which for a century convulsed kingdoms, arrayed popes against emperors, and pope against pope, and council against council, had in a little while no representatives on earth, except the poor handful of Maronites, who gathered about a monastery on Lebanon, and who as a body survive that Byzantine kingdom to whose policy they owed their being, though they have long renounced the doctrine which sundered them from the great body of the Catholic Church.

Revised by S. M. JACKSON.

Monotocar'dia [Gr. *μόνος*, one + *καρδία*, heart]: a division or sub-order of the gasteropod MOLLUSCA (*q. v.*) frequently called Pectinibranchia. It comprises a large number of species, most of which are marine. These are all united by the fact that the heart has a single (left) auricle (whence the name), and a single feather-like (pectinate) gill is present. There is but a single renal organ, and usually the left anterior mantle-fold is greatly prolonged and more or less completely rolled into a tube (siphon) through which water is drawn for respiratory purposes, and which frequently leaves its impress on the shell as a groove-like outgrowth or canal from the anterior margin of the lip. The Monotocardia are subdivided by systematists upon characters chiefly derived from the lingual ribbon. (See MOLLUSCA.) These divisions are—

(1) Architænioglossa, in which the teeth in a transverse series on the lingual ribbon are arranged 3, 1, 1, 1, 3. This group is the most primitive of the Monotocardia, as is shown by the presence of a rudimentary right auricle and by certain peculiarities of the nervous system. It comprises, among other families, the cowries (*Cypræidæ*) of tropical seas, and the pond-snails (*Paludinidæ*) of fresh waters. In these the siphon is but slightly developed.

(2) Tænioglossa, with teeth 2, 1, 1, 1, 2. Here belong the marine forms (*Naticidæ*) which are common on the shores of the U. S., and which lay their eggs in those peculiar bands commonly known as "sand-saucers." In these the siphon is imperfect. The other tænioglossate forms are very numerous, and but a few of the more prominent families can be mentioned; among them the periwinkles (*Littorinidæ*), the slipper limpets (*Calyptræida*), the *Cerithiidæ*, the strombs (*Strombidæ*), triton-shells (*Tritonidæ*), tun-shells (*Doliidæ*), violet shells (IANTHINIDÆ, *q. v.*), and the HETEROPODA (*q. v.*), all of which are marine; the fresh-water limpets (*Valvatidæ*) and the melanians, also fresh-water; and a few forms which, like the *Cyclostomidæ* and *Truncatellidæ*, dwell on the land.

(3) Stenoglossa or Rachiglossa, with teeth 1, 1, 1, the principal members of which are the whelks (*Buccinidæ*), volutes, olive-shells, miter-shells, cones, etc. The cones are especially noticeable from the fact that there is an unpaired poison-gland connected with the lingual teeth. J. S. KINGSLEY.

Monotrem'ata [Mod. Lat.; Gr. *μόνος*, single + *τρῆμα*, perforation, hole, deriv. of *τιτραίνειν*, bore, pierce, perforate]: the lowest order of mammals, the sole existing order of the subclass Ornithodelphia or Prototheria. The name is derived from the fact that, as in the birds, one external orifice, opening into a common cloaca, serves for the discharge of alvine and renal excretions and for reproductive purposes. They are by far the most primitive forms of their class, and in their structure depart less from the old-fashioned reptiles and amphibians than many others. One of the most interesting and significant points of their economy is that they mature very much larger eggs than other mammals, and they are even *oviparous*. The brain has a small cerebrum, whose hemispheres are chiefly connected by a well-developed "anterior commissure," the "corpus callosum" being rudimentary; but the most striking and peculiar structural characteristics appertain to the sternal apparatus; the sternum has a peculiar T-shaped bone (the episternum or interclavicle) in advance of the manubrium or presternum; the coracoids extend from the clavicle to the sternum, and only toward maturity become anchylosed with the scapula. Such features contrast remarkably with the simple sternum of all other mammals. The oviducts are enlarged below into uterine pouches, but open separately (as in oviparous vertebrates generally), and debouch into a cloacal chamber, as already noted, no true vagina being developed. The testes are abdominal in position throughout life, and the vasa deferentia do not open into a distinct urethral channel, but into the cloaca. The mammary glands have no nipples. Of the only two types known, one (the Ornithorhynchids) lays two eggs in a nest, while the species of the other (the Tachyglossids) as a rule only develop a single egg, which is carried in a pouch developed by the mother. See DUCKBILL, ECHIDNA, ORNITHORHYNCHIDÆ, and TACHYGLOSSIDÆ. THEO. GILL.

Monrea'le: town; in the province of Palermo, Sicily; 4 miles S. W. from the city of Palermo (see map of Italy, ref. 9–E). It has little of interest except its cathedral, one of the most splendid temples in the world. It is in form a Latin cross; the exterior has undergone modifications, though some original portions remain unchanged; the bronze doors date from 1186. The interior (325 feet long and 125 broad) consists of three naves supported by sixteen gigantic columns of Oriental granite, with capitals of exquisite workmanship. Adjoining the cathedral is the great monastery of the Benedictines. The terrible massacre known as the Sicilian Vespers (1282) began on the road from Palermo to Monreale. Pop. about 13,900.

Monro', ALEXANDER, M. D., F. R. S.: anatomist; b. in London, England, of Scotch parents, Sept. 8, 1697; studied medicine and surgery at London under Cheselden, at Paris under Bouquet, and at Leyden under Boerhaave; was admitted as a surgeon at Edinburgh 1719; was elected by the town council in Jan., 1721, first Professor of Anatomy to the new medical school established in connection with the university, and instituted a course of instruction which soon made that school the best medical college in the world. He was one of the two principal promoters of the Royal Infirmary at Edinburgh, where he delivered clinical lectures; founded a society for collecting and publishing professional papers; edited six volumes of *Medical Essays and Observations* (1732), and two volumes of *Essays, Physical and Literary*, for the same body, which had then taken the name of the Edinburgh Philosophical Society. His own publications comprised *Osteology, or Treatise on the Anatomy of the Bones* (Edinburgh, 1726); *Essay on Comparative Anatomy* (London, 1744); *Observations, Anatomical and Physiological* (Edinburgh, 1758); and an *Account of the Success of Inoculation of Smallpox in Scotland* (1765). These, with other tracts left in MS., were printed together in 1781. Dr. Monro resigned the chair of anatomy to his youngest son, Alexander, in 1759, but continued his clinical lectures at the infirmary. D. in Edinburgh, July 10, 1767. Dr. Monro is often styled *Primus*, to distinguish him from his son and grandson of the same name.—His eldest son, DONALD, b. 1731, was also an able physician, and published several medical books, besides a memoir of his father (1781). D. in July, 1802.

Monro, Alexander, M. D., F. R. S. E.: anatomist; son of Alexander Monro (1697–1767); b. in Edinburgh, Mar. 24, 1733; studied surgery in the University of Edinburgh under his father, to whom he became Assistant Professor of Anatomy July, 1756; spent some time at the medical schools of Berlin and Leyden; succeeded his father as full professor in 1759, and also as secretary of the Philosophical Society, which in 1783 took by royal charter the title of Royal Society of Edinburgh. Among his publications were *De Venis Lymphaticis Valvulosis* (Berlin, 1757), which involved him in a controversy with Dr. William Hunter of London; *On the Structure and Functions of the Nervous System*, a large illustrated folio (Edinburgh, 1783); *On the Structure and Physiology of Fishes* (folio, 1785); *Description of all the Bursæ Mucosæ of the Human Body* (1788); and *Three Treatises on the Brain, the Eye, and the Ear* (illustrated, 1797), besides several papers in the *Transactions* of the Edinburgh Royal Society. He retired from his professorship in 1808. D. in Edinburgh, Oct. 2, 1817. He was succeeded by his son Alexander, called *Tertius* (b. 1773; d. 1859), who wrote *Anatomy of the Human Body* (1813).

Monroe: city (settled by Spaniards in 1796); capital of Ouachita parish, La. (for location of parish, see map of Louisiana, ref. 7–D); on the Ouachita river, and the Queen and Cresc. and the St. L., Iron Mt. and S. railways; 75 miles W. by N. of Vicksburg, 400 miles N. W. of New Orleans. It contains 5 churches, U. S. Government building, 2 national banks with combined capital of $110,000, a merchants' and farmers' bank with capital of $100,000, and a daily and 3 weekly newspapers. The industrial establishments include a cotton compress, 90-inch Morse press, ice-factory, 2 cotton-seed oil-mills, 2 shingle-mills, 2 sawmills, 2 brick-factories, a stave-factory whose total output is shipped to Bordeaux, France; a sash, door, and blind factory, and a cigar-factory. Over 40,000 bales of cotton are pressed here annually. Pop. (1880) 2,070; (1890) 3,256; (1900) 5,428.

Editor of "Telegraph-Bulletin."

Monroe: city; capital of Monroe co., Mich. (for location of county, see map of Michigan, ref. 8–K); on the Raisin river, and the Flint and Pere Marq., the Lake Sh. and Mich. S. and the Mich. Cent. railways; 35 miles S. of Detroit. It contains a city library (founded 1837), seminary for young women, conservatory of music, a national bank with capital of $50,000, a private bank, and two weekly newspapers; has extensive nurseries and vineyards; and manufactures flour, lumber, and sash and blinds. Pop. (1880) 4,930; (1890) 5,258; (1900) 5,043. Editor of "Commercial."

Monroe: town: capital of Union co., N. C. (for location of county, see map of North Carolina, ref. 4–E); on the Carolina Cent. Railroad; 25 miles S. E. of Charlotte. It is a manufacturing town, with carriage-factory, iron-works, cotton-mills, foundry, and other industrial establishments. Pop. (1880) 1,564; (1890) 1,866; (1900) 2,427.

Monroe: city; capital of Green co., Wis. (for location of county, see map of Wisconsin, ref. 7–D); on the Chi., Mil. and St. P. and the Ill. Cent. railways; 34 miles W. by S. of Janesville. It is in an agricultural, dairying, and stock-raising region, and has a large cheese-factory, boiler-works, wagon-factory, agricultural-implement works, a national bank with capital of $100,000, a State bank with capital of $75,000, and a daily and 5 weekly newspapers. Pop. (1880) 3,293; (1890) 3,768; (1900) 3,927.

Monroe, James: fifth President of the U. S.; b. in Westmoreland co., Va., Apr. 28, 1758; son of Spence Monroe, and a descendant of a Scottish Cavalier family; educated at William and Mary College; entered the Revolutionary army in 1776; served with distinction in the principal engagements of 1777–78; was wounded at Trenton; studied law under Jefferson; served again in the latter part of the war; and was delegate to Congress 1783–86. Perceiving the defects of the Articles of Confederation he desired the extension of the powers of Congress, and in 1785 moved to confer on that body the authority to regulate interstate trade. The adoption of this resolution led to the calling of a convention at Annapolis, and ultimately to the formation of the Constitution. Monroe, however, as delegate to the Virginia convention in 1788 opposed the adoption of the new instrument by his native State, and as U. S. Senator 1790–94 he supported the Anti-Federalist party. He was minister to France 1794–96, and Governor of Virginia 1799–1802. He was sent as envoy extraordinary to France in 1802, and with Livingston, the minister resident, negotiated the Louisiana purchase. He was minister to Great Britain 1803–08, but in 1805 his duties there were interrupted for a time by a special mission to Madrid to settle the boundaries of the new purchase. He failed in this, and the treaty which he negotiated with Great Britain was not acceptable to the U. S. Government. Returning home in 1807 he published an elaborate defense of his course as a diplomatist, and in 1811 received a substantial proof of the public confidence by being again elected Governor of Virginia. In the same year he was appointed Secretary of State, and held that office till 1817, combining with its duties those of Secretary of War in 1814–15. In 1817 he was elected President over Rufus King, the Federalist candidate, and in 1820 was re-elected by the almost unanimous vote of the electoral college. The chief events of this prosperous administration, "the era of good feeling," were the conclusion of a convention with Great Britain relating to the Newfoundland fisheries in 1818, the acquisition of Florida from Spain in 1819, the establishment of a system of internal improvements, the enunciation of the Monroe Doctrine, the Missouri Compromise of 1820, the recognition of the independence of the Spanish-American states, and the last visit of La Fayette to the U. S. In 1831 he removed to New York, where he died July 4, 1831. Mr. Monroe was a man of plain and unaffected manners, unquestioned purity and honesty, and of very robust and useful though not brilliant qualities as a public officer. He was beloved by all parties, and few men did more than he to remove the animosities and prejudices so rife in the early part of his political life. See Gilman's *Life* of Monroe.

Revised by F. M. Colby.

Monroe, Will S.: See the Appendix.

Monroe City: town; Monroe co., Mo. (for location of county, see map of Missouri, ref. 3–H); on the Burl. Route and the Mo., Kan. and Tex. railways; 30 miles S. W. of Quincy, Ill. It contains 8 churches, public-school building that cost $25,000, planing, carding, and grist mills, 2 State banks with combined capital of $55,000, and 2 weekly newspapers. It is in a prairie region, and ships annually 200 carloads of railway ties. Pop. (1880) 640; (1890) 1,830; (1900) 1,929.

Editor of "News."

Monroe Doctrine: the name given to a declaration of the policy of the U. S. in opposition to the interference of European powers in the political affairs of the American continents, made by President Monroe in his message to Congress in 1823. It was known that at the Congress of Verona (1822) a project had been discussed of aiding Spain to recover dominion over her revolted American colonies. Mr. Canning, while making his preparations to go to India as governor-general, received the appointment of Secretary for Foreign Affairs in Sept., 1822, and it was by his influence that the British Government was led to take energetic measures against the absolutists' principle of interference in preventing revolution and all political changes proceeding from the people in opposition to the rulers. France early in 1823 was ready to invade Spain for the purpose of overthrowing the revolutionary government. The next measure was likely to be an attempt to subjugate the Spanish colonies, some of which the U. S. Government had recognized as independent nations. The British Government is understood to have suggested to the U. S. the policy of making some protest against such interference in the affairs of the American states or colonies. The suggestion being approved of by the President, by J. Q. Adams, Secretary of State, and by Jefferson, who was consulted, the annual message of Dec., 1823, contained the following declarations: "That we should consider any attempt on the part [of the allied powers] to extend their system to any portion of this hemisphere as dangerous to our peace and safety," and "that we could not view any interposition for the purpose of oppressing [governments on this side of the water whose independence we had acknowledged], or controlling in any manner their destiny by any European power, in any other light than as a manifestation of an unfriendly disposition toward the U. S." This declaration, together with the known sentiments of the British cabinet and nation, put an end to any designs which may have been entertained looking toward armed interference in American affairs. It was also consistent with international rights, and was fully justified by self-defense. The balance of power had in such a case no application, for that principle is essentially confined to European states, and interference on political, doctrinary grounds is unrighteous. This declaration has received the assent of the country. It may be called a part of its settled

policy, though Congress never took formal action in regard to it; but it should not be stretched into a warrant to prevent any dealings of an American with a European state which may be distasteful to the U. S. The Monroe doctrine was aimed at interference with the constitution or form of government of an American state forcibly carried out. These limitations are often lost sight of. During the civil war in the U. S., when the French emperor put the Archduke Maximilian on the throne of Mexico, the U. S. Government was too busy and too weak to endeavor to prevent the measure; the time was chosen accordingly; but in ordinary times that or a similar step would have roused government and country to opposition. At the close of the war troops were marched toward the Mexican border, the French forces were withdrawn, and the empire fell. Another declaration of the same message is as follows: That "the American continents, by the free and independent condition which they have assumed and maintain, are henceforth not to be considered as subjects for future colonization by any European power." If those words expressed the intention that the South American republics should be prevented from freely surrendering their territory for the purposes of colonization, this was going altogether too far; it was avowing a rule of interference on the part of the U. S. equally to be condemned with the similar one acted on by European absolutists; but it is probable that the words were intended to mean that the western hemisphere was already occupied by a number of states whose territories were contiguous, leaving no space for further colonization, a somewhat doubtful statement. This meaning is to be inferred from what Mr. Adams, then Secretary of State, said in 1825 when he was President, unless he is to be considered as retracting what had been hastily uttered two years before. He says, in reference to a congress of American powers at Panama, that "an agreement between all the parties represented at the meeting that each will guard, *by its own means*, against the establishment of any future European colony within its borders, may be found to be desirable. This," he adds, "was more than two years since announced by my predecessor to the world as a principle resulting from the emancipation of the American continents." The House of Representatives, however, opposed the principle, even when thus interpreted, by a resolution that the U. S. "ought not to become parties" with any of the republics of South America "to any joint declaration for the purpose of preventing the interference of any of the European powers with their independence or form of government, or to any compact for the purpose of preventing colonization upon the continent of America." The majority of the House was quite willing, without question, to approve of independent action with regard to interference when it should be threatened, but to prevent colonization they seem to have regarded as not worth any diplomatic proceedings. This declaration of Mr. Monroe has since fallen into oblivion. The other will probably always carry with it the approval of the U. S. Revised by T. S. Woolsey.

Monrovia: the capital of Liberia (*q. v.*).

Mons: the capital of the province of Hainaut, Belgium; on the Trouille; 38 miles S. S. W. of Brussels (see map of Holland and Belgium, ref. 11–C). It is strongly fortified, has a beautiful cathedral built in the sixteenth century and a very interesting town-house built in 1443, extensive manufactures of linen, lace, earthenware, and tobacco, and carries on considerable trade. As an important strategic point it figures prominently in the history of the wars between Spain and the Netherlands, France and Spain, and France and Austria. After enduring many sieges and changed hands several times, it became by the treaty of Utrecht one of the barrier towns of the Dutch, but in 1746 it was taken by the French, and soon afterward restored to Austria. After the battle of Jemmapes in 1792 it formed a part of the French republic, but was lost to France on the downfall of the first empire. Pop. (1896) 25,514.

Monserrat, mōn-sā-raat', Joaquin, de, Marquis of Cruillas: a Spanish general and administrator, Viceroy of Mexico Jan., 1761, to Aug., 1766. War having broken out between Spain and Great Britain in 1762, Cruillas took active measures to defend the coast, and he was the first to organize a regular militia. The latter measure, by fostering the military spirit of the people, had important effects on the country. H. H. S.

Monsoon' [: Fr. *mousson*: Span. *monzon*: Ital. *monsone*, from Malay *mūsim*, season, monsoon, from Arab. *mausim*, time, season]: a seasonal interchange of wind between continent and ocean—an annual land and sea breeze. The name was first applied to the seasonal periodic winds alternating between the southern part of the continent of Asia and the Indian Ocean, but has since been expanded to include all cases due to similar causes. The continents are warmer in summer (especially below lat. 42° N. or S.), and the cooler and heavier air of the ocean flows in; the reverse occurs in winter. The alternation is the more marked the larger the continent, the more arid its interior, and the greater the elevation of the latter; it is most marked when ranges of mountains are so arranged as to accentuate the differences between the air of continent and ocean, and the slope facilitates the flow of the air—upward on the principle of a flue or downward by gravity. The best marked case is that of Southern Asia, where the summer monsoon is from the S. and brings rain, while the winter monsoon is from the N. and brings dry weather. There are Australian monsoons, though not so well marked, but the interchange between the Asiatic and Australian, combined with the trades, cause seasonal periodic winds over the East Indies. The other continents have their monsoons. The most distinct in the U. S. is that of Texas, extending at times up the Mississippi valley to the Canadian boundary. See Ferrel, *Popular Treatise on Winds* (1889), and the present writer, *The Texan Monsoons* (Bull. Phil. Soc. of Washington, xii., 293–308, 1894). Mark W. Harrington.

Monstrelet, mōn'stre-lā', Enguerrand, de: chronicler; b. at Cambrai, France, about 1390; was provost of his native city and bailiff of Wallaincourt, where he died July 20, 1453. He wrote a *Chronique*, narrating the history of France from 1400 (the date at which Froissart stops) to 1444. The latest edition is by L. Douet-d'Arcy (7 vols., Paris, 1857–63); English translation by Thomas Johnes (13 vols., London, 1810).

Monstrosity, in natural history: See Teratology.

Mont, Ment, Month, Menthu: the Egyptian god of war, who was especially worshiped in Hermonthis (Erment) and Thebes. He was variously represented as a hawk-headed deity, though he sometimes wore the head and horns of a bull which was sacred to him under the name of Bakh, the Bachis of the classics. He is also occasionally pictured with the head-dress peculiar to Amon. In later times he was identified with the sun-god Ra, as Mont-Ra. His name was used in inscriptions as a synonym of power ("strong as Mont"). In conjunction with the Semitic Baal, the combination stood for the highest ideal of might.

Charles R. Gillett.

Montagnais: See Algonquian Indians; also Athapascan Indians.

Montagnards, mōn'tăăn'yaar' [Fr., liter., mountaineers], or simply **The Mountain**: in the first French Revolution a name sometimes given to the ultra-democratic members of the National Convention, so called because they originally sat in the highest seats of the hall. The Girondists were, in distinction, called the Plain; and after their destruction the lower part of the house was called the Marsh (*Marais*), and was occupied by the undistinguished rabble of Jacobins, the leaders retaining the high seats.

Mon'tagu, Basil: law reformer and author; b. in London, Apr. 24, 1770; a natural son of the Earl of Sandwich by an actress, Miss Ray or Wray. He graduated at Cambridge 1790; was soon after called to the bar at Gray's Inn, and acquired a large and profitable practice in London, chiefly in bankruptcy cases. He was a member of the literary circle of which Coleridge was the chief ornament, and came near being carried away by the social theories of William Godwin. In 1806 he was appointed a commissioner of bankruptcy, and exerted himself successfully through a series of years to procure the reform of the law concerning bankruptcy, which was then highly objectionable. Under the new law he became accountant-general of bankruptcy, compelled the Bank of England to pay interest on deposits ordered by a court of bankruptcy, and distinguished himself by his advocacy of other reforms, especially the abolition of capital punishment for minor offenses. He was a voluminous author, having published forty volumes and left in MS. 100 more. His principal professional work was a *Digest of the Bankrupt Laws*, but he is best known as the careful editor of the *Works of Francis Bacon* (16 vols., 1825–34), of which the last volume contains a *Life of Bacon*. D. at Boulogne, France, Nov. 27, 1851.

Montagu, Edward Wortley: adventurer; son of Lady Mary Wortley Montagu; b. at Wharncliffe, Yorkshire, England, in Oct., 1713; was the first English child inoculated for smallpox; was placed at Westminster School, but ran away three times, making a voyage once as a cabin-boy to Spain; was elected in 1747 to Parliament, but had to resign on account of debt; went to Paris, where he was imprisoned on account of gambling transactions; was a Roman Catholic in Italy; traveled in Arabia and Egypt, and professed to be converted to Mohammedanism; and was returning to England when he died at Padua, Italy, May 2, 1776. He published some papers in *The Philosophical Transactions*, and a volume of *Reflections on the Rise and Fall of the Ancient Republics* (1759), of which the authorship was claimed by his tutor. He left an *Autobiography*, first published in 1869.

Montagu, Elizabeth Robinson: author; b. at York, England, Oct. 2, 1720; was married in 1742 to Edward Montagu, grandson of the fifth Earl of Sandwich, and cousin of Edward Wortley Montagu, the husband of Lady Mary, and being possessed of wealth, ambition, and some literary talent, became a celebrated leader of London society in the second half of the eighteenth century. She gave a famous annual dinner on May Day to the London chimney-sweeps, and her magnificent residence in Portland Square was the headquarters of the so-called Blue-stocking Club, and figures largely in the diaries of the period. Mrs. Montagu wrote three of the *Dialogues of the Dead* published in the 4th ed. of Lord Lyttelton's work bearing that title (1765), and an *Essay on the Writings and Genius of Shakspeare compared with the Greek and French Dramatic Poets* (1769), but is best known by her *Correspondence*, of which 4 vols. have been edited by her nephew. D. in London, Aug. 25, 1800. See her *Life*, by Dr. Doran, entitled *A Lady of the Last Century* (1872). Revised by H. A. Beers.

Montagu, Mary Wortley, Lady: b. at Thoresby, Notts, England, in 1690; a daughter of the Earl of Kingston; was second cousin on her mother's side to the novelist Fielding. Even in childhood she was a favorite in society on account of her wit and beauty. In 1712 she married Edward Wortley Montagu, without her father's consent. In 1716 she went to Constantinople with her husband, then ambassador to the Porte. In 1717 she made a successful trial of inoculation for smallpox upon her only son—a practice common in the East, but unknown before her time in Western Europe. Her successful introduction of smallpox inoculation into England was accomplished in spite of great opposition and personal abuse from all classes. After her return to England in 1718 followed a bitter quarrel with Pope, who had been her friend. In 1739 she left her husband, and resided chiefly in Italy. D. in England of cancer, Aug. 21, 1762. She is remembered chiefly for her brilliant *Letters*, written during her travels. Her great-grandson, Lord Wharncliffe, published a collected edition of her works with *Life* (3 vols., 1837; 3d ed. 1887).

Revised by H. A. Beers.

Montague: village; Muskegon co., Mich. (for location of county, see map of Michigan, ref. 7–H); on White Lake, which is here navigable, and the Chi. and West Mich. Railway; 5 miles E. of Lake Michigan. It is in an agricultural, fruit-growing, and lumbering region, and has regular steamboat communication with the principal ports on Lake Michigan and considerable commerce. Pop. (1880) 1,297; (1890) 1,623; (1900) 998.

Montague, Charles: See Halifax, Earl of.

Montaigne, mōn′tāñ′, Michel Eyquem, Seigneur de: essayist; b. near Bergerac, in Périgord, France, Feb. 28, 1533. He was educated with great care, first at home, where he learned Latin at the same time with French, then at Bordeaux. He was a precocious student, and at fifteen was studying law. In 1554 he took his seat as counselor in the Parliament of Bordeaux, where began his great friendship for Étienne de la Boétie. He had little taste for public affairs, and after his father's death resigned (1570) his office. In 1569 he had published a translation of the *Theologia naturalis* of Raimond Sebond, and in 1571 he edited the posthumous works of his friend la Boétie. In 1580 he issued the first two books of *Essais*, and in the same year set out on a series of travels in Northern France, Germany, Switzerland, and Italy. His interesting but not remarkable journal of this tour was published in 1774. While still in Italy (1581) he was chosen mayor of Bordeaux, and discharged the functions of that office with success, in difficult times of civil dissensions, till 1585, when, shortly before laying down his office, he exposed his character to serious imputations by fleeing from the city while the plague was raging there. In 1588 he published in Paris a fifth edition of the *Essais*, enlarged by the addition of a third book. In the following years he was somewhat obscurely connected with political events. D. Sept. 13, 1592. The *Essais* are familiar discourses with the reader, whom he takes completely into his confidence, about what he has done and seen, read and thought, set down in a sort of willful disorder, and as far as possible from a systematic philosophy. Living in a time of the most active ferment of ideas, when the Renaissance was struggling against the mediæval order of things, the Reformation against the Church, he saw that much is to be said on both sides of all questions, and gave up the task of finding an absolute and convincing decision in the clash of opinions and views. He gave it up with serene good humor, not feeling the need of such a decision with the intensity of minds like Pascal's, and in giving it up he did not feel obliged to relinquish his theological orthodoxy. So if the spirit that gives unity to the *Essais* is essentially skeptical, it is so without bitterness. The *Essais* are written in a rich, varied, and exceedingly personal style, capable of the utmost easy familiarity and of serious and sustained eloquence. By it Montaigne holds rank as one of the very greatest masters of French prose. He left two annotated copies of the *Essais*. Upon one, now lost, Mlle. de Gournay founded the edition of 1595; upon the other, now in the library of Bordeaux, was founded the edition of Naigeon in 1802. The classic edition is that of J. V. Le Clerc (4 vols., Paris, 1865). The edition of 1588 was republished by Motheau and Jouaust (Paris, 1873–80). Cf. A. Grün, *La vie publique de M. Montaigne* (Paris, 1855); G. Merlet, *Études littéraires sur les classiques français* (Paris, 1882).

A. G. Canfield.

Montalembert, mōn′tăă′lăăn′bār′, Charles Forbes de Tryon, Comte de: French publicist and statesman; b. in London, England, May 29, 1810; son of the Marquis Marc René de Montalembert. He entered public life young, showing an enthusiasm for the liberal neo-Catholic movement. He was in 1830 associated with Lamennais and Lacordaire in publishing the journal *L'Avenir*, but, like Lacordaire, after the papal condemnation of that journal, he recoiled and did not follow the radical evolution of Lamennais. In 1835 he entered the hereditary upper house, and developed great power as an orator in support of ecclesiastical measures, especially the right of Roman Catholics to establish schools of their own independent of the university. He still combined an ardent devotion to the Church with an enthusiasm for liberty and liberal ideas, and when the revolution of 1848 came he accepted an election to the Assembly, where he voted at first with the moderate republicans, but afterward joined the reactionary group. He did not accept the empire of Napoleon III., and was one of its most dangerous antagonists, remaining in the Chamber of Deputies till 1857. Failing of re-election then, he retired from public life, and devoted himself to literary work, but he remained an active influence in clerical circles, opposing persistently, though without success, the acceptance of the dogma of papal infallibility. D. in Paris, Mar. 13, 1870. His works comprise a *Vie de Sainte-Élisabeth d'Hongrie* (1836); *L'Avenir politique de l'Angleterre* (1855); *Pie IX. et Lord Palmerston* (1856); the pamphlets *Une nation en Deuil* and *l'Église libre dans l'État libre*; and his main work, *Études sur les Moines d'Occident depuis Saint-Bénoît jusqu'à Saint-Bernard* (6 vols., 1860–67). This is not so much a careful history as an eloquent plea in which the ardor of the defender of the Church dictates the choice and presentation of the materials. The qualities of the orator are more conspicuous in him than those of the writer. After his death appeared *Lettres à un ami de collège 1827–30* (1874). He himself prepared an edition of his *Œuvres complètes* (Paris, 1861–68). Cf. Craven, *Le Comte de Montalembert* (Paris, 1873).

A. G. Canfield.

Montalembert, Marc René, Marquis de: military engineer; b. at Angoulême, France, July 16, 1714; d. Mar. 29, 1800. Descended from a noble family, he entered the army at the age of eighteen, and served at the sieges of Kehl and Phillipsburg and in the war with Bohemia. Subsequently he engaged in the manufacture of cannon for the French navy. At the age of sixty-two he began to publish his great work, *La Fortification perpendiculaire, ou l'Art défensif supé-*

rieur à l'offensif. The use of the casemate in some of its forms goes back to Albert Dürer and San Micheli, in the early part of the sixteenth century, and it was resorted to by Vauban in his second and third systems, of which the tower-bastions are casemated throughout, but it was reserved for Montalembert, in the latter part of the eighteenth century, to give it an extraordinary development, and to make the casemate the essential element of a system of fortification. Notwithstanding that the French corps of engineers rejected the system in its intended application, and disclaimed, as an engineer, its author, it nevertheless constructed in 1786, for the defense of the harbor of Cherbourg, forts which are in reality almost copied from his designs. European nations followed the example.

Revised by JAMES MERCUR.

Montalván, JUAN PÉREZ, de, Doctor : dramatist and story-teller; b. in Madrid, Spain, in 1602; d. there, insane from over-work, June 25, 1638. He is one of the most interesting and important of the lesser literary figures of the Spanish "golden age." Educated at Alcalá, he obtained his doctor's degree in 1625, joined a fraternity of priests in Madrid, and became a notary in the Inquisition. All this, however, was merely for the sake of obtaining leisure to write. He became intimate with Lope de Vega, and a friend of almost all the great writers of his time, with the exception of Quevedo, who was his bitter enemy. His literary master was Lope de Vega, whom he loved and admired unreservedly, and whom he celebrated in his *Fama póstuma de Lope de Vega* (1636). He tried his hand at most of the *genres* practiced in his day, both in prose and verse. In 1624 he published *Las novelas ejemplares*, and in the same year, with the connivance of Lope de Vega, his *Orfeo*, in competition with the successful *Orfeo* of Jáuregui. In 1627 appeared his nominally pious work *Vida y purgatorio de San Patricio.* This was followed in 1632 by a collection of stories, anecdotes, and even plays, *El para-todos*, of a diverting kind. During all this time he had been producing constantly plays and so-called *autos*, of which he wrote in all about sixty. Far the best, and the only one that has held the stage down to the present day, is *Los Amantes de Teruel*, written in imitation of a similar piece by Tirso de Molina, but far surpassing it in dramatic effect. This theme has been one of the most popular in the history of the Spanish drama. Though Montalván has not the excellences of Calderón and Lope de Vega, and is often guilty of the worst excesses of the playwrights of his generation, he rarely produced a piece without great beauties. He prepared himself for publication two volumes of his plays, which appeared in 1638 and 1639 (reprinted in 1652). The best of them are to be found in vol. xlv. of Rivadeneyra's *Biblioteca de Autores Españoles* (Madrid, 1881). A. R. MARSH.

Montalvo, GARCÍA ORDOÑEZ, de: Spanish romancer; the author of the earliest existing version of the famous romance AMADIS OF GAUL (*q. v.*). Little is known of his life beyond the fact that he was governor of the city of Medina del Campo, and lived in the end of the fifteenth century. The question of the origin of his romance and of its relation to the supposed work of the Portuguese VASCO DE LOBEIRA (*q. v.*) is involved in great obscurity. After completing the *Amadis* proper, Montalvo wrote a lesser work on the deeds of Esplandian, son of Amadis and Oriana. Both are printed in vol. xi. of Rivadeneyra's *Biblioteca de Autores Españoles* (Madrid, 1874) with an *Introduction* by D. Pascual de Gayangos. A. R. MARSH.

Montana, mon-taa'na [Lat. (sc. *ci'vitas*, state), fem. of *monta'nus*, mountainous]: one of the U. S. of North America (Western group); the twenty-eighth State admitted into the Union.

Location and Area.—It lies between lat. 44° 6′ and 49° N. and lon. 104° and 116° W.; is bounded on the N. by the provinces of Alberta and Assiniboia, Canada, on the E. by the Dakotas, on the S. by Wyoming and Idaho, and on the W. by Idaho; average length E. to W., 470 miles; average breadth N. to S., 275 miles; area, 146,080 sq. miles (93,491,200 acres), of which 770 sq. miles are water surface.

Physical Features.—As its name indicates, it is a mountainous country, in which there are some fine valleys, and it has an abundance of timber, such as pine, spruce, cottonwood, and aspen. The streams are skirted with dense thickets, in which at the proper season there is found plenty of serviceberries, currants, and gooseberries. The Bitter Root range of mountains forms the southwest boundary; the main chain of the Rocky Mountains turns N. at the southwest corner, and forms between the two ranges a great basin, which constitutes one-fifth of the entire area of the State. About three-fifths of the State consists of rolling table-lands in the E., which are generally treeless and often ill-adapted to irrigation. The streams which traverse these table-lands, however, are generally lined with cottonwood, willow, and other similar trees. The principal rivers are the Gallatin, Jefferson, and Madison, here called the Three Forks, which unite and form the Missouri. Besides these are the Yellowstone, Musselshell, Milk, Teton, Sun, and Maria's rivers, etc. Flathead Lake is the only considerable lake. The Yellowstone National Park is partly within Montana.

State Seal of Montana.

Mineral Productions.—Gold has been found in every portion of the State. Silver ore, iron, and coal are also found. Lignite, copper, and petroleum are among the mineral products. The value of gold, silver, lead, and copper mined since 1862 has exceeded $320.000,000. Butte City is the great mining center, in which the annual product of silver and copper is valued at more than $20,000,000. Since 1888 the output of copper has exceeded that of any other State, and is now annually more than 200,000,000 lb. In 1899 the production of lead was more than 10,000 tons, placing Montana fifth among lead-producing States. In 1899 the gold product was valued at $4,760,100 (State rank, fifth); silver, at $20,810,990 (State rank, second); copper, 225,126,855 lb. (State rank, first); and coal, 1,496,451 short tons, value, $2,347,757. The copper product was 39·6 per cent. of the total product of the country, and almost all of it came from the small hills in the town of Butte. The most productive coal counties were Park, 147,154 tons, value $284,970; Cascade, 988,821 tons, value $1,523,932; Carbon, 272,396 tons, value $393,884; and Gallatin, 63,626 tons, value $102,712. There were 3 coking plants, with 303 ovens, which used 110,274 short tons of coal and produced 56,376 short tons of coke, value $356,190. A number of deposits of coal well-adapted to coke-making have been found near the entrance to the Yellowstone Park. Valuable sapphire mines have been opened on the right bank of the Missouri river, 12 miles N. E. of Helena, and there is an abundance of marble, common, green, variegated, and black, in the Sweet Grass Hills.

Soil and Productions.—The mountains of Montana are usually well covered with forests, but the trees are, if deciduous, almost exclusively willow, poplar, and cottonwood; if evergreen, pine, spruce, fir, cedar, and balsam. There is very little hardwood timber in the State. Grass and flowers of great beauty abound in the valleys. As a grazing country this will always maintain a high rank, the "bunch grass," so excellent for cattle, covering all the hillsides and plains. Indeed, many herds are turned out in the autumn to get their own living through the winter, and springtime finds them in good condition. Since 1885 much has been done to increase agriculture by means of irrigation. Along the foot-hills and between the great mountain ranges favorable opportunities occur, and wherever irrigation has been provided an abundant agriculture is the result.

The following summary from the census reports of 1880 and 1890 shows the extent of farm operations:

FARMS, ETC.	1880.	1890.	Per cent.*
Total number of farms	1,519	5,603	268·9
Total acreage of farms	405,683	1,964,197	384·2
Total value of farms, including buildings and fences	$3,234,504	$25,512,340	688·8

* Increase.

MONTANA

County Towns ⊙

Scale of Miles

0 10 20 30 40 50 60 70 80

BRITISH COLUMBIA · ALBERTA · SASSINIBOIA · NORTH DAKOTA

MONTANA · IDAHO · WYOMING

BLACKFEET IND. RES. · FLATHEAD IND. RES. · FORT BELKNAP IND. RES. · FORT PECK INDIAN RESERVATION · CROW INDIAN RESERVATION · NORTHERN CHEYENNE IND. RES. · YELLOWSTONE NATIONAL PARK

Custer's Battle Ground June 25, 1876

L. L. POATES, ENGR., N.Y.

The following table shows the acreage, yield, and value of the principal crops in the calendar year 1900:

CROPS.	Acreage.	Yield.	Value.
Corn	1,598	23,970 bush.	$14,142
Wheat	72,555	1,929,963 "	1,177,277
Oats	65,865	2,568,735 "	1,078,869
Barley	5,194	201,527 "	96,733
Potatoes	4,781	640,654 "	339,547
Hay	369,161	590,658 tons	5,138,725
Totals	519,154	.....	$7,845,293

On Jan. 1, 1900, the farm animals comprised 146,781 horses, value $3,491,193; 878 mules, value $35,509; 45,314 milch-cows, value $1,778,574; 914,494 oxen and other cattle, value $24,865,089; 3,884,179 sheep, value $11,017,474; and about 40,000 swine, value $375,000: total head, 5,031,646; total value, $37,562,839.

Climate.—The climate is milder than that of States farther E. in the same latitude, The annual mean temperature ranges from 44° to 48°. The climate is very dry. The annual rainfall at Fort Benton is but 12·17 inches, and it is nearly the same over most of the State.

Divisions.—For administrative purposes, Montana is divided (1901) into twenty-four counties, as follows:

COUNTIES AND COUNTY-TOWNS, WITH POPULATION FOR 1900.

COUNTIES.	* Ref.	Pop. 1890.	Pop. 1900.	COUNTY-TOWNS.	Pop. 1900.
Beaver Head	7-D	4,655	5,615	Dillon	1,530
Broadwater†	5-F	.....	2,641	Townsend	446
Carbon†	7-H	.....	7,533	Red Lodge	2,152
Cascade	4-F	8,755	25,777	Great Falls	14,930
Choteau	3-G	4,741	10,966	Fort Benton	1,024
Custer	6-K	5,308	7,891	Miles City	1,938
Dawson	4-J	2,056	2,443	Glendive	.....
Deer Lodge	5-E	15,155	17,393	Deer Lodge City	1,324
Fergus	5-H	3,514	6,937	Lewistown	1,096
Flathead†	3-C	.....	9,375	Kalispel	2,526
Gallatin	7-F	6,246	9,553	Bozeman	3,419
Granite†	6-D	.....	4,328	Phillipsburg	995
Jefferson	6-F	6,026	5,330	Boulder Valley	.....
Lewis and Clarke	5-E	19,145	19,171	Helena	10,770
Madison	7-E	4,692	7,695	Virginia City	568
Meagher	5-F	4,749	2,526	White Sulphur Sp.	446
Missoula	5-D	14,427	13,964	Missoula	4,366
Park	7-G	6,881	7,341	Livingston	2,778
Ravalli†	6-D	.....	7,822	Stevensville	346
Silver Bow	6-E	23,744	47,635	Butte	30,470
Sweet Grass†	7-H	.....	3,086	Big Timber	.....
Teton†	3-E	.....	5,080	Choteau	.....
Valley†	3-K	.....	4,355	Glasgow	.....
Yellowstone	6-I	2,065	6,212	Billings	3,221
Crow Indian reservation	.....	.....	2,660		
Totals	.....	132,159	243,329		

* Reference for location of counties, see map of Montana.
† Formed since census of 1890.

Principal Cities and Towns.—Butte, 30,470; Great Falls, 14,930; Helena (capital), 10,770; Anaconda, 9,453; Missoula, 4,366; Bozeman, 3,419; Billings, 3,221: Livingston, 2,778; Walkerville, 2,621; Kalispel, 2,526; Red Lodge, 2,152.

Population and Races.—In 1870, 20,595; 1880, 39,159; 1890, 132,159 (native, 89,063; foreign, 43,096; male, 87,882; female, 44,277; white, 127,271; colored, 4,888, comprising 1,490 persons of African descent, 2,532 Chinese, 6 Japanese, and 860 civilized Indians); 1900, 243,329.

Finance.—The State has no debt, and generally has a large balance in its treasury. The assessed valuation in 1899 was $140,821,870.

Banking.—In 1900 there were 21 national banks with a capital of $2,305,000; surplus and profits, $1,198,860.70; and deposits, $13,360,264.52; 15 state banks, capital, $990,000; surplus and profits, $478,914; deposits, $6,066,057; and 6 private banks, capital, $271,000; surplus and profits, $110,314; and deposits, $3,509,883.

Means of Communication.—In 1899 the State board of equalization fixed the assessed value of all railway property in the State at $14,992,689, an increase in the year of $1,199,108. The Great Northern Railway has about 400 miles of roadbed in the State. There were twenty-nine railways in all, with an aggregate mileage of 2,988·39, the principal ones being the Northern Pacific and the Great Northern. The extension of the latter opened to settlement the Flathead country, and also tapped forests of cedar, fir, and pine that were previously almost inaccessible; it thus passes through a region whose agricultural resources are capable of sustaining thousands of families.

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	94	102	25,149	$184,100
Methodist Episcopal	48	48	1,901	159,850
Presbyterian in the U. S. of A	24	24	1 232	85,000
Protestant Episcopal	30	26	1,104	165,450
Disciples of Christ	13	14	785	58,800
Baptist	14	14	683	89,000
Methodist Episcopal South	23	23	492	74,000
Congregational	7	7	345	38,800

Schools.—The act of Congress providing for the admission of Montana, North Dakota, South Dakota, and Washington guaranteed that on becoming a State Montana should receive the sixteenth and thirty-sixth sections of every township of the State, the proceeds from the sale of which should form a permanent school fund; that the State should also be entitled to 5 per cent. of the net proceeds received from all sales of public land retained by the U. S. within the State made subsequent to its admission, the sums so derived to be likewise a part of the permanent school fund; and that the State should receive a grant of 72 sections of unappropriated public lands, to create a fund for the support of a State university, 140,000 acres for agricultural colleges, 100,000 acres for a school of mines, 100,000 acres for State normal schools, and 50,000 acres for a deaf and dumb asylum. Under these provisions, the Legislature in 1893 passed acts establishing the State University at Missoula, the State Agricultural College at Bozeman, the State School of Mines at Butte City, the State Normal School at Dillon, the State Deaf and Dumb School at Boulder City, a State Reform School at Miles City, and a home for orphans, foundlings, and destitute children at Twin Bridges. At the same time the State board of education was authorized to select lands for the educational institutions. Public school statistics for 1898–99 showed, children of school age, 49,498; enrolled in public schools, 35,070; average daily attendance, 23,400. There were 656 schools and 1,086 teachers—201 men, and 885 women; the average monthly salary for men was $69.28; for women $48.61. The value of school property was $1,857,965; the school revenue (1897–98), $815,341; expenditure, $776,150.

Libraries.—According to a U. S. Government report on public libraries of 1,000 volumes and upward each in 1891, Montana had 5 libraries, containing 21,139 bound volumes and 1,300 pamphlets. The libraries were classified as follows: General, 1; college, 1; law, 1; State, 1; and historical, 1. The Montana Historical Society was made a State institution in 1891.

Post-offices and Periodicals.—In Jan., 1901, there were 499 post-offices, of which 25 were presidential (2 first-class, 6 second-class, 17 third-class) and 474 fourth-class. There were 180 money-order offices, and 3 money-order stations. Of periodicals, there were 12 of daily, 2 tri-weekly, 2 semi-weekly, 74 weekly, 1 semi-monthly, and 4 of monthly publication; total, 95.

Charitable, Reformatory, and Penal Institutions.—On the admission of the State the former territorial penitentiary at Deer Lodge was turned over for a State prison, and a second one has been erected since at Billings. Pending the completion of the authorized State institutions, arrangements were made to maintain the insane at public expense by private individuals at Warm Springs, and a number of deaf and dumb, blind, and feeble-minded children, in appropriate institutions out of the State. A State board of charities and reform was created by the Legislature in 1893.

Political Organization.—The constitution permits aliens to own mines and mining property; proscribes polygamy; and prohibits trusts, contract labor in prisons and reformatories, and lotteries. The executive authority is vested in a Governor, Lieutenant-Governor, Secretary of State, attorney-general, State treasurer, State auditor, and superintendent of public instruction, all elected for four years. The Governor is given authority to veto separate items of appropriation bills. The legislative authority is vested in a Legislative Assembly, comprising (1901) a Senate of 24 members, elected for four years, and a House of Representatives of 70 members, elected for two years. The Legislature holds biennial sessions, limited to sixty days. It is prohibited from making appropriations for charitable, industrial, educational, or benevolent purposes to any person, corporation, or community not under the absolute control of the State, nor to any denominational

or sectarian institution or association. The Supreme Court has appellate jurisdiction only, with a supervisory control over all minor courts. It consists of three judges (who may be increased to five) elected by the people for six years. Judges of district courts, county attorneys, justices of the peace, and the clerk of the Supreme Court are also elected by the people. Citizens of the U. S., who have been residents of the State for one year, and of a county for thirty days next preceding an election, may vote, excepting U. S. soldiers, felons, and Indians. Women are eligible to hold the office of county superintendent of schools, or any school-district office, and have the right to vote at any school-district election. The tax rate for State purposes was limited to three mills, with the provision that when the value of the taxable property of the State reached $100,000,000 the rate should not exceed two and a half mills, and when the value reached $300,000,000 the rate should not exceed one mill and a half; but the rate may be increased by a majority vote of all those voting on the question at a general State election. The State capital was fixed temporarily at Helena. At the general election in 1892 votes were cast for a permanent capital as follows: Helena, 14,010; Anaconda, 10,183; Butte City, 7,752; Bozeman, 7,685; Great Falls, 5,045; Deer Lodge, 983; and Boulder, 295; and final choice between Helena and Anaconda was deferred to the general election of 1894, when Helena was chosen.

History.—Montana had had a few settlers, mostly trappers and hunters and some missionaries, for many years before its organization as a Territory, but its growth dates from the discovery of gold there in 1861. It was a part of Idaho Territory till May 26, 1864, when it was organized as a separate Territory. After the discovery of gold, people flocked in from all quarters. In the earlier days there was a very mixed population, among which were a number of noted robbers and desperadoes, who at one time seemed to have complete possession of the Territory. This state of things continued until the respectable portion of the community could endure it no longer, when they formed themselves into an organization known as the "Vigilantes," who administered the law without partiality or favor, and many a miscreant was hanged by them. It was once a favorite hunting-ground for hunters and trappers, and Fort Benton, on Missouri river, at the head of navigation, was a fur-trading post. Having adopted a State constitution the Territory was admitted to the Union as a State on Nov. 8, 1889. On Oct. 15, 1892, the surplus lands of the Crow Indian reservation, in Southern Montana, aggregating about 1,800,000 acres, were opened to settlement.

GOVERNORS OF MONTANA.

Territorial.		*State.*	
Sidney Egerton	1864-65	Joseph K. Toole	1889-92
Francis Meagher (acting)	1865-66	John E. Rickards	1893-97
Green Clay Smith	1866-69	Robert B. Smith	1897-1901
James M. Ashley	1869-70	Joseph K. Toole	1901-
Benjamin F. Potts	1870-82		
J. Schuyler Crosby	1882-84		
B. Platt Carpenter	1884-85		
Samuel T. Houser	1885-86		
Preston H. Leslie	1886-89		

AUTHORITIES.—Gannett, *Meteorological Observations in Utah, Idaho, and Montana, 1872* (vol. ii., *United States Geographical and Geological Survey of the Territories*); Crittenden, *Meteorological Observations in Colorado and Montana, 1873–74* (vol. vi., *ibid.*); *Codified Laws, 1868–72* (1872); Blake, *Supreme Court Reports, 1868–73*; Bancroft, *Washington, Idaho, Montana* (1890); Maddox, *Supreme Court Reports of Cases* (1891 and 1892); *Mineral Resources of the United States* (1892); U. S. Census *Bulletins*; Reports of the U. S. Department of Agriculture.

Revised by C. K. ADAMS.

Montanel'li, GIUSEPPE: statesman and poet; b. at Fuccecchio, in Tuscany, in 1813; d. in 1862. He was educated at the University of Pisa, and in 1838 published a volume of poetry; from 1837–39 practiced successfully as an advocate; and in 1848 was appointed Professor of Civil and Commercial Law in the University of Pisa. Even before 1848 he had excited much attention by his proposed liberal reforms, by the political association known as Fratelli Italiani, and by the *Italia*, a journal edited by him at Pisa in 1847 with the motto "Riforma e Nazionalità." On the breaking out of the revolution in 1848 he volunteered, and distinguished himself by his valor. A report of his death at the battle of Curtatone became current, and he was universally lamented. Mazzini wrote a splendid eulogy upon him. He was, however, only severely wounded and a prisoner. On his return to Tuscany he became a member of the constitutional ministry, and on the flight of the grand duke in 1849 he was chosen triumvir with Guerrazzi and Mazzini. At this time he exerted himself for the union of Tuscany with Rome. While he was on a mission to Paris the restoration took place, and Montanelli remained an exile until 1859, during which time he published two volumes of memoirs, *Memorie sull' Italia e specialmente sulla Toscana dal 1814 al 1850* (Turin, 1853; French trans. by F. Arnaud, Paris, 1857). Among his poems are mentioned with praise *La Tentazione*, and a tragedy entitled *Camma*. In 1859 he declared himself for the autonomy of Tuscany, rather than for the unification of Italy. *La Nuova Europa*, a journal founded by him, was the special organ of his peculiar political ideas, and its publication ceased at his death. See E. Redi, *Ricordi biografici su G. Montanelli* (1883).

Revised by A. R. MARSH.

Mon'tanists: an early Christian sect, the followers of Montanus of Pepuza in Phrygia. He appears to have been a priest of Cybele, was converted about 150 A. D., and soon after began to fall into fits of ecstacy and to utter prophecies. He was joined by two women (Maximilla and Priscilla) of wealth and high social position, who deserted their husbands and became prophetesses. Expelled from the Church, he set up for himself, organizing a body of preachers to be supported by the voluntary contributions of his followers. He established a singular hierarchy, consisting of (1) a patriarch, residing at Pepuza, which was to be the metropolis of the millennial kingdom; (2) cenones, which have not been described; (3) bishops. Orthodox in respect to the cardinal doctrines, his teaching, in substance, was that the Mosaic and Christian dispensations having failed to save the world, a new revelation had been made through him and his two prophetesses. This revelation pertained not to doctrine, but to discipline. The points were—(1) fasting, at first two and afterward three annual fasts of a week, instead of one such fast; (2) forbidding second marriages; (3) refusing restoration to such as had been guilty of murder, adultery, or idolatry; (4) requiring the veiling of virgins in the assemblies of the Church. The novelty was not in the things themselves, which were already popular, but in *prescribing* them in obedience to what was claimed to be a new express revelation. The system was received at first with some favor at Rome. Irenæus of Gaul was tolerant toward it. Finally it was treated everywhere as a heresy. Its strongholds were in Asia Minor and Northern Africa; Tertullian was its ablest champion. Severe laws against the sect were enacted (*Cod. Just.*, 1 : 5 : 18–21) as late as 530 and 532 A. D. The original sources of information in regard to Montanism are, mainly, Eusebius, *Hist.*, vol. iii., 14–19; Epiphanius, *Hær.*, 48, 49; and 22 of the 37 *Treatises* of Tertullian. See *Montanism and the Primitive Church*, by John de Soyres (1878).

Montanus Arias: See ARIAS MONTANUS.

Montauban, mōn'tō'bään': capital of the government of Tarn-et-Garonne, France; on the Tarn, 31 miles N. of Toulouse (see map of France, ref. 8–E). It is an old but well-built town, founded in the twelfth century, and contains a still older cathedral. It has large manufactures of woolens and beet-root sugar, extensive dye-works and distilleries, and carries on a considerable trade in wine and grain. It was one of the Protestant strongholds in France, and has a flourishing Protestant theological school. Pop. (1891) 22,616; (1896) 29,470.

Montauk' Point: a high, fertile headland, the extreme eastern point of Long Island; a part of the township of East Hampton, Suffolk co., N. Y. It was the seat of the Montauk Indians, now extinct. It has a stone lighthouse with a flashing white light of the first order, 172 feet above the sea, and also a fog-trumpet; lat. 41° 4′ 13″ N., lon. 71° 51′ 6″ W.

Montauks: See ALGONQUIAN INDIANS.

Mont Blanc, mōn' blăän' [Fr. *white mountain*, from its perpetual snow]: one of the Pennine Alps, 15,750 feet high, and the highest mountain in Europe except Mt. Elbruz in the Caucasus. It is a long ellipse of granite and crystalline schists directed N. E. and S. W., and standing at the angle where France, Switzerland, and Italy meet, the principal peak being in France. It is covered with an ice cap so thick that a horizontal shaft driven in at 40 feet below the highest point to a distance of 75 feet with lateral drifts, did not

reach the rock. From this mass of ice extend numerous glaciers down the valleys, in some cases to an elevation of only 3,600 feet. The line of perpetual snow extends down to 8,600 feet. The drainage is into both the Rhône and Po. The ascent is dangerous and fatiguing, requiring two days, starting from Chamouni (elevation 3,445 feet) on the N., and spending the first night at Grands Mulets (11,335 feet). The first ascent was made by the guide Balmat in 1786. The second, in the following year, was by the celebrated physicist Saussure, who recorded the first physical observations ever made on high mountains. Mont Blanc has since been a notable field for scientific exploration, and in Sept., 1893, under the instigation of M. Janssen, an eminent French scientist, an observatory was erected on the mountain near the apex. It is devoted to meteorologic and astronomic work. MARK W. HARRINGTON.

Montcalm, mōñ'kaalm', LOUIS JOSEPH SAINT-VERAN, Marquis de: soldier; b. near Nîmes, France, in 1712. Descended from a noble family, he received a careful education, and at fourteen years of age entered the army, and was distinguished in Italy, Bohemia, and Germany, attaining the rank of colonel. In 1756 he was appointed to the chief command of the French troops in Canada, and three months after his arrival captured Fort Ontario (Oswego) and a year later Fort William Henry (Lake George); in July, 1758, he occupied Fort Ticonderoga, where he successfully repulsed a greatly superior British force under Abercrombie. To protect Quebec, threatened by the forces of Gen. Wolfe, Montcalm assembled the main body of his troops on the Montmorency, where, July 31, 1759, he repulsed Wolfe, who, retiring, secretly reached, Sept. 13, the heights of Abraham, in the rear of the army of Montcalm. With numbers nearly equal, Montcalm gave battle to the British, but, though displaying the utmost personal bravery, his troops gave way, and were entirely routed by a charge which followed. Wolfe fell rejoicing in his victory, while Montcalm, who had received a fatal wound, died the following day, exulting that he should not live to see the surrender of Quebec. A monument stands in Quebec to the memory of the two heroes.

Mont Cenis, mōñ'se-nee': a remarkable mountain pass of the Alps; on the boundary between the Italian province of Turin and the French department of Savoie, at the junction of the Graian and Cottian Alps. It forms a plateau 6,773 feet high, with a peak 11,451 feet high. In 1803–10 Napoleon I. laid an elegant and comfortable carriage-road over the plateau, connecting France with Italy. In 1867 a railway on the Fell system was carried over the pass, running for the most part by the side of the carriage-road. It never paid well, and was discontinued in 1871. The famous tunnel was begun in Aug., 1857, completed Dec. 25, 1870, and opened for traffic in Sept., 1871. It is 8 miles long, lacking only 30 yards. Its north end is 3,942 feet above the sea, its south end 4,380, and the middle about 15 feet higher than the south end. The cost was £3,000,000. Trains run through in about twenty minutes. See FRÉJUS, COL DE.

Montclair: township; Essex co., N. J. (for location of county, see map of New Jersey, ref. 2–D); on the Del., Lack. and W. and the N. Y. and Greenwood Lake railways; 5 miles N. by W. of Newark, the county-seat, 14 miles W. N. W. of New York city. It comprises a tract 5 miles long by 1½ miles wide, and has for its western boundary the First or Watchung Mountain. Its average elevation above tide-water is 301 feet; the part called "The Heights" has an altitude of 368 feet. The township has been built up chiefly by New York business men, and the residential parts are Montclair, Upper Montclair, and Montclair Heights, forming together a charming, healthful suburb. There are several churches, a military academy, a high school, completed in 1893 at a cost of $125,196, public schools, a library founded in 1868, a club-house opened in 1889, a State bank with capital of $50,000, and two weekly newspapers. Pop. (1880) 5,147; (1890) 8,656; (1900) 13,962.

Mont de Piété, mōñ'de-pi-ā'tā' [Fr., mistransl. of Ital. *Monte di Pietà*, liter., mount of pity or compassion (*pietà* meaning both piety and pity). Cf. Fr. *piété* and *pitié*]: an institution for the loaning of money at a low interest to the poor, pledges being taken for security. The earliest seems to have been that of Padua, founded in 1491 in opposition to the usurious practice of the Jews. The ancient Lombard houses and modern loan-funds are in principle the same. The *Monti di Pietà* at Rome are among the best managed in the world. The *Mont de Piété* may be regarded as a public system of pawnbrokerage. A similar system has prevailed in China for ages. See PAWNBROKING.

Mont-Dore-les-Bains, mōñ'dōr'lā-bāñ' (i. e. the Baths of Mont-Dore): an important health resort of the department of Puy-de-Dôme, France; 11 miles S. S. E. of Rochefort, on the head-waters of the Dordogne river. It is situated in a picturesque region among the mountains, 3,445 feet above sea-level. Here are cold, hot, mineral-water, mud, and vapor baths, the beneficial effects of which have been known since the time of the Romans, who resorted to the place. The population of the commune is about 1,400; the annual number of visitors 5,000. M. W. H.

Monte Carlo: See MONACO.

Monte Casino: See CASSINO.

Monte Cristo (the *Oglasa* of Pliny): an Italian island, between Corsica and Tuscany, 30 miles S. of Elba; rendered famous by Alexander Dumas's romance *The Count of Monte Cristo*. It is a conical rock of granite, 5 miles in circumference, 2,093 feet high; long uninhabited, but in 1874 made a penal colony. It has very little land capable of cultivation. M. W. H.

Montecu'culi, RAIMONDO, Count of: soldier; b. near Modena, Italy, in 1608; entered the Austrian army in 1627; distinguished himself in the Thirty Years' war, and afterward in the Polish war against the Swedes, and received in 1660 the command of the allied Austrian and French army in Transylvania, with which he defeated the Turks in the great battle of St. Gothard, on the Raab, Aug. 1, 1664. In the war between France and Holland he again commanded the Austrian army, and distinguished himself much in the campaigns between 1672 and 1676. In 1679 the emperor made him a prince of the empire, and the King of Naples gave him the duchy of Melfi. D. at Lintz, Oct. 16, 1681. He left a memoir on the Turkish war, written in Italian, and translated into Latin, German, and French, and several other writings, including sonnets.

Montefio're, Sir MOSES HAYIM, F. R. S.: philanthropist; b. at Leghorn, Italy, Oct. 24, 1784. At an early age he was taken to England by his parents. He rose to prominence as a successful merchant, and was made a broker on the London Stock Exchange. He was honored for his integrity and benevolence. In 1824 he retired from business, and devoted the remainder of an unusually long life to works of charity and to the amelioration of the condition of the Jews in all parts of the world. In 1835 he became president of the United Deputies of British Jews. In 1837 he was preferred to the office of sheriff of London and Middlesex, in which year he was knighted by the Queen. In 1846 a baronetcy was conferred upon him. His first visit to the East was made in 1827; his second in 1839 for the purpose of founding colonies for Jews. In 1840 he again visited the East, and at Damascus secured the release of the Jews who had been charged with the murder of a monk. In 1846 he pleaded before Emperor Nicholas at St. Petersburg in favor of his people; 1855 he brought assistance to those who were suffering from the famine in Syria; 1858 he traveled over Europe in the unsuccessful endeavor to secure the release of Edgar Mortara, who had been forcibly converted to Roman Catholicism. In 1863 he visited Constantinople, in 1864 Morocco, in 1866 Syria, in 1867 Bucharest, and in 1875 Jerusalem. In memory of his wife he founded at Ramsgate the Judith Montefiore College for the training of Jewish divines. D. at Ramsgate, July 28, 1885. See Judith Montefiore, *Private Journal of a Visit to Egypt and Palestine* (London, 1836); *Diaries of Sir Moses and Lady Montefiore* ed. by L. Loewe (London, 1890); Baley's *Modern Methuselah*; *Dictionary of National Biography*, ed. by Sidney Lee (xxxviii., p. 278). RICHARD GOTTHEIL.

Montcleo'ne di Cala'bria: town; in the province of Catanzaro, Southern Italy; situated on an eminence, 11 miles E. of Tropea (see map of Italy, ref. 9–G), and containing some fine buildings. This town occupies the site of the ancient *Hipponium* of Magna Græcia; was known under the Romans as *Vibo Valentia*, and took a prominent part in the Neapolitan wars of the Middle Ages. In 1783 it suffered fearfully from an earthquake which destroyed nearly the whole town, including the magnificent castle erected by Roger the Norman. Pop. about 9,700.

Montelu'po, BACCIO, da: sculptor and architect; b. at Montelupo, near Florence, in 1450; d. at Lucca in 1533. Among his early works are a Hercules for Francesco dei Medici, and a bronze statue of St. John the Evangelist for

the garden of Porta Santa Maria—one of the best statues ever produced in Florence. He carved many crucifixes in wood for churches all over Italy. One of these is at St. Mark's convent in Florence, another at Arezzo. At Lucca he built the Church of San Paolino. W. J. S.

Montemayor, mōn-tā-maă-yōr′, Jorge, de: poet; b. at Montemor, near Coimbra, Portugal, probably between 1510 and 1520; d. in a duel at Turin, Italy, in 1561. Originally a soldier, he became connected with the traveling chapel of Philip II., owing to his knowledge of music. He was thus enabled to visit several foreign countries, particularly the Netherlands and Italy. The work for which he is famous is the pastoral romance *Diana Enamorada*, written in Spanish, as were all his other works. It is modeled upon the *Arcadia* of Sannazaro, but contains much of the author's personal experience and regret for unrequited love. This was first published in an incomplete form at Valencia in 1558 or 1559, nor was it ever finished by its author. After his death, however, several persons undertook to go on with it. First, Alonso Pérez, a physician of Salamanca, carried it a little way, according to Montemayor's own plan, which had been communicated to him (1st ed. 1564, and often after that date with the original *Diana*). Next, Gaspar Gil Polo, a professor of Greek in Valencia, furnished another continuation, also never finished (1st ed. 1564). Finally, one Hieronymo de Texeda, a Spaniard residing in Paris, prepared still a third continuation, the dullest of all (Paris, 1627). The original romance became at once extremely popular, not only in Spain, but in other countries. Translations were made into Latin, French (six versions), German (two versions), Dutch, and English. The last, by Bartholomew Yong (London, 1598, folio), as the introduction shows, was made because of the interest felt in the work by the illustrious group to which Sir Philip Sidney belonged, though its publication was delayed nearly twenty years. Another sign of this interest is the fact that the *Diana* was the immediate model of Sidney's own *Arcadia*. Besides the *Diana*, Montemayor wrote a considerable amount of verse of various kinds—lyrics, ballads, elegies, pastoral and satiric poems. These are to be found in the *Cancionero de las obras de Jorge de Montemayor* (Antwerp, 1554, and often), and in the *Cancionero espiritual* (Antwerp, 1558). See G. Schönnherr, *Jorge de Montemayor, sein Leben und sein Schäferroman* (Halle, 1886). A. R. Marsh.

Montemorelos, formerly **Pilon**: a town of the state of Nuevo Leon, Mexico; 52 miles S. E. of Monterey; at the southeastern base of the Sierra de la Silla; about 2,000 feet above the sea (see map of Mexico, ref. 4–G). It is the center of a rich sugar-producing district. Pop. about 10,000. H. H. S.

Montenegro (in Servian *Czrnagora*, Black Mountain): an independent principality of Europe; situated between 41° 45′–43° 15′ N. lat. and 16° 15′–17° 35′ E. lon., bounded by Dalmatia, Herzegovina, and Albania. Its area, 3,506 sq. miles, was somewhat increased by the Congress of Berlin (1878) through the cession of territory on the Adriatic with the port Antivari, and later (1880) of another port—Dulcigno. The country is a mass of rugged and lofty mountains, with dense forests of oak, beech, poplar, fir, and sumach. The loftiest peak, Kutsch-Kom, is 9,250 feet high. There are no roads and few villages. The people are a sturdy race, possessing all the characteristics of half-barbarous mountaineers, occupied in a primitive way with agriculture, hunting, and fishing when not engaged in war. No real census has ever been taken, and there is no budget, hence estimates are only approximate. Pop. 220,000, of whom 4,000 are Roman Catholics, 4,000 Mussulmans, and 212,000 Orthodox Greeks. Though "Montenegro is a military camp," there is no standing army, but every Montenegrin between sixteen and fifty years of age owes military service, and the prince can in a few days put under arms 36,000 men (20,000 between twenty and forty in the first class). The revenue amounts to $300,000, derived from taxes on land and cattle, from government salt monopoly, and customs dues, which are 6 per cent., *ad valorem*; public debt, $500,000. The exports of cattle, sheep, goats, scodano (a dye-wood), insecticide powder, smoked meat, fish, cheese, skins, and wool amount to $1,000,000. The political history of Montenegro is one long, ferocious heroism. When Servia was conquered by Bayezid I., at the battle of Kossova (1389), many of the inhabitants took refuge in the mountains under the lead of Balsha, son-in-law of the slain Servian king Lazarus, and have since maintained their independence against the frequent and desperate attempts of the Ottomans to subdue them. The country has often been overrun by armies more numerous than the entire population, the inhabitants almost exterminated, and the capital, Cettigné, several times captured and burned (1623, 1714, 1785). Still they were generally victorious over these fierce invaders, and their independence was formally acknowledged by the sultan in 1878. Peter the Great made an intimate alliance with them in 1710, and they have often been assisted by Russians, whom they regard with peculiar affection. Russia pays them annually $17,000, not as a subsidy, but as indemnity for losses they sustained in 1813, when helping to expel the French from the Dalmatian coast. For more than 300 years their government was theocratic, the metropolitan (Vladika) of Cettigné exercising despotic authority; but it is now a hereditary absolute monarchy vested in the Petrovitch Niégosch family. The chief towns are: Cettigné, 1,200 inhabitants; Podgoritza, 4,000; Nikchitch, 3,000; Dulcigno, 2,000; Antivari, 1,500; Kolashine, 1,500; Niégosch, 1,200; Danilovgrad, 1,000. E. A. G.

Monte Nuovo: See the Appendix.

Montépin, mōn′tā′păn′, Xavier Aymon, de: novelist; b. at Apremont, Haute-Saône, France, Mar. 18, 1824. He dabbled a little in politics in 1848, founded the newspaper *Le Canard* (1848), contributed to the anti-revolutionary *Le Pamphlet* and *Le Lampion*, and published satirical pamphlets. He had already(1847) made his appearance as a novelist with *Les Chevaliers du lansquenet*, and after 1848 he abandoned politics for literature. He has produced novels with surprising rapidity. Each work, as a rule, has appeared in several volumes, and these number nearly 350 (1894). Besides these, he has composed, alone or with collaborators, more than twenty plays. He depends for his interest upon exciting incident and sensational situation.
A. G. Canfield.

Monterey: city (settled by the Mexicans, former State capital); Monterey co., Cal. (for location of county, see map of California, ref. 9–C); on Monterey Bay, and the S. Pac. and the Monterey and Fresno railways; 80 miles by sea from San Francisco, with which it is connected by a line of steamers. It has a capacious harbor, absolutely safe in any weather; has electric lights, 3 churches, large public-school building, 2 State banks with combined capital of $70,000, and 2 weekly newspapers. The famous old Mission Church, Colton Hall, where the State constitution was signed, and the old custom-house are still preserved, but nearly all the adobe houses of the early Spanish and Mexican inhabitants have been replaced by modern buildings. Pop. (1880) 1,396; (1890) 1,662; (1900) 1,748.
Editor of "New Era."

Monterey, mōn-tā-rā′ [Span., liter., Mt. King]: capital and most important town of the state of Nuevo Leon, Mexico; in a valley or small plain, partly surrounded by picturesque mountains of the Sierra Madre (see map of Mexico, ref. 4–G). It is on the Mexican National Railway (from Mexico to Laredo, Texas), and is connected by other lines with Tampico and Eagle Pass; a line to Matamoros is in course of construction (1894). The city covers a large area on the banks of the little river San Juan; the houses generally have only one story. The principal public buildings, cathedral, etc., face on two large squares. There is a large trade, especially with the U. S., and the town has considerable manufacturing establishments, including a large one for woolen goods, breweries, tan-yards, etc. The climate is dry and healthful, though warm in the summer months, and somewhat changeable; mean winter temperature, 55° F.; summer, 83°. A settlement was formed here probably as early as 1581; it was called Leon in 1584, when it became the capital of Nuevo Leon; and the present name was adopted in 1596. During the early part of the war with the U. S. the Mexicans, having been defeated by Taylor on the Rio Grande, concentrated their forces at Monterey; here they had nearly 10,000 men under Ampudia. Taylor advanced from Matamoros Aug. 5, 1846, with 6,650 men, and carried the greater part of the fortifications and city after a hot battle in the streets and houses during three days, Sept. 21–23. Ampudia then capitulated, and was allowed to march out with his force. Pop. (1892) 46,000. H. H. Smith.

Montero, mōn-tā′rō, Lizardo: naval officer and politician; b. in the province of Piura, Peru, May 27, 1832. He was involved in the rebellion of Vivanco 1856–57, and was banished until 1860; took a leading part in the defense of Callao against the Spanish fleet May 2, 1866; and commanded part of the land force against Pierola 1874. When the war with

Chili broke out he had attained the rank of admiral, but served again with the land forces, commanded the right wing at the battle of Tacna, and took part in the defense of Lima. After the fall of that city he was made vice-president in the provisional government, and President Calderon, having been imprisoned by the Chilians (Sept., 1881), Montero assumed the executive at Arequipa. The Chilians forced him to evacuate that place Oct. 29, 1883, and he retired to Bolivia, only returning after Caceres had been regularly elected president. Subsequently he was senator from Piura. H. H. Smith.

Mon'te Ro'sa: a mountain in the Alps, exceeded in elevation only by Mt. Blanc; on the boundary between the Swiss canton of Valais and the kingdom of Italy, at the junction between the Pennine and Lepontic Alps. It rises in nine peaks, the four central ones of which are more than 14,000 feet high, the highest, the Dufourspitze, having an altitude of 15,217 feet. It is rich in metals. Gold, copper, and iron mines are worked. The highest of these mines is situated at an elevation of 10,500 feet, in the region of perpetual snow. The Dufourspitze was ascended for the first time in 1855.

Montesano: town; capital of Chehalis co., Wash. (for location of county, see map of Washington, ref. 5–B); on the Chehalis river at the head of navigation, and on the N. Pac. Railroad; 50 miles S. by W. of Olympia. It is engaged in lumbering, salmon fishing and canning, stock-raising, dairying, and manufacturing, and has a national bank with capital of $50,000, an incorporated bank with capital of $75,000, a private bank, and two weekly newspapers. Pop. (1890) 1,632; (1900) 1,194. Editor of "Vidette."

Montesquieu, mōn'tes'ki-ö', Charles Louis de Secondat, Baron de: historian and political philosopher; b. Jan. 18, 1689, at the Château de la Brède, near Bordeaux, France, whence he derived the title he bore during his youth—Baron de la Brède. He was educated at the oratorian college of Juilly; studied law at Bordeaux; in 1714 became councilor of the *Parlement* of Bordeaux, and in 1716 president. The same year he entered the Academy of Bordeaux, and showed more taste for study than for business. Under the influence of Newton he turned to natural history and conceived the plan of a *Histoire physique de la terre ancienne et moderne* (1719). In 1721 he produced the *Lettres Persanes*, in which, under guise of letters written home by a Persian traveling in France, he satirized French society and institutions. In 1725 came the *Temple de Gnide*, an allegorical prose poem. He was chosen to the Academy the same year, but the king refused to sanction the choice on the plea that he did not live in Paris. In 1728 he was elected a second time, and took his seat. The next years were spent in travel in Germany, Austria, and Italy, and in observing the institutions and manners of those countries. Montesquieu went next to England, where he remained nearly two years, studying the methods of government. He returned to France in 1731, and applied himself seriously to historical study. The first fruits of this labor were the *Considérations sur les causes de la grandeur et de la décadence des Romains* (1734), in which he sought to discover the laws of political life through the very complete political experience of Rome. The *Dialogue de Sylla et d'Eucrate* (1745), an imaginative embodiment of Roman ideas in characters, is closely connected with it. All this, however, was preparatory to his great work, *L'Esprit des Lois* (1748). The scope of this work is indicated by its fuller title: On the spirit of laws, or the necessary relations between a country's laws and the nature of its government, its manners, climate, religion, commerce, etc. In spite of errors and inaccuracies and a want of orderly plan, it has been, by reason of its vast information and its fertility of general views, one of the most important books of modern times in its field, and established the method of historical treatment of political science. It was received with great enthusiasm, and ran through twenty-two editions in a year and a half. To the objections it called forth Montesquieu replied by the *Défense de l'Esprit des Lois* (1750). D. Feb. 10, 1755. Some minor writings were long kept from print by his family—*Deux opuscules de Montesquieu* and *Mélanges inédits de Montesquieu* (Paris, 1891–92). The best edition of his *Œuvres complètes* is by E. Laboulaye (7 vols., Paris, 1879). See A. Sorel, *Montesquieu* (Paris, 1887), and Political Science. A. G. Canfield.

Monteverde, Claudio: originator of the modern style of musical composition; b. at Cremona, Italy, in 1568; d. in Venice in 1643. Monteverde was the first to discover and employ the chord of the dominant seventh and its inversions, also the chord of the ninth and the principle of suspensions. Besides this he showed astonishing gifts in the composition of dramatic music. He composed many operas, and may be said to have originated truly dramatic music in contradistinction to the then all-prevailing contrapuntal style of the old ecclesiastical composers. In the orchestra he also made innovations and improvements. In 1608, at the performance of his *Orfeo*, he employed thirty-six instruments. In 1624 he introduced into a large cantata, among other novel effects, a *tremolo* for the stringed instruments as we now employ it to express agitation, rage, anger, etc. It is said that the appearance of this tremolo upon paper so astonished the performers of that day that at first they declined to attempt it. Dudley Buck.

Monteverde, Juan Domingo: soldier; b. in Teneriffe, Canary islands, about 1772. He served at first in the Spanish navy, attaining the grade of captain of frigate. Being stationed on the Venezuelan coast, he exchanged into the army, taking the rank of *mariscal de campo*. The revolt which had broken out at Caracas attained great headway until the disastrous earthquakes of Apr., 1812. Monteverde, taking advantage of the confusion, collected forces in the western provinces, advanced rapidly on Caracas, and, with very little fighting, compelled the submission of Miranda in August, occupying the capital soon after. He treated the conquered region with great severity, and, in violation of his own treaty, sent Miranda a prisoner to Spain. His excesses excited new revolts; he was driven from Caracas, repeatedly beaten by Bolivar, and finally shut up in Puerto Cabello, where he was deposed by his own officers Dec., 1813. In 1816 he returned to Spain, where he died in 1823. Herbert H. Smith.

Montevideo: village; capital of Chippewa co., Minn. (for location of county, see map of Minnesota, ref. 9–B); at the junction of the Chippewa and Minnesota rivers, and on the Chi., Mil. and St. P. Railway; 133 miles W. of Minneapolis. It was founded soon after the Sioux Indian outbreak in 1862, and is near the spot, now marked by an imposing monument erected by the State, where Little Crow surrendered a large body of hostiles and several hundred white prisoners. There are 7 churches, Windom Institute, State High School, graded schools, a State bank with capital of $30,000, 2 private banks, a monthly and 2 daily periodicals, 5 elevators, and 2 large flour-mills. It is in an agricultural, dairying, and stock-raising region. Pop. (1880) 862; (1890) 1,437; (1900) 2,146. Editor of "Leader."

Montevideo, Span. pron. mōn-tā-veĕ-dā'ō: capital and chief city and port of Uruguay; on a small bay of the northern shore of the Rio de la Plata, where the estuary begins to open out into the Atlantic; lat. (of the cathedral) 34° 54′ 33″, S. lon. 56° 12′ 18″ W. (see map of South America, ref. 8–E). The bay, which is about 2½ miles long and wide, forms the best harbor on the Plata; it is, however, open to winds from the S. E., and it will not admit vessels of over 15 feet draught; larger ships anchor in the open roadstead formed by the mouth of the estuary, where, during the winter months, they are exposed to the dangerous storms called pamperos. A conical hill, the Cerro, marks the southwestern side of the entrance to the bay, and is a conspicuous feature in the landscape. The city occupies a low ridge or headland with gently sloping sides: this gives it an excellent surface drainage during the frequent rains, and there is now a good system of under drainage. The water-supply is obtained from the river Santa Lucia, about 12 miles distant. The streets are wide and straight, crossing each other at right angles; the most important ones run along the top of the ridge, where also there is a series of fine public squares. The better class of houses in the city proper are commonly in the Italian style, three or four stories high; owing to the general taste for architecture and the free use of white marble in building, this is one of the handsomest cities of South America. Among the numerous fine public edifices may be mentioned the cathedral, municipal building, government palace, school of arts and sciences, and the Solis theater. Lines of tram-cars run to the outskirts—Paso Molino, La Union, etc.—where there are numerous charming suburban residences, surrounded by gardens and lawns. The Prado, about 3 miles from the city, is a handsome park, adorned with fountains, groves, and flower-gardens. Pocitos and Buceo, on the coast just E. of the city, are much frequented for bathing; and Victoria and Villa del Cerro, on the opposite side of the bay, contain

many slaughter-houses and establishments for curing hides, preparing jerked beef, etc. At Cerro there are three large dry docks. Montevideo absorbs a large portion of the commerce of Uruguay, and to some extent the trade in transit to the rivers Paraná and Paraguay; numerous regular lines of steamers connect it with Europe, North America, Brazil, the Argentine, and the Pacific coast. In 1891 the number of vessels which entered the port was 4,033, of which 1,092 were from foreign ports. In 1889 the value of the exports was about $17,415,000, of the imports $33,476,000. The most important exports are hides, jerked beef, and other bovine products, and wool. Railways connect the city with Santa Ana (Brazil), Minas, and Barra de Santa Lucia. The city, like Uruguay in general, has few important manufactures. It is the seat of a university, schools of medicine, art, etc., and many charitable institutions. Montevideo was founded in 1726, and during the colonial period was little more than a fort and settlement, dependent on Buenos Ayres. On Feb. 2, 1807, it was taken by a British expedition, but was soon abandoned. When Buenos Ayres declared its independence, in 1810, the Spanish forces intrenched themselves in Montevideo, whence they were not expelled until June, 1814. It became the capital of Uruguay in 1828, but at that time had only 9,000 inhabitants. Its commercial prosperity began in 1836, owing to the short-sighted policy of Rosas, which drove trade and immigration from Buenos Ayres and turned the current to this port; the tyranny of the dictator also drove many of the better class from Buenos Ayres to this place, and it became a center of opposition to him. From 1842 to 1851 Oribe, supported by Rosas, made constant efforts to take the city; this period is known as the "nine years' siege." Notwithstanding this and the burdens of subsequent civil wars, Montevideo has prospered steadily. Pop. (1892) officially given as 238,080; but this includes the department of Montevideo, which contains 256 sq. miles; the city proper probably has about 180,000, most of the rest being in Cerro, Victoria, Pocitos, Buceo, and other villages of the outskirts. See Mulhall, *Handbook of the River Plate* (1892); Childs, *Spanish-American Republics* (1891); Isodoro De-Maria, *Compendio de la historia de la República Oriental* (1874–75).

HERBERT H. SMITH.

Mon'tez, MARIE DOLORES ELIZA ROSANNA, Countess of Landsfeld, known as LOLA MONTEZ: adventuress; b. at Limerick, Ireland, in 1818; was the daughter of an ensign named Gilbert; was married in 1837 at Neath to a Capt. James, from whom she soon separated; appeared as a *danseuse* in Paris 1840; proceeded in 1846 to Munich, where she became mistress of King Louis and received the title of Countess of Landsfeld. She took an active part in politics, but was compelled to leave the country by the outbreaks of 1848; went to the U. S. in 1851; appeared for some years as an actress and lecturer, and published her *Autobiography* (1858), besides various other writings. D. at Astoria, L. I., Jan. 17, 1861. Revised by B. B. VALLENTINE.

Montezu'ma: town; capital of Poweshiek co., Ia. (for location of county, see map of Iowa, ref. 5–I); on the Ia. Cent. and the Burl., Cedar Rap. and N. railways; 24 miles N. of Oskaloosa, 56 miles E. of Des Moines. It is in a farming, dairying, and stock-raising region; has valuable coal deposits in its vicinity; and contains 4 churches, 2 public-school buildings, electric lights, a national bank with capital of $50,000, and 2 weekly newspapers. Pop. (1880) 921; (1890) 1,062; (1900) 1,210.

EDITOR OF "REPUBLICAN."

Montezuma [also written MOTECZUMA, MOCTEZUMA, MOTECHUZOMA, etc.; Aztec, *Motecuhzoma*, the sad or severe one]: the name of two war-chiefs or so-called "emperors" of ancient Mexico.—MONTEZUMA I., called ILHUICAMINA, was born about 1390, became chief in 1436, and, like most of the line, was a successful warrior; he is said to have been the first who carried his arms to the Gulf coast. D. about 1464. —MONTEZUMA II., surnamed XOCOYOTZIN, was born about 1476 (according to Bernal Diaz, in 1479), and is famous as the chief of Mexico at the time of the Spanish invasion. He was the son of Axayacatl, a former chief; was early noted as a warrior; and it would appear was also a priest. In 1503 he was chosen to succeed his uncle, Ahuizotl. At this time Tenochtitlan, or Mexico, was the most powerful city of the plateau, and its authority was in some sense recognized by most of the tribes as far as the Gulf to the E. and southward to the Isthmus of Tehuantepec. Montezuma had almost continuous wars with the Tlascalans, who had never been subdued; and he is said to have made an expedition far southward into Honduras. From these and other wars he brought back thousands of prisoners, who were sacrificed in the temples. In 1518 he heard that ships with white men (Grijalva's expedition) had appeared on the coast; and his uneasiness at the tidings was increased, it is said, because it had been foretold that descendants of the white god, Quetzalcoatl, would one day come and rule Mexico. When Cortés landed at Vera Cruz, Apr., 1519, Montezuma sent him gifts, but tried to dissuade him from coming to Tenochtitlan. Beyond this it does not appear that he ever attempted an armed resistance; and the only fighting done by the Spaniards in their march over the plateau was in the independent territory of Tlascala, and in Cholula, where they discovered, or thought they discovered, a conspiracy, and punished it by killing several hundred unarmed people. Since Cortés had insisted on coming, pretending that he was an ambassador from the King of Spain, Montezuma received him well, going out from the city to meet him, assigning him quarters in a public building, and sending rich presents to him and his officers (Nov. 8, 1519). The common people soon showed that they hated the strangers, and were impatient with the pusillanimous policy of their chief; Cortés, fearing an outbreak, boldly seized Montezuma in his own house, and confined him as a hostage in the Spanish quarters. Here he was, in the main, kindly treated, and nominally ruled as before, through his officers; on one occasion, when it was alleged that he was attempting resistance to his jailer's wishes, he was put in irons. The people at length rose in open revolt, and attacked the Spanish quarters. At the request of Cortés, Montezuma appeared on the wall and attempted to pacify them; but he was received with a shower of stones, and fell back wounded. Four days after he died, probably more of grief and shame than from the effects of his wounds, June 30, 1520. See Prescott, *Conquest of Mexico*; Bancroft, *History of the Pacific States: Mexico* (vol. i.); Bernal Diaz del Castillo, *Historia verdadera de la conquista de la Nueva España*.

HERBERT H. SMITH.

Montfaucon, mōn'fō'kōn', BERNARD, de: classical scholar; b. at Soulaye, in Languedoc, Jan. 17, 1655; served for some years in the army, but entered in 1675 the Benedictine congregation of Saint-Maur, devoting himself exclusively to classical studies, inspired by Amyot's famous French translation of Plutarch; traveled in Italy, and settled in 1701 in Paris, where he died Dec. 21, 1741. The first fruits of his extensive learning were new critical editions of several of the Greek Fathers, but his enduring fame rests upon the *Palæographia Græca* (1708), by which he became the founder of scientific palæography. He examined 11,630 MSS. with a view to determine chronological data from the character of the handwriting. Other works are *L'Antiquité expliquée et representée en figures* (French and Latin, 15 vols., 1719–24); *Bibliotheca bibliothecarum MSS. nova* (2 vols. fol., 1739), containing a list of the MSS. examined by him during a period of forty years; *Monuments de la monarchie française* (1729–33, in 5 vols. fol.). Cf. E. de Broglie, *La société de l'abbaye de Saint-Germain* (2 vols., 1891).

Revised by A. GUDEMAN.

Montferrat: formerly an independent duchy of Italy; bounded by Piedmont, Milan, and Genoa; now a part of the Italian province of Turin. From the time of Otto the Great it was governed by margraves or marquises, of whom several became famous as military chiefs, especially in the crusades. Conrad successfully defended Tyre against Saladin in the third crusade, and one of the leaders of the fourth was Bonifacе III. who after the establishment of the Latin Empire of the East (1204) became lord of Thessaly. Montferrat became a duchy in 1574. In 1631 a part of it was ceded to Savoy, which in 1703 secured the remainder.

Montfort, SIMON, de, Earl of Leicester: statesman; b. in France early in the thirteenth century, a son of Simon de Montfort, the vanquisher of the Albigenses. In 1231 his brother, the Count Amaury de Montfort, gave him the honor of Leicester, inherited from his maternal grandmother, an English lady; for this title Simon did homage to Henry III. in 1231, and in 1239 it was formally granted by the king after his marriage with the king's sister; was for many years employed as governor of Gascony, where he conducted many wars with advantage, and twice refused the French regency; in England, unlike most other French adventurers of that period, he took the part of the barons against the king in the wars of Henry III.'s reign; compelled the

king to sign the provisions of Oxford 1258, and in 1262 became the leader of the baronial party; dictated terms at the victory of Lewes 1264; summoned the Parliament of 1265, at which knights of the shire and representatives of the boroughs were admitted—the germ of the future House of Commons; became justiciary of England. Long the virtual master of the realm, he was attacked by Edward, Prince of Wales, at Evesham, and there defeated and slain Aug. 4, 1265.

Montfort, Simon, de, Count, subsequently Count of Toulouse: soldier; b. about 1150; took part in the fourth crusade; was appointed leader by the pope of the crusade against the Albigenses in 1208, and became famous for the unheard-of cruelty with which he suppressed this movement. In 1213 he took Toulouse from Count Raymond, but was afterward driven from the city, and when he returned to besiege it he was killed by a stone thrown from the wall June 25, 1218.

Montgolfier: See Aëronautics.

Montgomery: city (founded in 1817, incorporated in 1837, made State capital in 1847); capital of Alabama and of Montgomery County (for location of county, see map of Alabama, ref. 5–D); on the Alabama river, and the Ala. Mid., the Cent. of Ga., the Louis. and Nash., the Savannah, Amer. and Mont., and the W. of Ala. railways; 180 miles N. E. of Mobile, with which it has steamboat communication all the year. It is built on the bluffs of the river, and is in an agricultural, mineral, and yellow-pine and hard-wood timber region. It contains 35 churches, 7 large cotton-storage warehouses, 3 compresses, 4 ginneries, 8 public-school buildings, an orphanage, a home for widows, U. S. Government building, State Capitol (erected in 1851), 3 national banks with combined capital of $600,000, a State bank with capital of $100,000, and 2 daily, 5 weekly, 3 monthly, and 2 other periodicals. There are gas and electric light plants, electric street-railway, water and sewerage plants (the former supplied from artesian wells), and suburban parks at Riverside and Highland Hill. Extensive deposits of coal and iron are within easy reach by rail and water, and the city is connected with the heart of the timber region by a narrow-gauge railway. The river tonnage of freight averages 500,000 tons annually, and the aggregate business of the city exceeds $40,000,000 in value annually. Besides the industries connected with the cotton, coal, iron, and timber production, there are brick-yards, flour-mills, and carriage and wagon, ice, candy, fertilizer, cigar, soap, paper-box, vinegar, cracker, and other factories. Pop. (1890) 21,883; (1900) 30,346. Editor of "Advertiser."

Montgomery: village; Orange co., N. Y. (for location of county, see map of New York, ref. 7–J); on the Wallkill river, and the Erie and the Wallkill Val. railways; 12 miles W. of Newburg, 70 miles N. by W. of New York city. It is in an agricultural and dairying region, has 4 churches, public union school, and 2 weekly newspapers. Pop. (1890) 1,024; (1900) 973. Editor of "Standard."

Montgomery City: town; Montgomery co., Mo. (for location of county, see map of Missouri, ref. 4–I); on the Wabash Railroad; 84 miles W. of St. Louis. It contains 7 churches, high school, public school, free public library, electric lights, woolen, flour, tobacco, and box factories, 2 State banks, and 2 weekly newspapers. It is in a farming, dairying, and live-stock region, and has valuable quarries in its vicinity. Pop. (1890) 2,199; (1900) 2,026. Editor of "Standard."

Montgomery, Gabriel, Comte de: soldier; b. about 1530; was an officer in the Scotch Guard at Paris. In 1559 he was invited to joust against King Henry II. in the royal tournament, and accidentally drove a splinter of his lance into his antagonist's eye, causing a fatal wound. He then retired for a time to his estates, and afterward traveled in Italy and England. Having turned Protestant, he returned to France and took part in the Huguenot wars, winning distinction by his brave defense of Rouen, and by his successes in Languedoc and Béarn. In 1573 he made an attempt on La Rochelle, but without success. Then, gathering a considerable body of Huguenots, he began war in Normandy, but was captured in the Castle of Domfront and taken to Paris. Despite his captor's promise that his life should be spared he was executed by order of Catherine de Médicis, June 26, 1574.

Montgomery, James: poet; b. at Irvine, Ayrshire, Scotland, Nov. 4, 1771; was the son of a Moravian preacher; was educated at the Fulneck School, Yorkshire, and apprenticed to a grocer, but ran away in 1789, and in 1792 became clerk to Joseph Gales, a famous journalist of Sheffield. Montgomery then founded *The Sheffield Iris*, which he edited thirty-one years, 1794–1825. In 1835 he received a pension, and declined the professorship of Rhetoric at Edinburgh. D. at Sheffield, Apr. 30, 1854. His principal works are *Prison Amusements* (1797), written during an imprisonment for seditious libel; *The West Indies* (1809), an anti-slavery poem; *The World before the Flood* (1813); *Greenland* (1819); *Prose by a Poet, Lectures on Poetry and English Literature* (1830–31); *Original Hymns* (1853).

Montgomery, John Berrien: sailor; b. at Allentown, N. J., Nov. 17, 1794; entered the navy as midshipman 1812; was a midshipman on the flagship Niagara at Perry's victory on Lake Erie, Sept. 10, 1813, receiving a sword and the thanks of Congress; was with Decatur in the naval campaign against Algiers 1815; commanded the Portsmouth on the Pacific coast 1845–48, during which cruise he took possession of Lower California, occupied Guaymas, and blockaded Mazatlan for some months; was commissioned captain 1853; commanded the Pacific squadron 1860–61; made commodore July 16, 1862, and rear-admiral July 25, 1866; commanded the naval station at Sackett's Harbor 1867–69; retired 1869. D. at Carlisle, Pa., Mar. 25, 1873.

Montgomery, Richard: soldier; b. in Swords, near Feltrim, Ireland, Dec. 2, 1736. He was educated at Trinity College, Dublin; entered the English army at the age of eighteen; and in 1757 was ordered to Halifax. He served in various Canadian campaigns, and in 1762 had reached the rank of captain. He also fought in the campaigns against Martinique and Havana, and afterward spent some time in England, where he became intimate with Edmund Burke and Charles James Fox. In 1772 he sold his commission and purchased a farm at King's Bridge, now in New York city, and married Janet, daughter of Robert R. Livingston. In May, 1775, he was sent as a delegate to the First Provincial Congress in New York city, and in June was made brigadier-general in the Continental army. Through the illness of Gen. Schuyler the command of the campaign into Canada devolved upon him. After his successes at St. John, Chambly, and Montreal he was made major-general, Dec. 9. He was killed while leading the attack on Quebec, Dec. 31, 1775. In 1818 his body was removed to New York city and buried in St. Paul's Chapel.

Montgomeryshire: county of North Wales, comprising an area of 797 sq. miles. The surface is mountainous, and the soil, with exception of the valleys of the Severn, Wye, and Dee, not fertile. On the mountain-pastures many sheep are reared, and the county is the chief seat of the Welsh flannel manufacture. Pop. (1901) 54,892. Chief town, Montgomery.

Month [M. Eng. *month*, *moneth* < O. Eng. *mōnð*, *mōnað*: O. H. Germ. *mōnōd* (> Germ. *monat*): Icel. *mānuðr*: Goth. *mēnōþs*; cf. Moon]: a period of time roughly corresponding in length to one revolution of the moon around the earth. The length of a mean lunation is 29d. 12h. 44m. 2·8s. Months were at first therefore reckoned as alternately 29 and 30 days long, twelve lunar months falling short of the length of a year by about 11¼ days. The methods used by different peoples to obviate this disparity, together with the history of our own system, are discussed in the article Calendar (*q. v.*).

Montholon', Charles Tristan, de, Count: soldier; b. in Paris in 1782; entered the army in 1798; distinguished himself in the battle of Wagram 1809; was attached to the personal staff of Napoleon; followed him to St. Helena, and was appointed one of his executors. After 1830 he re-entered the French army; took part in the attempt of Prince Louis Napoleon at Boulogne, and was condemned to twenty years' imprisonment, but regained his liberty after the Revolution of 1848, and became a member of the Legislative Assembly. D. Aug. 24, 1853. In connection with Gen. Gourgaud he published *Mémoires pour servir à l'Histoire de France sous Napoléon, écrits à Sainte-Hélène, sous sa dictée* (8 vols., Paris, 1822–25; 2d ed. 1830); and in 1846 *Récits de ta Captivité de l'Empereur Napoléon à Sainte-Hélène.*

Mon'ti, Vincenzo: poet; b. at Alfonsine, near Ravenna, Italy, Feb. 19, 1754; d. in Milan, Oct. 13, 1828. Studied literature with the poet Onofrio Minzoni in Ferrara, and imitated Varano and Dante; at Rome obtained the position of secretary to Prince Luigi Bracchi, himself secretary of

Pope Pius VI. Inspired by the tragedies of Alfieri, Monti became a tragic poet, and wrote the tragedies *Aristodemo* (1785) and *Galeotto Manfredi*. Basseville, the representative of the French republic, having been assassinated at Rome, Monti, to please the papal court, wrote a poem entitled *Cantica in morte di Ugo Basville*, which gave him great celebrity. This poem was followed by two others, *La Musogonia* and *La Feroniade*, satiric attacks upon the French Revolution and the whole revolutionary movement. On the triumph of Bonaparte, however, Monti sought the protection of the rising genius, and obtained at Milan the post of secretary of the executive directory. Thence he was sent to Bologna as commissioner of the Cisalpine republic. After the Russo-Austrian invasion (1799) he fled to Paris, and there wrote a third tragedy, *Cajo Graccho*; and his *Mascheroniana*, a poem in three cantos, on the death of the mathematician Lorenzo Mascheroni. Returning to Italy after the battle of Marengo, he was appointed professor in the Brera at Milan, and of Italian rhetoric in the University of Pavia. In 1805 Napoleon named him historian of the kingdom of Italy. Then followed certain adulatory but unsuccessful poems—*Il Bardo della selva nera*, *La Spada di Federico*; afterward an indifferent translation of Persius, and an elegant translation of the *Iliad* of Homer. When Napoleon fell (1815), Monti was ready to compose a poem in honor of the Emperor of Austria, Francis I. In the last years of his life he prepared a voluminous *Proposta di alcune correzioni ed aggiunte da farsi al vocabolario della Crusca* (6 vols., Milan, 1817–24). Collected editions of his works appeared in Milan (6 vols., 1839, *seq.*), Florence (5 vols., 1847), Milan (1 vol., 1847). See Vicchi, *Vincenzo Monti, la lettere e la politica in Italia dal 1750 al 1830* (Rome, 1885, *seq.*); also B. Zumbini, *Sulle poesie di Vincenzo Monti* (Florence, 1886). Revised by A. R. Marsh.

Montiano y Luyando, Agustin, de: poet; b. in Valladolid, Spain, Mar. 1, 1697. Educated by an uncle in the island of Majorca, he wrote there a poem, *El robo de Dina*, and a drama, *La lira de Orfeo*, which gave him some repute. In 1727 he went to Madrid, where he had political employment of some importance, and became a member of all the academies, as well as director of the Academy of History. D. in Madrid, Nov. 1, 1764. He is chiefly known for his attempts to regulate and purify the Spanish drama, bringing it under the rules of the French playwrights, particularly Racine. For this purpose he composed two tragedies, *Virginia* (1750) and *Athaulpho* (1753), so rigidly regular as now to be scarcely readable. He had great repute in his day, both in and out of Spain. A. R. Marsh.

Monticello: town; capital of Drew co., Ark. (for location of county, see map of Arkansas, ref. 5–D); on the St. L., Iron Mt. and S. Railway; 85 miles S. by E. of Little Rock, the State capital, 35 miles W. of the Mississippi river. It contains saw and grist mills, and a weekly newspaper. Pop. (1880) 891; (1890) 1,285; (1900) 1,579.

Monticello: town; capital of Jefferson co., Fla. (for location of county, see map of Florida, ref. 2–G); on the Fla. Cent. and Pen. and the Savannah, Fla. and West. railways; 30 miles E. of Tallahassee, 142 miles W. by N. of Jacksonville. It is in a farming and fruit-growing region, and contains 6 churches, 2 public schools, several private schools, and 2 weekly newspapers. Pop. (1890) 1,218; (1900) 1,076.
Editor of "Constitution."

Monticello: city; capital of Piatt co., Ill. (for location of county, see map of Illinois, ref. 6–F); on the Sangamon river, and the Wabash and the Ill. Cent. railways; midway between Chicago and St. Louis. It is in a corn-growing and stock-raising region; contains 5 churches, 3 public-school buildings, water-works, electric lights, and 2 weekly and 2 monthly periodicals; and has steam flour-mill, steam elevator, foundry and machine-shops, planing-mill, harness, broom, and cigar factories, and patent fence and tile works. Pop. (1890) 1,643; (1900) 1,982. Editor of "Bulletin."

Monticello: town (laid out in 1835); capital of White co., Ind. (for location of county, see map of Indiana, ref. 4–C); on the Tippecanoe river, and the Louis., New Alb. and Chi., and the Pitts., Cin., Chi. and St. L. railways; 21 miles W. of Logansport, 25 miles N. of Lafayette. It has 4 churches, 2 public-school buildings, 2 weekly newspapers, electric lights, 3 flour-mills, canning-works, and a hub and spoke factory. The river furnishes excellent water-power. Pop. (1880) 1,193; (1890) 1,518; (1900) 2,107.
Editor of "Herald."

Monticello: city (settled in 1836); Jones co., Ia. (for location of county, see map of Iowa, ref. 4–K); on the Maquoketa river, and the Chi., Mil. and St. P. Railway; 36 miles S. W. of Dubuque, 216 miles W. of Chicago. It is the center of a large dairy region, has extensive creamery interests, manufactures feather dusters, feather trimming, and cigars, and contains 6 churches, high and grammar schools, water-works (supplied from an artesian well), and 2 weekly newspapers. Pop. (1880) 1,877; (1890) 1,938; (1900) 2,104. Editor of "Express."

Monticello: village (founded in 1804, made the county-seat in 1809); capital of Sullivan co., N. Y. (for location of county, see map of New York, ref. 7–I); on the Port Jervis, Mont. and N. Y. Railroad; 24 miles N. of Port Jervis, 40 miles W. by N. of Newburg. Its altitude of about 1,600 feet above sea-level gives it an invigorating, dry atmosphere, and makes it a charming health and pleasure resort. It is in a lumbering region, and has a tannery in which fancy leather for bookbinding and other purposes in the arts is manufactured, an academy, Methodist Episcopal, Presbyterian, Protestant Episcopal, and Roman Catholic churches, and two weekly newspapers. Pop. (1880) 941; (1890) 1,016; (1900) 1,160.
Editor of "Republican-Watchman."

Montmorency, Fr. pron. mōn′mō′raăn′see′: the surname of an ancient and illustrious French family, traced back as far as 950 to Bouchard, Sire de Montmorency, a great French feudatory, nephew of Edred, King of England. The Montmorencies were long known as the premier barons of France, and among those of this name were six grand constables, twelve marshals, four admirals, many cardinals, generals, grand chamberlains, and other high magnates. Belgium and Luxemburg have still several princely and ducal lines of this family. Count Horn and Marshal Luxembourg were both Montmorencies.

Montmorency, Anne, de, First Duke: soldier; b. at Chantilly, Mar. 15, 1492; was one of the leading generals in the wars of Francis I.; gained renown for his gallantry at Marignano and Mézières, and was captured with Francis at Pavia in 1525. On the renewal of the war with Charles V. he commanded with such success that he was appointed by Francis constable of France. In the war with Spain he was defeated and captured at St.-Quentin (1557). During the first Huguenot wars he commanded the royal army. He was taken prisoner at the battle of Dreux (1562), but was soon released. In 1563 he drove the English from Havre, and fought with Condé at Saint-Denis. He was fatally wounded in the latter engagement, and died on the following day, Nov. 11, 1567.—Henry, fourth Duc de Montmoreney, a grandson of the preceding; b. at Chantilly, Apr. 30, 1595; godson of Henry IV., when sixteen years old became admiral of France and Viceroy of Canada. He served with distinction in Italy and against the Huguenots; took part in the rebellion of Gaston of Orleans, and was executed by order of Richelieu at Toulouse Oct. 30, 1632.

Montmorency, Falls of: a beautiful cascade in the Montmorency river, 8 miles N. E. of Quebec. The river rises in Snow Lake, Montmorency County, and flows S. for more than 30 miles, emptying into the St. Lawrence, after being joined by Des Neiges river. About a mile above the precipice of 250 feet, over which the waters take their final leap, are the natural steps, formed by the action of the water on the rock. At the base of the steps or terraces is a narrow, water-worn channel through which the stream rushes as in a mill-race over cascades and through seething pools. Between the falls and the natural steps the river is crossed by a wooden bridge built since the destruction of the beautiful suspension bridge that once spanned the cataract. Montmorency is a favorite resort for visitors to Quebec. In summer the scene is very impressive from the Duke of Kent's lodge, or from the steep stairway on the eastern side. In the winter the freezing spray forms a cone which attains a considerable height, and down this tobogganers slide with great velocity. The road to the falls passes through the straggling village of Beaufort with an asylum and numerous picturesque residences. Beaufort was the headquarters of Montcalm in 1759 when he prevented Wolfe from landing at Montmorency Falls. A railway connects the falls with Quebec. J. M. Harper.

Montpelier: town; Bear Lake co., Ida. (for location of county, see map of Idaho, ref. 11–F); on the Union Pac. Railway; 145 miles N. W. of Green river. It is in an agri-

MONTREAL

Railway Depots.
1. Dalhousie Square, C. P. Ry., 5 E
2. Windsor St., C. P. Ry., C 3
3. Bonaventure, G. T. Ry., C 3

Hotels.
4. Balmoral, D 4
5. Queen's C 3
6. St. Lawrence Hall, D 4
7. Windsor, D 3
7a. Richelieu, E 4

Theatres, etc.
8. Academy of Music, D 3
9. Art Gallery, D 3
10. Cyclorama, E 3
11. Royal Theatre, E 4
12. Queen's Theatre, D 3
13. Sohmer Park, F 5
14. Victoria Skating Rink, D 3

Public Buildings, etc.
15. City Hall, E 4
16. Court House, E 4
17. Post Office, D 4
18. Custom House, D 4
19. Board of Trade, D 4
20. Fraser Institute, D 3
21. Bank of Montreal, E 4
22. Merchants Bank, D 4
23. Y, M. C. A. Building, D 3
24. Nat. Hist. Society's Museum, D 3
25. Archbishop's Palace, D 3
26. Drill Hall, E 4
27. Victoria Armory, D 3
28. Crystal Rink, C 3

Colleges, Hospitals, etc.
29. Mc Gill University, E 2
30. Redpath Museum, D 2
31. Montreal College, C 1
32. High School (Pro.), D 2
33. Victoria Hospital, E 2
34. General Hospital, E 4
35. Western Hospital, B 2
36. Hotel Dieu, F 2
37. Grey Nunnery, C 2
38. Notre Dame Hospital, E 5
39. House of Refuge (Pro.), E 3

Churches.

ROMAN CATHOLIC.
40. Notre Dame de Lourdes, F 4
41. Jesuit's, E 3
42. St. Peter's Cathedral, D 3
43. Notre Dame, D 4
44. St. James', F 4
45. St. Patrick's Cathedral, D 3

EPISCOPAL.
46. Christ Church Cathedral, D 3
47. St. George's, D 3
48. Trinity, E 4
49. Grace, D 4

METHODIST.
50. St. James', D 3
51. St. Charles', E 3
52. West End, B 3

PRESBYTERIAN.
53. St. Andrew's, D 3
54. St. Paul's, D 3
55. American, C 3

BAPTIST.
56. French, E 3
57. Olivet, C 3

CONGREGATIONAL.
58. Calvary, C 3
59. Emmanuel, D 2

SYNAGOGUES.
60. German and Polish, D 3
61. Spanish and Portuguese, D 2

Miscellaneous.
62. Custom Examiners' Warehouse, D 4
63. Harbor Office, D 4
64. Montreal Jail, G 5

Mt. Royal Cemetery
MOUNT ROYAL PARK
Reservoir
Mountain Elevator
Provincial Exhibition Grounds
Race Track
Mount Royal Drive Park
LOGANS PARK
Jacques Cartier Normal School
Stock Yards
Elm Ave.
Cedar Ave.
Macgregor St.
Summerhill Ave.
Simpson St.
Redpath St.
Ontario Ave.
(Redpath Ave.)
Pine Ave.
Park Ave.
Esplanade Ave.
Mitchison St.
St. Lawrence St.
Mount Royal Ave.
Durham St.
Sydenham St.
Western Sq.
Chamber St.
Chomedy St.
Sussex St.
St. Luke St.
St. Mark St.
St. Matthew St.
Seymour Ave.
Fort Rolle St.
Tupper St.
Dorchester St.
Atwater Ave.
St. Antoine St.
Albert St.
St. James St.
Queen St.
Conrad St.
Pulford St.
Camilla St.
Notre Dame St.
Workman St.
Chatham St.
Richmond Square
Richmond St.
Guy St.
Bishop St.
Mackay St.
Crescent St.
Mountain St.
Aqueduct
Osborne St.
Wolfe St.
Cathcart St.
St. Antoine Market
St. James St.
Barre St.
Ottawa St.
Haymarket Square
St. Maurice St.
College St.
William St.
Wellington St.
Wellington Basin
Lachine Canal Basin
Common St.
Queens Basin
Mill St.
McShane St.
Forfar
Conway
Britannia
RACE TRACK
POINT ST. CHARLES
Immigrant Dep.
Covered at High Water
Proposed Guard Pier
Victoria Pier
Military Basin
Victoria Bridge
Covered at High W.
Covered at High W.
RIVER ST. LAWRENCE
TRUE NORTH
VERTE I.
ST. HELEN'S I.
Government Reserve
Park
RONDE I.
Ontario St.
Notre Dame St.
Berri St.
Lagauchetiere St.
Craig St.
Dufferin Square
Victoria Square
Phillips Square
Beaver Hall Hill
Beaver Hall Sq.
Burnside Place
Union Ave.
University St.
Victoria Ave.
Metcalfe St.
Mansfield St.
Peel St.
McGill College Ave.
Drummond St.
Stanley St.
St. Catherine St.
Dorchester St.
Prince Arthur St.
Pine Ave.
Roy St.
Napoleon St.
Rachel St.
Duluth St.
Dufferin St.
Amherst St.
Marie Anne St.
Rivard St.
Mentana St.
Drolet St.
Calixa St.
St. Hubert St.
Maple St.
Champlain St.
Berri St.
Cherrier St.
Sherbrooke St.
Ontario St.
Amity St.
Larivière St.
De Lorimier Ave.
Hochelaga St.
Gale Ave.
Forsyth St.
Richelieu St.
Moreau St.
Desery St.
Iberville St.
Lafontaine St.
Papineau Road
Frontenac St.
Therrien St.
Elm St.
De Lesis St.
Logan St.
Perthuis St.
Fullum St.
Dufferin St.
Poupart St.
Harbour St.
Shaw St.
Wolfe St.
Beaudry St.
Dorchester St.
Lagauchetiere St.
Notre Dame St.
Craig St.
Duford St.
Vitre St.
Mignonne St.
Malsonneuve St.
Visitation St.
Montcalm St.
Jacques Cartier Sq.
St. Antoine St.
St. Elizabeth St.
St. Christopher St.
St. Hubert St.
St. Denis St.
St. Urbain St.
St. Dominique St.
St. Famille St.
St. Monique St.
St. Lawrence St.
Sanguinet St.
Bleury St.
Mance St.
Dorchester St.
Concord St.
Berthelet
Fortier St.
Albina St.
Ernest St.
St. Christophe St.
Bern St.
Ebberbrooke St.
Lette St.
Lusignan St.
Ste. Elizabeth St.
Robin St.
Ontario St.
Craig
Wellington St.
Favard St.
Ash Ave.
Leber St.
Nelson St.
Charron St.
Bourgeois St.
Maclalen St.
Congregation St.
Sebastopol St.
Liverpool St.
Hibernia Rd.
Mullins St.
Grand Trunk St.
Sherrer St.
St. Patrick St.
Richmond St.
Montmorend
Canal St.
Basin St.
Island St.
Lapierre St.
Ste. Rose St.
Charlevoix St.
Grand Trunk Ry.
GRAND TRUNK RY.
CAN. PACIFIC RY.

cultural, dairying, lumbering, and mining region. Pop. (1890) 1,174; (1900) 1,444.

Montpelier: city; capital of the State of Vermont and of Washington County (for location of county, see map of Vermont, ref. 4–C); on the Winooski or Onion river, here crossed by a stone bridge, and on the Mont. and Wells River and the Cent. Vt. railways; 40 miles S. E. of Burlington, 205 miles N. N. W. of Boston. It is in an agricultural and granite region, is the commercial center of a large territory, and has an extensive trade. It contains 6 churches, the Vermont Methodist Seminary (chartered in 1833), the Washington County Grammar and two Montpelier Union Schools, electric-light, gas, and water plants, 7 libraries containing nearly 100,000 volumes, an educational, 3 weekly, and 2 monthly periodicals, and 2 national banks with a combined capital of $400,000, and two savings-banks and a trust company, with capital of $150,000, two fire and one life insurance company, the assets of the latter being

State Capitol, Montpelier, Vt..

nearly $20,000,000. The town was made the State capital in 1805, and contains a Capitol built of granite, with a frontage of 177 feet and a dome and cupola 56 feet high, surmounted by a statue of Agriculture, 120 feet above the ground. The principal industry is the quarrying of the celebrated Barre granite; other industries are the manufacture of sawmill, candy-making, and other machinery, leather, organ and piano springs, and clothes-wringers and washing-machines. Pop. (1880) 3,219; (1890) 4,160; (1901) 7,157.

EDITOR OF "THE ARGUS."

Montpellier, mōn'pel'i-ā': capital of the department of Hérault, France; on the Lez; 6 miles N. of the Mediterranean and 76 miles W. N. W. of Marseilles (see map of France, ref. 8-G). Its promenades afford the most splendid views of the Mediterranean, the Pyrenees, and the Alps; and as its climate is remarkably mild and salubrious, its vicinity is covered with villas and cottages. Remarkable among its buildings are the cathedral and the aqueduct, and among its institutions its medical school, founded in the Middle Ages by Arabian physicians and in 1289 incorporated with its schools of law and arts as a university; a botanical garden, the first established in France, and many excellent collections, are connected with the school. Montpellier has large distilleries and manufactures of woolens and cottons, and it carries on an important trade in wine, olive oil, fruits, and grain. Pop. (1896) 73,931.

Montpensier, mōn'paŋ'si-ā', ANNE MARIE LOUISE D'ORLÉANS, Duchesse de (better known by her courtesy title of Grande Mademoiselle); niece of Louis XIII.; b. in Paris, May 29, 1627. Being of royal blood and having enormous wealth, she was encouraged to look forward to the French throne through a marriage with Louis XIV., but was disappointed in this and in other plans for a brilliant match, and, attributing her misfortunes to Mazarin, favored the rebellious movement known as the Fronde. In the ensuing war she played a bold and masculine part. In 1652, at the time of the fighting in the city, she held the Bastile and saved her defeated party by opening the gates and ordering the cannon to be directed against the royalists; and during the riots that followed she occupied the Hôtel de Ville and tried to mediate between the combatants. After this she was for some time in disgrace, but returned to the court in 1657, apparently restored to favor. About this time she fell in love with LAUZUN (*q. v.*), and in 1670 she sought the royal permission to marry him. The king's consent was at first given and then withdrawn at the instance of other members of the royal family. Lauzun passed ten years in prison, but after his release in 1681 Mademoiselle and he were secretly married. The union was unhappy and they soon separated, after which she devoted herself to religious duties and to the completion of her *Mémoires*. D. Apr. 9, 1693. The *Mémoires* were first published at Amsterdam in 1729; edited and republished by M. Chéruel in 1858. See Voltaire's *Siècle de Louis XIV.*

F. M. COLBY.

Montpensier, ANTOINE MARIE PHILIPPE LOUIS D'ORLÉANS, Duke of: the fifth and youngest son of Louis Philippe, King of the French; b. at Neuilly, July 31, 1824; was educated at the Collège Henri IV., and in 1842 was appointed *sous-lieutenant* of artillery; took part in several campaigns in Africa, won the grand cross of the Legion of Honor, and rose to the rank of brigadier-general in 1846. At this period the negotiations took place by which the duke was betrothed to the sister of the Queen of Spain. These alliances and the famous "Spanish marriages" produced a great sensation in France and dissatisfaction elsewhere, especially in England. After his marriage, Oct. 10, 1846, he took up his residence at the palace of the Tuileries, whence he was driven in 1848 by the revolution which dethroned the king. He finally fixed his residence, with the duchess, in the palace of San Telmo at Seville. Besides honorary appointments, he was made by Queen Isabella, in 1858, captain-general of the Spanish army, and in 1859 she conceded to him the honors due to "infants" of Spain. This cordiality was disturbed by political troubles accumulating about the queen's government, and by his alleged ambition to succeed to the Spanish throne. After the dethronement of the queen (Sept., 1868) his claims were pressed by his friends, but he was not successful. The most marked event of this period is his quarrel with his cousin, who spoke of him in bitter and insulting terms. A duel ensued and Montpensier killed his adversary, Duc Henrique. The duke and his family lived for some years in Paris. D. in Andalusia, Feb. 4, 1890.

Montreal [literally, Mount Royal]: city; province of Quebec, Canada; ranking first in the Dominion in population, wealth, commercial importance, and political influence (see map of Province of Quebec, ref. 5–B). It occupies a commanding position at the highest point of ocean navigation, and the beginning of a vast system of railways and canals that ramifies throughout Canada. The city has grown up along the southeast side of an island formed by the junction of the Ottawa river with the St. Lawrence, the older portion lying upon the slope of a hill, known as The Mountain, whose crest has been reserved for a public park, the newer parts of the city spreading out at the east and west ends upon more level ground. The general direction is northeast by southwest, and with the broad river in front and the richly wooded Mountain behind, Montreal presents a most picturesque and pleasing appearance from any point of view.

Area and General Plan.—The length of the city is about 6 miles, and the breadth at its widest part over 2 miles. The main avenues run parallel with the river, and the cross streets at right angles to it. Upon the whole, the street plan is regular, although in the older wards there are many narrow, tortuous streets. The alley system is in use in the newer residence quarters. The business part of the city is closely built up with lofty and substantial warehouses and office buildings. In the residence quarter the streets are broad, well shaded with trees, and lined with handsome stone dwellings, brick and wood being very little used. There are many open squares scattered through the city, and the principal ones, such as Dominion Square, Victoria Square, Place Viger, and St. Louis Square, are adorned with ponds, fountains, and flowers. The Mountain Park comprises nearly 500 acres, and is beautifully laid out and carefully maintained.

Important Public Buildings.—The principal public buildings are the court-house and the city-hall, both large blocks of gray limestone; the Windsor and Place Viger Hotels, the former one of the world's most noted; the Bonsecours market; the exhibition buildings, where the provincial exhibition is held annually; the drill hall and armory, one of the largest in Canada; the Windsor Street, Place Viger, and Bonaventure railway stations; and the federal buildings, such as the custom-house, post-office, etc.

Institutions.—In institutions of all kinds Montreal is exceptionally rich. Within the bounds of the city are the grandest ecclesiastical edifices, the best-equipped and most largely attended university, the richest Catholic convents and monasteries, the finest public schools, the most perfectly appointed public hospitals, and the most costly and luxurious clubs in Canada. The chief church buildings are the new St. James's Cathedral (Roman Catholic), modeled after St. Peter's at Rome on a scale of one-half; Church of Notre Dame, in one of whose lofty twin-towers hangs the largest bell in America; St. James's (Methodist), the most splendid Protestant church in Canada; Christ Church Cathedral (Episcopal), a beautiful specimen of Gothic architecture; the Jesuit church, notable for its fine frescoes; and St. Paul's and Crescent churches, both Presbyterian. The public-school buildings are principally of the modern type, the new high-school building being the largest in the Dominion. There are five hospitals, the Royal Victoria, presented by Lord Mount-Stephen and Sir Donald Smith at a cost of several millions of dollars; the Montreal General, opened in 1822; the Hôtel Dieu, a large and useful Roman Catholic institution; the Notre Dame; and the Western Hospital. As an educational center Montreal takes high rank, the most important institution being McGill University, founded in 1813. The University of Bishops College has its medical department in Montreal, and there are many important French institutions, such as the branch of Laval, the Seminary of St. Sulpice, St. Mary's College, and the convent of Ville Marie. There is one free library, the Fraser Institute, with 40,000 volumes. Other good libraries are the Redpath of McGill University with 35,000 volumes, the Law Library with 15,000, the Mechanics' Institute with 12,000, and the Union Catholique with 20,000. The only museum of note is that attached to McGill University. In the galleries of the Art Association there is a choice collection of paintings.

Government, Finance, etc.—The municipal affairs are administered by a mayor and corporation elected by popular vote, the city being divided into wards, each represented by two or more aldermen. The annual revenue is about $3,049,000, and is usually exceeded by the expenditure, with the result that a debt exceeding $27,000,000 has been incurred. The total valuation of real estate liable to assessment is $152,000,000; the religious, school, and other property exempt from taxation is $36,300,000; and the rate of taxation $1.25 per $100.

Business Interests.—As a manufacturing center Montreal stands sixteenth on the list of American cities. In 1891 the number of establishments was 1,735; capital invested, $51,212,133; number of persons employed, 38,562; total wages paid, $13,078,546; and the value of products, $52,509,710. The principal products were sugar, cotton, flour, malt liquors, tobacco and cigars, and iron and steel goods. The city is the chief distributing point for the commerce of the Dominion. It contains the largest wholesale houses, the leading banks and other financial institutions, and the headquarters of the two great railway systems, the Canadian Pacific and the Grand Trunk. Situated at the head of ocean navigation in the summer season, and having Boston and Portland as winter ports when the St. Lawrence is closed, it holds the key to the commercial movement the year round. In 1900 the imports aggregated in value $68,550,993; the exports, $65,344,197; the customs dues paid, $9,136,377. The arrivals of seagoing vessels were 415, and during the year about 2,739 inland vessels, with aggregate tonnage of 731,596, were in the port. The first bank was established in 1817, and named after the city. It has a capital of $12,000,000 and a reserve fund of $6,000,000. In 1900 the total capital of the banks was $30,000,000, the deposits $121,191,306, the circulation $15,580,312, and the discounts $96,545,963.

History, Antiquities, etc.—When the first town was built upon the island can not be known. As early as 1535 Jacques Cartier found a strong settlement of Hochelaga or Beaver Indians, who were active traders, and whose influence extended far up the Ottawa and down to the Gulf of St. Lawrence; but when in 1603 Champlain visited the place, the Indian town had vanished and desolation prevailed. Eight years later, when he decided to establish an entrepôt for trade he chose the same location, and built Place Royale, the site of the present Custom-house Square. Until 1642 Place Royale continued to be merely a trading station, but on May 18 of that year the city was formally founded by Maisonneuve. The original purpose was mainly to Christianize the Indians therefrom, the Ottawa river furnishing ready passage to the Great Lakes among friendly savages. The first charter therefore prevented the company by whom the enterprise was carried out from engaging in the fur trade, but so favorable was the site for commercial purposes that Montreal shortly became an important center of traffic in spite of the endeavors of the authorities of Quebec to prevent it. In 1663 the company of Montreal got into financial difficulties, and transferred its possessions to the Sulpicians. Three years before that a young officer of the garrison, Adam Doulac, Sieur des Ormeaux, with a handful of companions had, by a most heroic sacrifice, saved Canada from the Iroquois, meeting their invading force at the Long Sault Rapids, and holding it at bay for five days until he and all his companions were slain, when the Indians withdrew disheartened by the stubborn defense. In 1689 the Iroquois fell upon Lachine, at the upper end of the island, and massacred 400 inhabitants. The early days of the city were full of warfare with the Indians, varied by more civilized but scarcely less bitter diplomatic strife between the religious and civil authorities at Montreal and Quebec. Notwithstanding many restrictions in favor of Quebec, Montreal outstripped her. The peltry-trade was her chief support, and this grew to immense proportions, until the glut of beaver-skins brought ruin upon many connected with the business, and it had to be reorganized upon a sounder basis. In 1741 the fortifications of the city, begun in 1717, were completed. They consisted of solid masonry with a deep ditch, and had thirteen bastions. Seven gates gave admittance within the walls. Nothing of these now remain, the growth of the city having long since compelled their demolition. It was to Montreal that Gov. de Vaudreuil retreated after Montcalm's defeat by Wolfe at Quebec, and there was signed the capitulation of New France. On Sept. 7, 1760, the entry of the British troops marked the beginning of a new era.

During the war between the North American colonies and Great Britain, in Nov., 1775, Maj.-Gen. Richard Montgomery, leader of a division of the Continental army, invaded Canada, and captured Montreal. He set out thence to join Arnold at Quebec, where their joint forces suffered defeat and Montgomery was slain. Since then, with the exception of the excitement connected with the rebellion of 1837, the history of Montreal has been that of ever-increasing growth and prosperity, varied by occasional incidents of note, such as the epidemic of Asiatic cholera in 1832, the epidemic of ship-fever in 1847, the burning of the Parliament building by a mob in 1847, the great fire of 1852, the opening of the Victoria bridge by the Prince of Wales in 1859, the great flood of 1861, the Orange riots of 1877, the smallpox riots of 1885, etc. The population of the city in 1891 was 216,650, an increase of 61,413 since 1881. Including the surrounding municipalities, which practically form parts of the city, the total population is now about 380,000. Two-thirds the inhabitants are French-Canadians, the other portion being principally English, Scotch, and Irish. PERCY ST. CLAIR HAMILTON.

Montreal d'Albino: See FRA MOREALE.

Montrose': town; in the county of Forfar, Scotland; on the South Esk (see map of Scotland, ref. 9–J). It has a good harbor, lined with wet and dry docks and handsome quays; its bleaching-works, flax-spinning mills, and manufactures of linens are important, and it carries on some ship-building and a considerable trade. Pop. (1891) 13,048.

Montrose': town; capital of Montrose co., Col. (for location of county, see map of Colorado, ref. 4–B): on the Denver and Rio Gr. Railroad; 353 miles S. W. of Denver. It is in a farming, fruit-growing, and stock-raising region, and has a bi-monthly and two weekly newspapers. Pop. (1880) not in census; (1890) 1,330; (1900) 1,217.

Montrose: borough; capital of Susquehanna co., Pa. (for location of county, see map of Pennsylvania, ref. 2–H): on the Del., Lack. and West. and the Montrose railways: 8 miles W. of Alfred Station, 165 miles N. by W. of Philadelphia. It is in an agricultural region, nearly 2,000 feet above sea-level, is a popular summer resort, and has three weekly newspapers. Pop. (1880) 1,722; (1890) 1,735; (1900) 1,827. EDITOR OF "DEMOCRAT."

Montrose, JAMES GRAHAM, First Marquis of; soldier; b. at the family estate of Montrose, Scotland, in 1612; was educated at the University of St. Andrews; traveled in Italy and France; returned home in 1637, and joined the Covenanters, as it is said, on account of the cold reception Charles I. had given him. After some successes against the royalists, Montrose was won over to the king's side in 1639. He was created a marquis, and in 1644 he gathered an army of about 5,000 men, partly Irish mercenaries and partly

Highlanders, who followed him from hatred of the Campbells. With this army he made a most successful campaign, defeated the Covenanters several times with great slaughter, and took several towns, which were given up to plunder and massacre; but on Sept. 13, 1645, he was defeated at Philiphaugh by David Lesley; in July, 1646, he capitulated at Middleton, and soon after left Scotland for the Continent. Having been authorized by Charles I., and afterward by Charles II., to raise a force and invade Scotland, he traveled from Austria to the Scandinavian kingdoms, busy in the king's interest. In Mar., 1650, he landed at the Orkneys with a small force, but having gone as far to the S. as the border of Ross-shire, his army was scattered, and he himself taken prisoner, condemned to death as a traitor against the Covenant, and hanged at Edinburgh, May 21, 1650.

Monts, mōn, Pierre du Guast, de, Sieur: explorer; b. in Saintonge, France, about 1560, of an Italian Catholic family; became a Protestant, and attached himself to the fortunes of Henry IV., by whom he was given a high post in the royal household. He had already made a voyage to Canada with Chauvin, when in 1603 the king appointed him director of the Canadian Company, to which he granted, under the name of Acadia, the region between lat. 40° and 46° N. De Monts fitted out a considerable expedition; took Samuel Champlain, Poutrincourt, Biencourt, and Pontgravé as his chief officers; sailed from Havre Mar. 7, 1604; explored the Bay of Fundy; discovered Annapolis harbor and the river St. John, which he ascended; visited the St. Lawrence, and returned to France in October, while his colony established itself at Port Royal (now Annapolis) under Poutrincourt. On his arrival at court de Monts found his monopoly ended; various other grants were made to different individuals, and he failed to obtain indemnification. He dispatched a vessel in command of Lescarbot to the relief of Poutrincourt Mar., 1606; dispatched Champlain and Pontgravé on a new voyage to the St. Lawrence 1607; sent them other vessels 1608, by the aid of which Quebec was founded. On the death of Henry, in 1610, de Monts lost favor at court. D. in Paris in 1611.

Montserrat, mont-ser-răt': an island of the British West Indies, forming part of the Leeward islands colony; crossed by lat. 16° 42′ N., lon. 62° 13′ W. Area, 32 sq. miles. Pop. (1891) 11,672. It is 34 miles N. W. of Guadeloupe and 29 miles S. E. of Nevis; between it and Nevis is the little island of Redonda. Like most of the Caribbean islands, Montserrat is mountainous and of volcanic origin. It has a crater, the Soufrière, which is now quiescent, though emitting fumes of sulphur. The highest peak is about 3,000 feet above sea-level. The principal products are sugar, rum, and tropical fruits; the latter, especially limes, are now exported in large quantities. The only town is Plymouth (pop. 1,475). Montserrat was first colonized by the English in 1632, but was held by the French 1664–68 and 1782–84. H. H. Smith.

Montt, Jorge: naval officer and politician; son of Manuel Montt, statesman; b. at Santiago, Chili, 1847. He was a captain in the navy when, in the latter part of 1890, the Chilian congress began its resistance to President Balmaceda. When (Jan. 6, 1891) the congressional leaders proclaimed a revolution, Montt was given provisional command of the naval and land forces. Soon after the death, by suicide, of Balmaceda (Sept. 19) Montt was proclaimed provisional president, and was regularly elected to the office Nov. 6, 1891, for a term of five years. H. H. S.

Montt, Manuel: statesman; b. at Petorca, Chili, Sept. 5, 1809. He was educated in the National Institute at Santiago, and for a time was a professor there, but was soon appointed to government offices; entered actively into politics, and became leader of the conservatives. In 1841 he was president of the Chamber of Deputies, Minister of Justice 1841–45, and of the Interior 1846–48; and in 1851 he was elected president of Chili, assuming office Sept. 1; by reelection in 1856 he retained the office until Sept. 1, 1861. During this period the country was, in the main, very prosperous, and many material improvements were instituted; but the extreme conservative policy of President Montt and his principal minister, Varas, caused great discontent among the liberals. Immediately after his inauguration in 1851 a formidable revolt broke out, and it was put down only after several months of hard fighting. In 1858 there were fresh disorders, culminating in a fierce civil war and several sanguinary battles in 1859; but in this case also the revolutionists were beaten, and many of the most prominent men in Chili were banished. President Montt turned over his office peacefully to his successor, Perez, and subsequently he was president of the Supreme Court. Montt and Varas were the founders of the extreme conservative party, now known in Chilian politics as the Montt-Varistas. D. at Santiago, Sept. 20, 1880. H. H. Smith.

Monument: a commemorative structure, as a building erected or a stone set up in memory of an important event or in honor of a famous man; by extension, any important building, perhaps in the sense that such a building commemorates the past. Monuments proper, that is, structures put up in memory of something or somebody, are of all sizes and kinds, from the small churchyard cross to the Great Pyramid. The last-named mass of stone is generally admitted to have served as a tomb at last if not at first, and the other pyramids of Egypt are tombs and nothing else. The great Sphinx, however, is a monument of a different kind, erected in honor of a divinity, or a system of worship and devotion. It is a human-headed lion, cut out of the living granite rock, and of gigantic size, and is probably the oldest monument of which any considerable remains exist.

Among the Greeks one very curious species of monuments existed—those which commemorated the triumphs of the *choregi*, or leaders and organizers of the Dionysiae musical festivals. A bronze tripod was commonly the prize at such a contest, and the winner would erect a pillar or a small edifice upon the top of which his prize would be displayed. The very beautiful circular building in Athens known as the Monument of Lysicrates was one of these *choragic* monuments. Greek tombal monuments are also of great interest. (For these and the great Roman structures made into fortresses in the Middle Ages, see Tombs.) The Roman monuments erected in honor of a great event or of a living man deserve special notice. See Arch for the best-known type of such monuments.

Columns.—The huge and very richly adorned columns of Trajan and of M. Aurelius at Rome, and the smaller and much less elaborate pillars set up in Alexandria in Diocletian's time, and in the Roman Forum in Phocais's time, are original examples of a style of monument which has prevailed over all the European world in modern times. The London monument of Fish Street Hill, in commemoration of the great fire of 1666; the Nelson column in Trafalgar Square; the Napoleon column of the Place Vendôme in Paris, and that in memory of the Revolution of 1830 in the Place de la Bastile; the Washington Monument in Baltimore, and the pillar of Alexander I. at St. Petersburg, are well-known instances of this form. Trajan's campaigns are sculptured in long panoramic display on the spiral band which adorns his shaft, and the galleries of his basilica may have afforded a better chance for the study of these than could be had by those standing on the pavement below; but the copies of this great original are without its advantages, and are generally devoid of anything worth looking at with care, the Antonine column of the second century and the Napoleonic one of the nineteenth century being cold readjustments of the great original plan. Obelisks, as the Roman world understood them, and as the modern world takes them over from Rome, are monuments of a sort very nearly akin to the columns. To the Egyptian builder an obelisk was not an independent erection; many obelisks were brought by the imperial officers to Rome, and from Rome one of these wandered on to Paris, where it stands in the Place de la Concorde. To a strict definition of the word monument these, in their new homes, hardly conform; they are now decorative objects, the adornments of public places, and little more.

The truly characteristic monument of modern times is the memorial chapel, the memorial hospital, the college hall, or the special library named after the man or the event commemorated. Such foundations as these, if they take on a decorative character in some part of the buildings which house them, are monuments in every sense of the word. They can not, however, replace altogether the purely decorative structure, the colossal statue like Schwanthaler's *Bavaria* at Munich and Bartholdi's *Liberty* in New York harbor, the equestrian group, the pedestal crowned by a portrait-statue, the emblematic or allegorical composition in sculpture. For mention of some of these works of art, see Sculpture. Russell Sturgis.

Mon'za: town; in the province of Milan, Italy; on the Lambro; about 10 miles N. N. E. of the city of Milan (see map of Italy, ref. 2–C). It is a favorite summer and autumn retreat, and the Crown Prince and Princess of Italy gener-

ally pass a part of each year at the royal palace, situated in a beautiful park. Monza, though for a time the royal residence of the great Theodoric, is best known as the capital of the old Lombard kings, and especially as the favored seat of the renowned Theodolinda, who adorned it with magnificent buildings. Very interesting memorials of this queen are still preserved in the cathedral; also the famous iron crown, so long used for the coronation of the Kings of Lombardy. The history of Monza is intimately connected with that of Milan. Pop. about 18,000.

Moody, Dwight Lyman: evangelist; b. in Northfield, Franklin co., Mass., Feb. 5, 1837; received a meager education; worked on a farm till he was seventeen, when he became clerk in a boot and shoe store in Boston; joined a Congregational church soon after, and in 1856 went to Chicago, where he engaged zealously in missionary work among the poor classes; in less than a year he built up a Sunday-school which numbered over 1,000 children. He was in the service of the Christian Commission during the civil war, and subsequently became city missionary of the Young Men's Christian Association of Chicago; a church was built for his converts, and he became its unordained pastor; in the Chicago fire of 1871 the church and Moody's house and furniture, which had been given him, were destroyed, but a new church was erected in its place. In 1873, accompanied by Ira D. Sankey, Moody went to Europe, and held religious revivals at Edinburgh, Glasgow, Dublin, London, and other cities of Great Britain; in 1875 they returned to the U. S., and held large meetings in various cities. Moody afterward continued his evangelistic labors in the U. S. and in Great Britain. He established four schools, three at his native town of Northfield, Mass., and one at Chicago. Two of the Northfield schools are academies fitting students for college, the third is a woman's training-school, while the Chicago institution is for biblical instruction. Among his published works are *Arrows and Anecdotes* (1877); *Heaven* (1880); *Secret Power* (1881); *The Way to God* (1884); *Bible Characters* (1888), etc., and several collections of sermons. D. Dec. 22, 1899.

Mooltan, India: See Multan.

Moon [M. Eng. *mone* < O. Eng. *mōna*: O. H. Germ. *māno* (> Germ. *mond*): Goth. *mēna* < Teuton. *mēna*: Lat. *men-sis*, month: Gr. *μήνη*, moon, *μήν*, month: Sanskr. *mās*, moon]: the satellite of the earth, bearing the same relation to it that the satellites of other planets do to their primaries. In size and mass, however, it differs much less from its primary than do any of the other satellites, its diameter being more than one-fourth that of the earth, and its mass nearly one-eightieth.

The following particulars relate to the size and motion of the moon:

Greatest distance from earth's center...	252,600 miles.
Least distance from earth's center.....	221,700 "
Least distance from earth's surface.....	217,740 "
Diameter of moon.....	2,161 "
Mean interval from one new moon to the next, called a lunation	29d. 12h. 44m. 2·8s.
Density (that of the earth = 1).....	0·605
Gravity at the surface (earth = 1).....	0·165

If the mean density of the moon were the same as that of the earth its mass would be in proportion to its volume, or about one-fiftieth. The difference in density does not necessarily prove that the moon is composed of materially different substances from the earth; it may arise from the fact that the pressure in the interior is much less than in the interior of the earth. The force of gravity at the moon's surface is about one-sixth that at the earth's surface. Thus an ordinary man would weigh but 25 or 30 lb., and could jump over a stile several yards high.

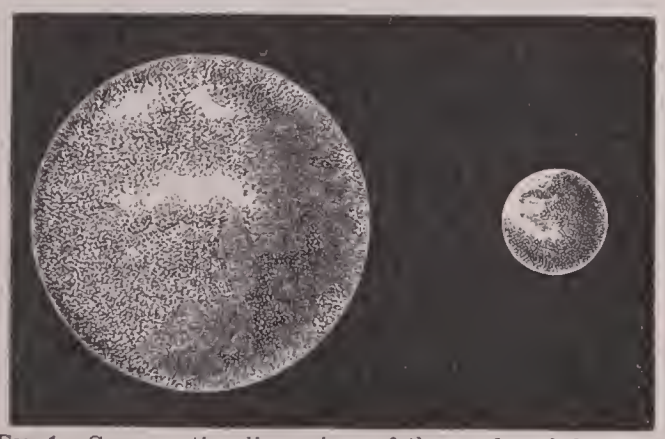


Fig. 1.—Comparative dimensions of the earth and the moon.

Phases of the Moon.—A careful study of the changes which the moon goes through in the course of a month shows that it is a dark globe, shining by the light of the sun, and revolving round the earth at a distance much less than that of the sun. When this globe first emerges from the sun's rays the hemisphere turned toward the earth is all in darkness, except a bright border on one side, which we see illuminated. This gives the form of a crescent, which one can easily reproduce by looking at a globe illuminated by a candle nearly on the opposite side of it. It will frequently be noticed, however, that when the moon is a crescent her whole globe is visible, shining with a faint, ashy light. This appearance, sometimes called "the old moon in the new moon's arms," is evidently due to the light reflected from the earth upon the dark hemisphere of the moon. When the moon, moving through one-fourth of a revolution from the sun, is in the first quarter, the hemisphere turned toward the earth is one-half illuminated and one-half dark. The globe then presents the familiar appearance of a semicircle. As it moves around into the position of full moon, or opposite the sun, the entire hemisphere turned toward us is illuminated. During the second half of the revolution the same phases are repeated in reverse order.

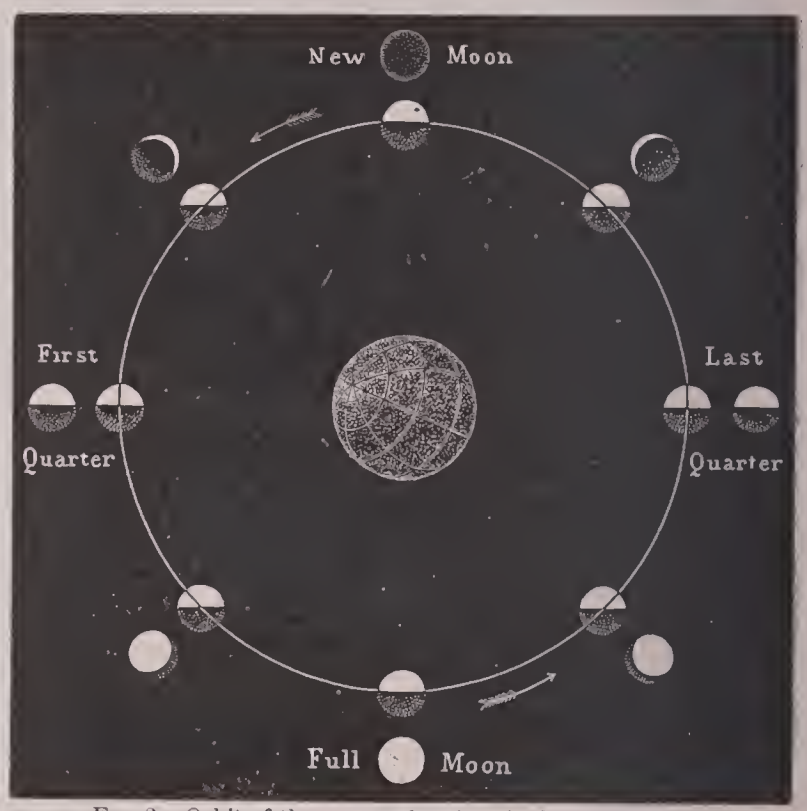


Fig. 2.—Orbit of the moon, showing the lunar phases.

Sidereal and Synodic Revolutions of the Moon.—When the moon, after passing a star, completes a revolution so as to come back to the same star, it is said to make a sidereal revolution. The time required for this is 27d. 7h. 43m. (See Acceleration.) If the sun were apparently fixed among the stars, this would also be the period from one new moon to another; but, owing to the earth's revolution around the sun, the latter appears to describe a complete revolution among the stars in the course of a year. Hence if we suppose the moon to begin a sidereal revolution at the moment when she is in conjunction with the sun, we shall find that after completing such a revolution the sun has moved away from that point about 27°. Therefore the moon must

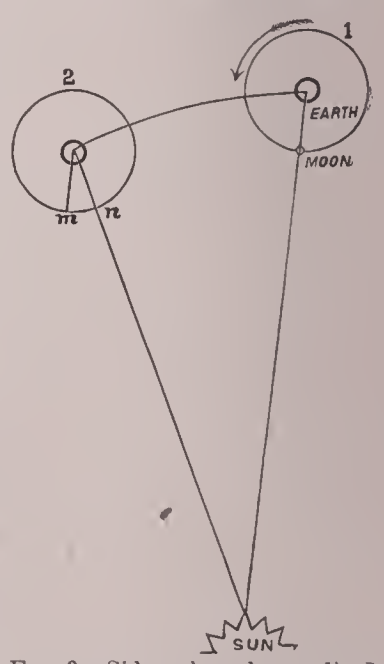


Fig. 3.—Sidereal and synodical revolutions of the moon.

overtake the sun (i. e. travel farther, the distance *m* to *n*, Fig. 3) before new moon can again occur. This requires two days and five hours, so that the synodic revolution, or the period between one new moon and the next, requires more than twenty-nine days and twelve hours.

Rotation of the Moon.—Long before the telescope was invented it was evident to careful observers that the moon always presented the same face to the earth. It therefore rotates on its axis in the same time that it revolves around the earth. It is often supposed that, presenting always the same face toward the earth, it can have no rotation at all, and a great deal has been written to explain the fallacy of this notion. The explanation turns upon what we should mean by saying the moon had no rotation. In scientific language a body is said to have no rotation when any line passing through its center and in a fixed position relative to its surface always points in the same direction. Now, as the moon revolves around the earth, the earth must appear from the moon in different directions from time to time, and seem to an observer on the moon to make a complete revolution around it in one month. Hence if the moon did not rotate at all it would appear to an observer on the earth to make one rotation on its axis, because as it moved around the earth he would see all sides of it in succession; but in order to turn the same face always toward the earth it must turn around on its axis exactly as fast as it revolves around the earth and in the same direction.

FIG. 4.—The full moon.

From this correspondence between the rotation and revolution of the moon, it follows that the latter is not a perfect globe, but is slightly elongated in the direction of the earth. Without such an elongation the correspondence of the two motions would not be kept up forever, because in the course of ages the moon moving sometimes a little faster and sometimes a little slower would present different faces toward the earth. The deviation from the spherical form is, however, so slight as to be unmeasurable with our instruments.

Libration of the Moon.—The rotation of the moon on its axis is nearly uniform, while in its motion around the earth it moves faster when near perigee than when near apogee. Its latitude also varies from time to time. In consequence of these inequalities the globe seems, to telescopic vision, to vibrate back and forth through a very small amount from time to time. This vibration is called the libration of the moon. In consequence of it about $\frac{57}{100}$ths of the moon's surface may be seen at one time or another. The remaining portions are forever hidden from human eyes.

Telescopic Appearance of the Moon.—Seen through a small telescope at the proper time the moon is the most beautiful and striking object in the heavens. To see it to the best advantage we must not choose the time of full moon, which people are apt to do, but rather the first quarter, or even two or three days before the first quarter, when the form of the illuminated portion is still a crescent. The moon presents the most beautiful appearance when viewed through a small telescope 3 or 4 inches in diameter, though to see the smallest details of the surface a large telescope is necessary. Under the most favorable circumstances the moon does not seem flat, as to the naked eye, but the globular form is very evident. The general effect is that of chased silver or gold. The delicacy with which the surface seems to be worked, when viewed in the way we have described, is exquisite; the highest art of the goldsmith could only imitate it. With higher telescopic powers features of a very remarkable character are brought out on the lunar surface. When Galileo first viewed this luminary through his small and imperfect telescope he is said to have considered that the moon had land and water, like our globe; but careful study shows that the surface is totally unlike that of our earth. No liquid is visible upon it. There is no evidence of any atmosphere; if one exists at all it is so rare as to be totally inappreciable. In consequence, there is no vegetation, no life, and, so far as we can observe, no change of any sort. We might describe the moon as a place where

FIG. 5.—Last quarter of the moon.

nothing ever happens. No sound ever breaks the eternal silence; every object, large and small, stays where it was placed long ages ago; and doubtless our remotest posterity will see the moon just as we see it to-day. The surface is indeed very rough, and the mountains are about as high as on our earth; but these lunar mountains are totally different in shape from our earthly ranges of hills. They have the appearance of extinct volcanic cones and walled plains, in the center of which a smaller cone can frequently be seen. The whole aspect suggests volcanic action at some former period, but nothing like an active volcano has ever been seen. With a telescope of low power small regions will seem to be smooth, but when we look through one of sufficiently high power, cavities, furrows, and lumps are visible almost everywhere. Long, deep rills, or clefts, are quite numerous; and perhaps the most extraordinary features, which can almost be seen with the naked eye, are long white streaks which extend from some of the prominent mountains through distances of several hundred miles.

Telescopic and Photographic Study of the Moon.—Though the moon is much the nearest of the heavenly bodies, yet, even on the moon, an object would have to be about 50 miles in diameter to be clearly visible to the naked eye. No minute details can therefore be seen except with a telescope. A telescope magnifying a hundred times would make visible an object half a mile in diameter, and higher magnifying powers would show yet smaller objects, but not in proportion to the power. When we use powers of several hundred times all the indistinctness caused by the air and the imperfections of the glass are magnified in the same degree, so that we at last reach a point beyond which no increase of power will help the vision. It may be questioned whether a power of more than 1,000 can be used with advantage in viewing the moon even with the great Lick telescope of California.

The photographing of the moon has in recent years been practiced with great success. The lunar photographs of Rutherfurd and Draper, of New York, were justly celebrated in their time. The fine air of the locality in which the Lick Observatory is situated and the splendid equipment of that institution have been utilized for photographing the face of our satellite on a scale and with a minuteness never before reached. It is proposed, with the aid of these photographs, to make a map of the moon showing the configuration of its surface with the utmost detail. S. NEWCOMB.

Moon Alphabet: See Blind, Education of the.

Mooney, James: ethnologist; b. at Richmond, Ind., of Irish parentage, in 1861; began the study of Indian ethnology as a boy of twelve, starting in an endeavor to make a geographic list of all the tribes of North and South America, and steadily prosecuted this purpose, which soon widened in scope. After leaving school he learned the printer's trade, and worked at it six years. In 1885 he went to Washington, where his work secured the recognition of the Bureau of Ethnology, his list of tribes, then numbering nearly 3,000, being taken as the basis of a *Dictionary of Tribal Synonyms*. Soon after this he began researches among the Cherokees. In the course of this investigation he discovered and secured the whole secret ritual of their priesthood, the most complete collection yet obtained from any tribe. Later he began collecting materials relating to the ethnology of the South Atlantic tribes. In 1890 he was commissioned to study the ghost-dance among the wild tribes in the West; soon after he was commissioned to work among the Kiowas, and made an extensive collection for the World's Columbian Exposition, together with an ethnologic study of the tribe. His principal publications are *Medical Mythology of Ireland* (1887); *Funeral Customs of Ireland* (1888); *Holiday Customs of Ireland* (1880, published in *Proceedings* of Am. Philos. Soc., Philadelphia); *Myths of the Cherokees*; *Cherokee Theory and Practice of Medicine* (in *Journal of American Folk-lore*); *Indian Tribes of the Potomac*; the *Cherokee Ball Play* (in *American Anthropologist*); *Sacred Formulas of the Cherokees* (in Seventh Report of Bureau of Ethnology); *The Siouan Tribes of the East* (in bulletin of the Bureau of Ethnology); *The Messiah Religion and the Ghost-dance* (in Fourteenth Report of the Bureau of Ethnology).

Moonstone: a variety of adularia, or transparent potash-feldspar (*orthoclase*); so called because when polished it presents an opalescent appearance due to internal chatoyant or pearly reflections. Varieties of *oligoclase* and *albite* (other species of feldspar) occasionally present a similar appearance. The finest moonstones come from the Kandy district in Ceylon, where many thousands are annually cut into gems and exported. G. F. K.

Moor'croft, William: traveler: b. in Lancashire, England, about 1770; studied surgery in Liverpool and Paris, and became one of the earliest veterinary surgeons in England. In 1808 he went to India as superintendent of the East India Company's stud in Bengal, and being of an adventurous disposition made two daring journeys to Balkh and Bokhara in Central Asia in the disguise of a Hindu pilgrim (1812 and 1819). He was one of the earliest explorers of the Himalayas and the lakes, rivers, and valleys of Chinese Tartary. In 1820–25 he visited Ladakh, Kashmir, Afghanistan, and Bokhara. With the government of Ladakh he concluded a commercial treaty which virtually opened the whole of Central Asia to English commerce. Of almost equal importance were his numerous geographical discoveries. On his return, he was seized at Andkhui, between Bokhara and Cabul, with malignant fever, and died Aug. 27, 1825. His papers were recovered by Alexander Burns, and his *Travels* were edited by Prof. H. H. Wilson in 1841.

Moore, Clara Jessup: See the Appendix.

Moore, Clement Clarke: scholar; son of Bishop Benjamin Moore; b. in New York, July 15, 1779; graduated at Columbia College in 1798; in 1821 became Professor of Biblical Learning in the Protestant Episcopal Seminary; afterward Professor of Hebrew and Greek, and then of Oriental and Greek Literature. He was the author of a *Hebrew and Greek Lexicon* (1809); a volume of poems (1844); *George Castriot, surnamed Scanderbeg, King of Albania* (1850); and of the well-known ballad called *The Visit from St. Nicholas*, beginning: "'Twas the night before Christmas, when all through the house." He also edited a collection of his father's sermons (1824, 2 vols.), and was a contributor to Philadelphia and New York newspapers. D. at Newport, R. I., July 10, 1863. Revised by H. A. Beers.

Moore, David Hastings, M. A., D. D.: minister and journalist; b. near Athens, O., Sept. 4, 1838; graduated at Ohio University in 1860; joined the Ohio conference in the same year; entered the Union army as a private in 1862, and was elected captain of Company A, Eighty-seventh Ohio Volunteer Infantry; on expiration of term became major and the lieutenant-colonel of the 125th Ohio Volunteer Infantry, serving until the fall of Atlanta; resumed the pastorate and served several churches in Ohio; was president of the Wesleyan Female College, Cincinnati, O., 1875–80; president of Colorado Seminary and first chancellor of the University of Denver 1880–89; became Professor of Political Economy in Colorado University in 1889; has been editor of *The Western Christian Advocate* since 1889.

Moore, Edward: dramatist; b. at Abingdon, Berkshire, England, Mar. 22, 1712; was the son of a dissenting minister, and was brought up as a linen-draper in London, but abandoned that business and engaged in literary pursuits. He published *Fables for the Female Sex* (1744); *The Trial of Selim*; the unsuccessful comedies of *The Foundling* (1748) and *Gil Blas* (1751); and the very successful tragedy *The Gamester* (1753; often reprinted). An edition of his *Poems, Fables, and Plays* was published in 1756, and his *Dramatic Works* appeared in 1788. He edited a paper called *The World*, in which he was assisted by Lords Lyttelton and Chesterfield, and other able writers. D. Feb. 28, 1757.

Moore, Harry Humphrey: See the Appendix.

Moore, Sir John, K. B.: soldier; son of John Moore, M. D.; b. in Glasgow, Scotland, Nov. 13, 1761; entered the army in 1776; served in the Mediterranean, in America, and the West Indies, and sat in Parliament for a time; was governor of St. Lucia 1796–97; served in Ireland 1798; was badly wounded in the Netherlands 1799; served in Egypt and became major-general and K. B. 1801: served afterward in Sweden (1802) as envoy and commander of the British contingent; took (Oct. 6, 1808) chief command of the British troops in the Peninsula, numbering 23,000, managing the campaign against Napoleon with consummate skill and boldness; but the failure of the Spanish to co-operate with him compelled him to fall back upon Corunna. He conducted the retreat with masterly skill. He was killed at the battle of Corunna by a cannon-shot Jan. 16, 1809. This was a very spirited battle, and both sides claimed the victory. The British at once took ship for England, and the town was evacuated. *The Burial of Sir John Moore*, by Rev. Charles Wolfe, has immortalized both its subject and its author.

Moore, John Bassett: See the Appendix.

Moore, Thomas: poet; b. in Dublin, Ireland, May 28, 1779, of Roman Catholic parents; was in youth distinguished for his skill in lyric poetry; studied at the Dublin University and at the Middle Temple, London. His first volume of poems, the *Anacreon* (1800), was a success; the *Poetical Works of Thomas Little* (1801) was vastly more popular, though disgraced by a vein of licentiousness which Moore lived to regret. He was in the civil service in the Bermudas 1803–04; made the tour of the U. S. and Canada; married in 1811 Bessy Dyke, an actress of admirable character. For many years his principal writings were political satires in the Whig interest, full of wit and of general interest in their own day, but of small value now. His subsequent works of permanent value are the *Irish Melodies* (10 parts, 1807–34); *Lalla Rookh* (1817); *Loves of the Angels* (1823); *Life of Sheridan* (1825); *The Epicurean*, a romance (1827); *Life of Byron* (1830); and the *History of Ireland* (1827–35). He excelled as a song-writer, and many of his songs set to favorite airs, such as *Araby's Daughter*, *Those Evening Bells*, *The Last Rose of Summer*, etc., are still popular. Moore had brilliant powers in conversation, and was a talented singer. D. Feb. 25, 1852.

Revised by H. A. Beers.

Moore, William Eves, D. D., LL. D.: clergyman; b. at Strasburg, Pa., Apr. 1, 1823; was educated at Yale College; studied theology privately with Dr. Lyman H. Atwater; has been pastor of the First Presbyterian church of West Chester, Pa., 1850–72, and since 1872 of the Second Presbyterian church, Columbus, O. He has been permanent clerk of the General Assembly since 1884, and was moderator at Saratoga in 1890. He has published *New Digest of the Acts and Deliverances of the General Assembly of the Presbyterian Church* (Philadelphia, 1861) and *The Presbyterian Digest* (Philadelphia, 1873; new ed. 1886).

Moore, Willis Luther: See the Appendix.

Moor-fowl, incorrectly called **Red Grouse**: a ptarmigan of the British islands (*Lagopus scoticus*), which is one of the most highly prized of British game-birds. It is not only shot extensively by sportsmen, but it is snared for market, and even bred in confinement for food. It is about 16 inches long, mostly of a red-brown color, and feathered to the toes.

Moorhead: city; capital of Clay co., Minn. (for location of county, see map of Minnesota, ref. 5-A); on the Red

River of the North, and the North. Pac. and the Great N. railways; opposite Fargo, N. D., 253 miles W. of Duluth. It is in an agricultural region, and contains Hope Academy (Lutheran), a high school, 2 national banks with combined capital of $110,000, and a daily and 2 weekly newspapers. Pop. (1880) not in census; (1890) 2,088; (1900) 3,730.

Moor-hen: a member of the rail family (*Rallidæ*) common in many parts of Europe, Asia, and Africa. Its scientific name is *Gallinula chloropus*. It is about a foot long, of a dark-slate color, with a conspicuous red frontal shield formed by an upward prolongation of the beak. The moor-hen swims well, and keeps time to the strokes of the feet with a nodding motion of the head. The nest is large, but usually hidden among the rushes, or placed at some distance from the edge of the water. The eggs are about ten in number. The moor-hen is extremely common on quiet rivers and small ponds in Great Britain. Allied species occur in temperate and warm regions throughout the world.

F. A. Lucas.

Moors [from Lat. *Mau'rus*, later *Mor'us*, a Moor (> Fr. *Maure*) = Gr. Μαῦρος, Mauritanian, apparently a special use of μαῦρος, dark]: the name generally given to the Mohammedan race who invaded the southern part of Spain in the early part of the eighth century A. D. All the leaders of this famous invasion were Arabs, but as their forces were largely recruited from the African population of the neighborhood, the old *Mauri* of *Mauritania*, the whole of the invaders were called by the popular name of Moors; so, too, in early English writers Mohammedans are constantly thus designated. The history of their invasion of Spain is the simplest possible, and needs not, to account for it, the poetical tales invented afterward. Food was scarce among the Berber tribes; much discord prevailed in the waning kingdom of the Visigoths; the Jews, cruelly oppressed by the Spanish rulers, as everywhere else, were for aiding any who might help them; above all, the Arab chiefs, who had swept the seaboard of Africa to the waters of the Atlantic, had warriors at their disposal hard to restrain under peaceful bonds, but ready to undergo any toils for the hope of further plunder. Hence the invasion of Spain was naturally on this wise: Musa, the Arab Viceroy of Western Africa, sent his freedman Tárik, A. D. 711, to survey its southern provinces, and in less than one year the whole of Andalusia, then the richest part of the Peninsula, had submitted to his arms, while he had himself left behind him for all time a sure record of his prowess, the ancient Calpe, which he had captured, being named from him Gebêl-al-Târik (the hill of Târik), now shortened into Gibraltar. In the course of the next year Musa himself came over, jealous of the fame of his lieutenant, and in the course of the next five-and-forty years all Spain, except the Asturias, submitted to the rule of successive warriors with the title of emirs, the deputies of the Viceroys of Africa. Many of these men (they were twenty-one in all) were able administrators, and revived agriculture and the arts, which had fallen into abeyance toward the close of the feeble sway of the Visigoths; while some of them carried their arms into France, and attempted, but in vain, to establish there a similar Arab kingdom. The fate of perhaps their greatest leader, Abd-er-Ahman, and the crushing victory over him in A. D. 732 by Charles Martel in the plains of Tours, are known to every student of history. In later days, though Arab hosts ravaged Carcassonne and Narbonne and burned Marseilles, they were never able to secure a permanent footing on French soil.

The subsequent history of the Moors in Spain is the history of certain dynasties they founded there, which maintained for more than seven centuries a strong or a weak sway over the whole or parts of that country, according as they were or were not supported by their own people, internal treachery in the end accomplishing what all the arms and valor of the Christians had failed to achieve. The first, indeed the only, dynasty which swayed the whole of Spain and Portugal, with the exception of the Asturias, was that of the Ommiade caliphs from A. D. 756 to A. D. 1036. This dynasty was founded by Abd-er-Ahman, who reigned thirty-four years. During his rule his capital, Cordova, was a center of learning—not for Arabs only, but for Christians. Many able rulers followed him, the most eminent being the second and the third of that name. Abd-er-Ahman II. was distinguished as a warrior of great prowess, which is shown by his recapture of Barcelona from the Franks (A. D. 827), his burning of Marseilles (A. D. 839), and his successful encounter with the first Scandinavian vikings who had reached Spanish coasts (A. D. 844–845). Abd-er-Ahman III., whose reign extended from A. D. 911 to 961, was probably, with the exceptions of Haroun-al-Raschid and Akbar of Delhi, the ablest ruler that has ever governed the followers of the Prophet. As a warrior he was pre-eminent, but as an administrator he was even greater. He was, too, the first of the Western rulers to adopt the title hitherto reserved for the Caliphs of Bagdad alone, that of "commander of the faithful," and to rule his own dominions without reference to the original seat of Islam. Many of the works he executed still attest his power and munificence—notably, the great mosque at Cordova, with many roads, canals, aqueducts, and bridges. Many colleges and schools were also founded by him or by his son, Al-Hakem II., who, more perhaps than he, was an enthusiastic lover of literature, the great library he formed at Cordova being unrivaled at that period. After the death of Al-Hakem (A. D. 976) the Ommiade power rapidly declined, chiefly from internal quarrels or from the ill-regulated ambition of individual princes. Indeed, on the dissolution of this family the Mohammedan power in Spain may be said to have been in a state of decay; and though from time to time men of vigor arose and for a while restored the sinking fortunes of Islam, the attacks of the Christians became more and more persistent, ending in the final capture of Granada by Ferdinand in 1492. After the taking of Granada, the Moors who desired to remain still in Spain were required to accept the outward forms of Christianity and to be baptized, and those who did so were called by the *Moros* (or adherents to the ancient faith of Islam) *Christianos Moriscos*, or *Moriscos* alone, in derision. The atrocious cruelty with which these poor people were treated after every solemn promise had been broken by the Catholic party is a grievous blot on the memory of Ferdinand and of his successors. The skill of the Moors in agriculture contributed greatly to the wealth of the country for many centuries.

Authorities.—Gayangos, *History of the Mohammedan Dynasties in Spain* (2 vols., 1840–43); Dozy, *Histoire des Musulmans d'Espagne* (4 vols.); Lane-Poole, *The Moors in Spain* (1886); Abou Zacaria, *Libro de Agricultura* (2 vols., Madrid, 1878). Revised by C. K. Adams.

Moo'ruk [native name]: a species of cassowary (*Casuarius bennetti*), differing from the cassowary of North Australia (*C. australis*) and related species in having the helmet-shaped crest of its head much less elevated and flattened behind, and the absence of cervical wattles. It is about 5 feet high. Compared with its nearest allies (*C. westermanni* and *C. picticollis*), it is distinguished by the blue color of the throat as well as the back of the neck. It is an inhabitant of the Australasian island of New Britain. It is very easily tamed, and is often kept in a domesticated state by the natives who rear the birds from the egg. Like the ostrich, it swallows stones, iron, and whatever else it can pick up. When hard pressed it kicks, giving a severe blow. Like the emu, it is often seized with an ebullition of joyousness, and then it dashes about as if half insane. See also Cassowary. Revised by F. A. Lucas.

Moose: See Elk.

Moosehead Lake: the source of the Kennebec river; a body of water lying in Somerset and Piscataquis cos., Me. It is 36 miles long, from 3 to 10 miles wide, and is surrounded by a picturesque forest region sparsely inhabited. It is a favorite resort for sportsmen and anglers. Its waters abound in fine trout and are navigated by steamers.

Moquats Indians: See Shoshonean Indians.

Moquegua, mō-kā'gwaă: a maritime department of Southern Peru, adjoining Chili, and bounded on the N. by Arequipa and Puno. It was separated from Arequipa in 1875, and previous to the war with Chili (1879–83) consisted of the three provinces of Moquegua, Arica, and Tacna, with an aggregate area of about 30,200 sq. miles, and a population of 60,460. By the treaty ratified Mar. 8, 1884, Arica and Tacna were to be held provisionally by Chili for ten years; at the end of that time the people of the provinces to determine whether they will belong to Chili or Peru, and the country to which they are annexed to pay $10,000,000 to the other. Up to the time of this writing (June, 1894) the question has not been settled. Thus dismembered, Moquegua consists of the single province of the same name, with an area of about 10,400 sq. miles, and a population of perhaps 40,000. The coast region for about 60 miles inland is arid desert; the eastern part, which is mountainous, con-

tains fertile valleys, noted for their rich vineyards. The principal exports are wine and brandy. Moquegua, the capital and chief town, is situated in the valley of the river Ilo, 65 miles by railway from its port of Ilo, and 4,500 feet above the sea. It was an Indian settlement before the Conquest. Moquegua has been repeatedly destroyed by earthquakes, the last time on Aug. 13, 1868. Owing to the excellence of its wines it has been called the Peruvian Bordeaux. Pop. about 5,000. H. H. Smith.

Moquelumnan or Mutsun Indians [*Moquelumnan* is from Moquelumne, a corruption of the Miwok word *Wa-kal-u-mi-toh*, the native name of a river in Calaveras co., Cal.]: a linguistic stock of North American Indians comprising two divisions—the Miwok (twenty-three tribes) and the Olamentke (twelve tribes). The original habitat of the former embraced the territory bounded by Cosumne river, Fresno river, the Sierra Nevada, and the San Joaquin, except a strip on the east bank of the last-named river. The Miwok territory was bounded on the S. by San Francisco Bay, on the W. by the Pacific Ocean from Golden Gate to a point below Bodega Head, thence by a line to the southwestern corner of the Yukian territory northeastward of Santa Rosa, and on the E. by the Copehan family.

Habits and Customs.—As recently as 1876 the Miwok were described as the largest body of Indians speaking the same language in California, but they were also held to be the lowest in culture. Their beliefs have been described as superstitious and degraded, their conceptions imbecile, and their legends obscene almost beyond belief. The Miwok tribes practiced cremation, but it was never universal. Their houses were very rude, those of the Miwok having been simply frameworks of poles and brush which in winter were covered with earth. In the mountains a cone-shaped summer lodge of puncheons was made. Acorns formed the principal food of these tribes, and were stored for winter use in granaries raised above the ground. It has been asserted that the Miwok ate every living creature indigenous to their territory, save the skunk.

With the Miwok, chiefship was hereditary except when the successor was not of sufficient commanding influence. As with most of the tribes of California, marriage among the Miwok tribes was practically by purchase. When twins were born one of the children was killed. Shamanistic rites were performed by both men and women, and scarification and sucking were the principal remedial agents. The acorn-dance as well as a number of other ceremonials, principally for feasting or amusement, were formerly celebrated by the Miwok. No puberty dance was celebrated, nor did they observe a dance for the dead, but an annual mourning, and sometimes a special mourning, was observed.

Population.—Comparatively few of the natives of the Miwok division of this stock survive, and these are scattered in the mountains.

Authorities.—Stephen Powers, *Tribes of California, Contributions to North American Ethnology*, iii. (Washington, 1877); H. H. Bancroft, *History of California*, i.–vii. (San Francisco, 1884–90). See Indians of North America.

F. W. Hodge.

Moraes, mō-raa′ās, Prudente; politician; b. at Itú, São Paulo, Brazil, about 1845. He studied law at São Paulo; was admitted to the bar in 1863, and in 1866 was elected to the provincial assembly. In 1870 he avowed republican principles, an action which at the time seemed to debar him from taking any further part in politics; but in 1879 he and two other republicans were elected to the São Paulo assembly, where their moderation and dignity did much to advance their cause. In 1885 he was elected to the national chamber of deputies, being, with two others from São Paulo, the first avowed republicans who ever entered that body. After the revolution (in which he had no personal part) Senhor Moraes was the first republican governor of São Paulo (1889–90), and immediately after was elected senator. In Feb., 1890, he was a presidential candidate, receiving 97 votes against 123 given to Fonseca. Subsequently he was president of the Brazilian senate. The presidential elections of Feb. 28, 1894, took place when the rebellion was at its height, and Moraes was elected by a large majority.

H. H. Smith.

Moraine′ [= Fr.; cf. Ital. *mora*, heap of stones, probably from Teutonic; cf. Germ. dial. (Bavar.) *mur*, broken stones, *débris*]: (1) a mass of stones and earth carried by a glacier; (2) a mass of stones and earth deposited by a glacier. See Drift, Geology, and Glaciers.

Moralities: See Miracle-plays and Dance of Death.

Moral Philosophy [*moral* is from Lat. *mora′lis*, relating to morals or manners, deriv. of *mos*, *mo′ris*, manner, custom, conduct, way of life]: the theory of the *value* of human conduct. Moral philosophy, or ethics, is a branch of the philosophic as distinct from the physical sciences. The latter investigate facts and relations in their objective character. They fulfill their end, therefore, when the facts are adequately described and their relations stated. The philosophical sciences—namely, æsthetics, logic, and ethics—deal with the investigation of value. They reach their end, not in a description of a given experience, but in an estimate of its worth as a part of the whole system of experience. The philosophical sciences are sometimes termed normative, in that they all recognize a norm or standard, as duty, truth, and the good. This, however, is a derivative mark, not the primary differentia. The norm is simply the basis employed in estimating value.

The Origin of Ethical Theory.—In primitive societies morality is identified with the customs of the community; and these customs, receiving religious sanction, are thus binding religiously as well as morally. This fact tends to retard the growth of any theory of conduct. Custom when consecrated by religion is the essence of conservatism. Free inquiry would imply both lack of loyalty to the community and disrespect to the gods. The chief offset to this extreme conservatism is found in the existence of the councils of the community, in which certain questions are discussed and decided on their own merits; but among every folk, except the Greek, this germ of free inquiry was checked by the assumption that the decision simply declared existing custom, or else (when the council was a priesthood) made known the immediate will of the gods. In Greece, the discussion of the means and ends relating to the welfare of the community took at an early period a wide range, and was freed from any slavish subserviency to the fixed habits of the past or to the divine will. A divine sanction was supposed to attach to the *themistes* (or judicial decisions), but this was rather in virtue of the wisdom displayed in them than because they were regarded as authoritative expressions of will. We find the early proverbs and maxims—the so-called gnomic morality—different from those of other peoples in putting importance upon certain habits of mind and states of character rather than upon the performance of certain outward acts. Such maxims as "Know thyself" and "In nothing excess" already contain in themselves the principle of a free as distinct from a customary morality. The development of democracy, with its popular judicial tribunals and its assemblies for the general discussion of political matters, was a further influence in promoting the growth of moral reflection. A premium was put on power to persuade and to move the citizens of a community in all matters of public policy. At the same time the Greek, with his strong community feeling, always referred the measures under discussion to the welfare of the state as a decisive criterion. Along with this development of a reflective standard and method of judgment went a continual increase in the exchange of culture between Greece proper and the Greek colonies in Asia Minor and Italy. The effect of this was to abstract the consideration of moral questions from their identification with local customs. If we add the vast expansion in art and science found in Athens, consequent upon the Persian wars, we have all the material for a growth of conscious ethical theory. The immediate stimulus to this came from the Greek dramatists on one side and from the teachings of the Sophists on the other. Amid the decay of older religious beliefs and customs, attending the expansion of life, the dramatists tried to uphold a morality based upon a purification of the older mythology. This tendency culminated in the assertion that the fundamental ethical relations are absolute, eternal, and controlling in all the affairs of life; meantime the Sophists were moving in quite a different direction.

The Influence of the Sophists.—In connection with the rise of the democracy and increase of intellectual intercourse, already mentioned, there grew up a well-defined class of persons who made it their business to instruct ambitious citizens in the community in whatever was best calculated to make the latter capaple of securing political influence. Protagoras, for example, affirmed that he "was able to give his pupils skill in both private and public affairs; that his pupils learned to order their own houses in the best manner, and became able to speak and act for the

best in affairs of the state." (Plato, *Protagoras*, 319.) The Sophists, in other words, professed to abstract questions of social welfare from the traditions and habits of any particular community, and to discuss them with reference to the welfare of the state at large. This generalization of the idea of the state and its welfare or good formed the basis at once of the art of politics and of the science of ethics. More than this, many of the Sophists made use of concepts derived from the philosophic theories of the time to attack all traditional morality and, at least indirectly, morality itself. There was, for example, a general agreement among them that, so far as the subjects or citizens of the community are concerned, moral rules are simply the expressed will of the stronger; that duty is simply the necessity of submitting to superior force; while, on the part of the rulers, or stronger, moral rules are simply expedients for securing personal advantage.

Influence of Socrates.—The work of Socrates may be described as an effort to use the positive side of the Sophistic teaching against the negative side, and in the interest of an intrinsic morality like that taught by the dramatists, but freed from its religious dependence. The question raised by the Sophists was whether morality exists by nature (φύσει) or by institution—that is, by sheer enactment (θέσει). Socrates endeavored to show that it exists by the very nature of man and the state; that there is a single and supreme good or end for the individual and the community, reference to this end fixing the value of all particular acts and habits. The basis of morality is therefore knowledge of this good. Except in so far as the agent knows the good and acts with reference to it, his conduct is purely haphazard. Socrates is therefore in agreement with the Sophists in attacking all morality that is merely customary. So far as morality is merely traditional, it may be regarded as based upon either arbitrary authority or considerations of private expediency. All such conduct therefore is more than non-moral; it is immoral. Socrates, at the same time that he founds reflective theory, is the creator of a new type of morality. He introduces, as the precondition of all other virtues, the virtue of insight into the good and the doing of acts because of their value with reference to this good. He differs from the Sophists, not in the emphasis put on the discussion of moral questions—in that respect he is himself a Sophist—but in his insistence upon the necessity of a standard and method for the discussion—a standard and method to be derived from an examination of the essential end and laws of conduct itself. Hence his generalization of the Delphic γνῶθι σεαυτόν as the fundamental principle of morals.

The Limits of the Socratic Ethics.—In contrast with both the customary and the Sophistic moral teaching, Socrates points to the practice of the artists and artisans. The latter know the ends at which they aim; they proceed from a definite model or pattern, and follow a method every step of which has definite reference to the end to be reached; moreover, in the use of their method, they observe continually rules of measure and proportion. In decided contrast with this is the practice, not only of the ordinary citizen, but of the politician, the poet who sets up as a moral teacher, and the Sophist as a professed teacher of virtue. No one of these has a fixed or universal aim, pattern, or rule of measurement. Socrates himself does not claim to have himself any knowledge of what this supreme controlling good is; he represents simply a demand that men do not claim to be moral, much less teachers of morals, until they can base their conduct upon assured insight into the good. His own attitude toward knowledge of the good is thus finally decidedly ironical. Meantime Socrates urged, not only by precept, but still more by his own practice, loyalty to the spirit of the community of which one is a member. The relation between loyalty to the community and insight into the good is nowhere developed by Socrates. We may assume that he *felt* the identity of the good as known by scientific insight, and the good as expressed in the laws of the community, but he nowhere affords any justification for the identification. These limitations fix the problem for his successors.

Influence of Plato.—Speaking roughly, we may say that Plato, following the fundamental Socratic principle of the identity of knowledge and virtue, had to accomplish two things—to work out more positively the content of the good, and to establish more in detail its connection with social organization. The first of these tasks he attempted to perform by bringing the problem of the nature of the good into closer connection with the problem of the objective structure of the universe. He united, that is to say, the ethical analysis of the end of man with the philosophical analysis of the nature of reality. Nature itself was interpreted teleologically; the good or end is the supreme law and unity of both being and knowing. The second problem he met by admitting that most men can never of themselves attain to insight into the good or to true moral action. It is necessary, therefore, to reconstruct the whole social fabric so that the knowledge of the good obtained by the philosophers or the wise shall be mediated to the rest of the community through the very structure of the social organization. His scheme of virtues and his idea of social organization stand, therefore, in direct relation to each other. The supreme or controlling class in a state must, by the moral necessity of the case, be those who comprehend the supreme good, and who can estimate the value of particular acts by reference to the supreme good as a standard. This class follows the good simply because they appreciate it; their virtue is wisdom. Of them it is true that knowledge and virtue are identical. The next class in the state is composed of those who, without ability in themselves to comprehend the good, can appreciate it sufficiently when made known by the ruling class to defend and maintain it at all hazards. Their virtue is courage, or knowledge of the good at one remove. The lowest class in the state is composed of those who neither know nor can *positively* assert, under the direction of others, the good, but who can, when restrained, devote their energies to supplying the material making possible its realization by others. This is the industrial class, whose virtue is control or temperance; that is, knowledge at two removes. Justice is the whole made one by wisdom. Plato further began the psychological analysis of conduct by transferring the constitution of the state over into the structure of the individual soul. The appetites and desires, on their more passive side, correspond to the industrial class, the impulses and active desires to the loyal citizen class; reason to the ruling class, and the balance of the powers to the just state.

Influence of Aristotle.—Aristotle tended to separate ethics from its close connection both with metaphysics and with political organization. Plato himself had been obliged to admit that his idea of the universal and absolute good was but a bare outline; that it represented an ideal to be filled up rather than an accomplished fact. Aristotle added that in any case the ethical problem must relate to a good practically realizable by man, and not to some transcendent good. In place, therefore, of a metaphysical analysis of the good, Aristotle substitutes a description of the moral excellence found in the best type of the citizen gentlemen, a type which Athens, with its centuries of disciplinary and refining influences, had reared up. His account of goodness and of the chief virtues describe the ideals and habits of the typical Athenian gentleman; his principle of the golden mean is the generalization of the artistic principle upon which the Athenian character, in its best estate, had formed itself. Aristotle thus put at the disposal of all later peoples the net product of Greek life on its strictly moral side. As regards the method of attaining virtuous character, Aristotle substituted for the Platonic ideal of direction through social organization (now no longer possible, even as a dream, because of the loss of Athenian independence) the ideal of habits formed through careful discipline and training. Personal education tends to become the instrument for doing what previously social life as a whole had done. This emphasis upon the personal training of the individual made necessary more attention to the nature of the individual agent. Aristotle's ethics are thus as decidedly psychological as Plato's are political. It must not be thought, however, that Aristotle completely severs ethics from politics. Education is still conceived as carried on by the state; the community is thus the chief ethical instrument, indirectly if not directly. Moreover, since the individual is by nature social, he can realize his full good only in relation to others; his good includes a life in a community. In this way the state is also one form of the ethical end, but Aristotle distinctly separates the practical and social virtues from the contemplative virtues, making the latter higher in type, and thus prepares the way for the later isolation of the individual, and the divorce of ethics from politics.

Further Greek Development.—The so-called one-sided Socratic schools, namely, the Cynic and the Cyrenaic, had already entered upon the individualistic development. With the growth of the Macedonian and Roman supremacies, the welfare and customs of the local community came to mean

less and less to the individual. He was thrown back upon himself for moral strength and consolation. It is customary to put the two later schools, the Stoic and Epicurean, corresponding to the two one-sided schools already spoken of, in marked opposition to each other, and even to regard the Stoic school as the embodiment of all that was manly and truly virtuous in the life of the times, while the Epicurean is regarded as given over to lax and selfish pleasure-seeking; but considered in relation to the place which they occupy in the development of ethical problems and methods, the agreement between these two schools is much more important than the differences. Both are concerned with the question of how the individual, in an environment which is becoming more and more indifferent to him, can realize satisfaction; both answer in terms of a personal detachment from all outward concern, and of an attainment of internal self-sufficiency; both make wisdom the chief means in reaching this end; both, in a word, deal with the problem of the true satisfaction of desire in a world where good is no longer mediated through social organization, but has to be attained through the individual himself. Both schools therefore continue the psychological analysis, working out, indeed, the whole problem of will in its relation to desire, reason, and pleasure. In both schools there is an equilibrium reached through a remarkable compromise between self-satisfaction and self-sacrifice. While the Stoic school represents, upon the whole, asceticism, it has strongly hedonistic factors in it. The wise man was freed from everything merely customary, and this gave rise, in extreme cases at least, to a shameless disregard of the ordinary conventions of life in the satisfaction of passions. Moreover, the very contempt which the Stoic displayed for pleasure was in itself largely hedonistic; he felt that the pleasures which he despised were of little account compared with the pleasure of knowing that he was independent of them. On the other hand, there is a marked ascetic factor in Epicurus. He emphasizes the necessity, in order to secure stable pleasures, of moderating and even surrendering the urgency of desire. On the social side, the Stoics introduced an abstract cosmopolitanism by the side of their self-sufficient individualism. They conceived of the whole universe—"nature," in their phrase—as a vast city of which gods and men are the citizens, and for which the immanent reason, the Logos, gives laws. They thus generalize the ethical analysis which Plato and Aristotle had made with reference to the Athenian community. To live according to nature was to assume the same kind of relation to the whole world that Plato had required of the citizen with reference to his own community. The Epicurean school was even more definitely hostile in its moral aims to actual political life than the Stoic; but it set up the ideal of a brotherhood of like-minded men whose bond was not formal law, but personal friendship and voluntary sympathies.

Influence of Christianity.—The introduction of Christianity tended rather to deepen the existing antithesis than wholly to shift the center of interest. Within Christianity itself there were two contending strains. One, in its emphasis upon individual salvation and the freedom of the will, tended to reduce to the lowest terms possible the social side of conduct. It regarded social life, from the family to the state, as having primary relation to man's appetites, in themselves evil; social institutions therefore were either to be got rid of or, since that was impossible for most men, to be endured as necessary evils. On the other hand, the conception of love as the supreme law of life, and of a kingdom of heaven as a supreme social institution having complete community of interests—harmony of man with man—made the social aspect of conduct more prominent than it ever had been before. In the early centuries these two factors exist side by side with almost no consciousness of their contradiction. The chief immediate result in ethical theory was to center all moral questions in the will, and to conceive of will as power of personal choice rather than as expression of either desire or wisdom. God's will was the source and sanction of all moral law; man's will the free source of either goodness or badness; and the eternal destiny of man was fixed by the relation assumed between the divine will on one side and the human on the other.

Roman Influence.—The Roman empire formed at once the scene upon which all the contending ideas and tendencies met, and the framework which held them together and gave them objective consistency. The Latin influence furnished no new ethical analysis. It supplied neither a new idea of the supreme good, nor a further demand for personal righteousness. What it did afford was a vast and coherent system of practical means for realizing the ideal elsewhere developed. The system of private rights which civilization owes to Roman genius made the individualism of the Greek morals and Christian religion more than a speculation of the philosopher and an inner state of the saint; it gave this individualism objective body. In the same way the unified system of law and executive power necessary to the centralization of the Roman empire afforded at once a symbol and an objective support for the otherwise vague aspirations toward a unified humanity current in Greek and Christian thought. The first five centuries of our era are an epoch of fusion and assimilation. The Greek ideas furnish the theoretical analysis of conduct; Christianity insists upon the infinite meaning of life, and both are interpreted, on the practical or working side, by means of the legal and administrative concepts of Rome.

Mediæval Ethical Theory.—The result of this fusion is the Catholic Church of the middle ages with its well defined structure both as a political institution and the maintainer of a dogmatic system of truth. Ethical theory as free examination of conduct ceased; but none the less the Catholic Church gathered up into itself the net product of previous culture, and made it a tremendous influence in the practical discipline of men, both in their inner consciousness and in their community life. The official ethics was dominated by the legal ideas inherited from the Roman empire. God was the absolute lawgiver and judge. Moral laws and the laws of physical nature were the expression of his will, almost his arbitrary commands. The moral life was a process of conforming to legal rules; moral discipline a scheme for paying, either directly or vicariously, the penalties incident to infraction of law. The idea of government was everywhere supreme. The complete subordination of science, art, and ordinary social life to the demands imposed by the transcendent God, resulted in making an organized dualism out of conduct. The supernatural is the all-important, but the present and actual is the natural, which therefore can not be ignored. Thus there are two organs of moral knowledge, wisdom, making known the natural law, and revelation, declaring the supernatural; two types of virtue, the natural and the theological; two instruments for realizing the law, the state, the secular expression of the divine will, the kingdom of nature, and the Church its sacred expression, the kingdom of grace.

The Beginnings of Modern Moral Philosophy.—The Renaissance, here as elsewhere, marks a body of thought working free from constriction and subordination, and beginning to assert itself on its own account. After two or three centuries of conflict we find free theory finally able to maintain itself. Moral philosophy is severed from its theological subjection. From, say, 1625 to 1785 there are two main currents of ethical thought, the continental and the English, flowing on in relative independence of each other. The continental is from the *De Jure Belli et Pacis* (1625) of Grotius to the ethical writings of Kant; the English from the *Leviathan* of Hobbes to the death of Adam Smith. The continental school grew up under the traditions of Roman law and administration. It was interested mainly in an analysis of law; its source, sanction and content, jurally considered. English thought grew in connection with the struggle for political and industrial freedom. Hence it took the individual agent as its focus of interest and discussed moral questions as they bore upon the individual's life.

Agreement and Difference of the English and the Continental Movements.—It is customary to contrast the English and the continental phases of moral philosophy, regarding the former as empirical and the latter as rationalistic; yet their identity in principle was far more important than their difference in method. The problem of both was fixed by their attitude to the dogmatic character of mediæval theory; both were seeking a free basis for morality; in finding this, both start from the nature of the individual in himself, carrying out the same tendency in ethics which the Protestant Reformation introduced into religion and Descartes into metaphysics. Both neglected the positive and historical element—a neglect lasting until after the French Revolution. Both had the same fundamental question to deal with, the relation of the individual to society. The chief difference was that the English movement conceives of this relation as the adjustment of self-interest and benevolence, while the continental deals with it as the relation between the inner morality of the individual and the outward order of the state; moreover, English thought deals

with the individual as a feeling and desiring being, while continental thought derives its conclusions from his rational nature.

The Continental Development.—Grotius (1583–1645) initiated ethical science on the Continent. With the break-up of the feudal system and of the political authority of the Catholic Church, together with the emergence of independent nationalities, it became necessary to find a new source for authority and law. Grotius was particularly concerned with the problem of the relations between the various European states. Obviously there was no political sovereignty to impose law, and yet if there was no law anarchy was a sure result. Grotius fell back upon the idea of a law of nature antecedent to and controlling positive law. This natural law might be defined both as the law of reason and as a fundamental social law. It sprang from the rational impulse in the nature of man to seek for permanent union with his fellows, and to identify his good with theirs. The law of nature or right is to do whatever tends to execute this impulse. To Leibnitz (1646–1716) we owe the idea of a distinct philosophy of morals. Puffendorf (1632–94) had distinguished between a *forum internum* and a *forum externum*. The former was the region of religion in which all moral duties were included, the latter the region of jurisprudence. Leibnitz pointed out that moral duties must have a sphere of their own, separate from theology on one side and from jurisprudence on the other. Thomasius (1655–1728) tried to find a common principle underlying the sciences of morals and of civil law. The fundamental nature of man is toward rational happiness; the primary law of nature is therefore to seek both inner and outer peace. Morals deal with the former law; jurisprudence with the latter. The duties of the latter are expressed negatively: do not injure others. Its law is the law of justice; its defining mark the coercive character of such duties. The moral law is positive: do unto others as one would be done by; its law the law of benevolence, and its defining trait the impossibility of using coercive force. Thomasius thus afforded a philosophical basis for the growing tendency toward confessional religious freedom. Wolff (1679–1754) contributed no materially new elements, but carried out the idea of the rational character of morality on the formal side, working out the scheme of duties and virtues into a regular system on the basis of the principles of logic.

The English Development.—Hobbes (1588–1679) did for English thought what Grotius did for continental. The characteristic of his moral philosophy is the peculiar union of a thoroughly egoistic psychology, with an assertion that the basis of all moral obligation is positive law issued by a sovereign. The individual left to himself aims always and only at his own pleasure, so much so as to bring every individual into conflict with every other. The institution of the state is necessary to set limits to this self-seeking; by its enactments, which bring order out of anarchy, it sets up the moral ideal and definite moral duties. This theory of the positive origin of moral law called out the first reaction —an assertion of the intrinsic character of ethical distinctions. (See Intuitionalism.) The intuitionalists asserted that one law directly made known was that of benevolence, or the duty of considering the common good as one's own, but neither More (1614–87), Cumberland (1632–1718), nor Clarke (1675–1729) showed how this principle of benevolence appealed to the individual. Indeed, so far as they dealt with the question of how benevolence could become a working motive for the individual, they tended to fall back on external rewards and punishment. In so far they not only left the psychological egoism of Hobbes unrefuted, but also implicitly asserted it. This deficiency Shaftesbury (1671–1713) attempted to make good by a new analysis of the individual's make-up, with a view to showing the active presence within him of disinterested impulses or social affections on the same level as his self-seeking tendencies. Butler (1692–1752) went a step further and denied that even the self-regarding impulses, so called, aim at pleasure, claiming that each is directed to its own appropriate object. Self-love he held to be a general principle arising from reflection, and subject therefore to reason, as determining in what it really consists and how it may truly be obtained. Hutcheson (1694–1747) applied the same idea to the analysis of the social impulses, distinguishing between the natural and turbulent impulses on one side, whether personal or social, and calm self-love and calm benevolence on the other. He thus attempts to give the ultimate moral value to the balance of the impulses as affected by reason, claiming that a reasonable self-love and a reasonable benevolence coincide. He also laid great stress on the disinterested character of the social affections. Since no one of these writers assumed that the moral good coincides absolutely with the benevolent impulses, the question of the object of approbation, or the good, came to be a distinct problem. Hutcheson intensified this problem by recognizing the opposition between the disposition or character from which acts proceed and the nature of the acts themselves. He distinguished between the formally good, whose criterion is in the character, and the materially good, whose criterion is in the results of acts, holding that the test of the goodness of an act is its tendency to promote the greatest happiness of the greatest number. He thus prepared the way for the later utilitarianism. Hume (1711–76) attempts to unite Hutcheson's account of the object of approbation with a psychological account of approbation considered as a state of mind. According to him, approbation is the state of pleasurable consciousness, arising through sympathy, when we contemplate any traits or acts which are agreeable or useful to others. Hume thus carries to its extreme the emphasis upon feeling latent in the earlier writers; that which is approved and the act of approbation are both states of feeling. Reason comes in only as enlightening the feelings. Adam Smith (1723–90) carries out still further the idea of sympathy. Hume had not attempted to differentiate moral approbation from the sympathetic pleasure arising at the contemplation of any enjoyment whatever. Smith undertook to supply this lack by holding that our moral sympathy is not with the mere experiences of others, but with the active impulses from which the experiences arise. Moreover, he substituted for the more or less haphazard sympathies of Hume's moral agent the sympathies which would arise in a spectator who was both impartial and enlightened. Our own conscience or self-judgment is simply the reflex of such an imaginary spectator. Hartley (1705–57) completed this psychological analysis by the fuller use of the idea of association. He practically eliminated the "reason" of the older moral writers by accounting for all complex facts as associations of pleasure and pain with simple sensations and appetites.

Transition to the Moral Philosophy of the Nineteenth Century.—The common tendency of more recent ethical thought, underlying all differences between the various schools, is fixed by the effort to deal more adequately with the social factors of morality. Kant (1724–1804), in Germany, and Bentham (1748–1842), in England, represent the transition from their respective sides. In Kant the contradiction in previous rationalistic ethics almost comes to consciousness. This contradiction lay in deriving the moral laws from reason, which is assumed to be universal and necessary, and yet in beginning with the individual and considering the state simply as a compact between individuals. Kant became aware of the necessity of explicitly asserting the universal character of the individual as to his rational nature, and he set it over against the particular side found in his appetites and feelings. Morality thus becomes the struggle of the rational universal will to give the law to conduct, as against the inducements of the sensuous appetite. These two selves, moreover, he tends to identify with the results of Rousseau's political analysis, according to which the individual is to be considered both as sovereign or legislator and as subject, or recipient, of law. The universal character of the law to be realized forces Kant to the verge of realizing the social nature of morality. Having, however, excluded all historical content as empirical, he can get no further than asserting that the moral law, since universal, demands equal regard to all personalities, and requires of each that he act so as to make possible the harmony of all—the kingdom of ends. Instead, therefore, of continuing the parallelism between the inner and the outer (that is, the moral, motive, and political structure) erected by Thomasius, he asserts the necessity of having the outward conditions of action so regulated as to enable the internal moral motive to be really executed. Thus the structure of the state and law, though not in themselves moral, must be made of such sort as will permit the realization of morality. It was, of course, impossible that this unstable equilibrium of the individual and society could be continued. Meanwhile Bentham, on his side, had been effecting a similar transformation in English ethics. On one side he asserted that the sole criterion of morality is found not in the disposition of the agent, but in the tendency of acts to affect the happiness and misery of all sentient creatures; he

condemned all other standards as capricious and subjective. On the other hand, he demanded that the whole legal structure and machinery, both legislative and judicial, be transformed so as, in the first place, to have equal regard to the welfare of all, and, in the second place, to induce the individual really to identify his own happiness with that of others. Thus the contradiction latent in the earlier English thought comes to consciousness. The more (from Shaftesbury down) the writers had insisted upon the benevolent character of the individual the more it was open to cynical observers like Mandeville to point out the discrepancy between the theory and the actual facts of political and economic life in England, where self-seeking seemed the rule. Bentham's utilitarianism may thus be considered an assertion that the previous utilitarian theory of the identity of private and public happiness can become a fact only when the legislative and judicial agencies of the state are brought into play to equalize conditions and furnish motives. Utilitarianism thus became the intellectual instrument of reform in the interest of the rising democratic spirit. Ethical theory was forced from the attitude of mere psychological analysis into a theory of the nature and methods of social well-being.

Recent Ethical Theory.—The movement in Germany subsequent to Kant consists in translating the abstract universal will of his theory into concrete social terms. The unified life of society was substituted for formal reason. The particular or sensuous self was transformed into a given individual within the social whole. The categorical imperative, that is, the consciousness of the legislative character of the rational self, was translated into the consciousness on the part of the individual of his place in the social organism, and of the duties devolving upon him because of this place. In Hegel (1770–1831) this tendency reached its culmination. In his philosophy the moral consciousness of the individual is but a phase in the process of social organization. In England Bentham was followed by James Mill (1773–1836), who, uniting the psychology of Hartley with the reforming utilitarian spirit of Bentham, became the center of the philosophical liberal school—a school which had an influence quite out of proportion to its actual numbers. The son of James Mill, John Stuart Mill (1806–73), came early in life under the influence of the disciples of Coleridge, who was introducing German transcendental philosophy into England according to his understanding of it. While the younger Mill remained at bottom a Benthamite, he modified utilitarianism in such ways as to meet the intuitionalism of the other school at least half way. He introduced the conception that the quality of pleasure is more important than its quantity, and that the highest quality is found in the satisfied conscience of the wise and virtuous man. He admitted an independent moral consciousness in the sense which the individual has of himself as a member of a community. He thus added to the external sanctions of Bentham a strictly internal sanction. He further deepened the social factor of morality, introduced by Bentham, by laying less emphasis upon the direct activity of political administration, and more upon the organic and continuous national life with its moral bent and religious attitude. This, as an educative force, he came to regard as the finally determining element in morals.

Recent Scientific Influence in Ethics.—As we have already seen, the democratic tendencies in social and industrial life resulted in attaching greater importance to the objective and social content of morality. This practical tendency has been re-enforced in the last half of the nineteenth century by the development of science. The historical method, worked out in Germany and applied first to law and language, became the ruling instrument of scientific investigation. The effect was to put in clear and definite light the dependence of the individual upon his social environment. This idea was generalized by Comte (1798–1857), who made it the basis of a religious doctrine as well as of a moral theory. The theory of evolution broadened and deepened the historical method by applying it to the entire past history of the world. The result in ethical theory has been the introduction of biological concepts, and the attaching of new importance to anthropological researches into the early customs of humanity. The last decades have witnessed an effort to rethink the previous results of ethical speculation in the light of the new scientific methods, and by the incorporation of the anthropological and sociological data thus attained. The result, curiously enough, has been that the moral philosophy of Germany has been rendered more empirical, while that of England has become more metaphysical. German ethics had reached by its rational analysis the necessity of building up ethics on a social basis. The groundwork was thus provided for the ready assimilation of the historical data. On the other hand, English thought, having been led by its psychological analysis of the individual to the necessity of recognizing the social relations of the individual, felt the need of philosophical concepts, which would enable it to emerge from its individualism, and assert the organic place of the individual in the social whole. These organic ideas it found prepared in the philosophical systems of Germany.

Bibliography.—There is one excellent brief history of moral philosophy in English—Sidgwick, *History of Ethics* (London and New York, 3d ed. 1892). The earlier writings by Mackintosh, *On the Progress of Ethical Philosophy during the Seventeenth and Eighteenth Centuries* (Edinburgh, 1872), Whewell, *History of Moral Science* (Edinburgh, 1863), and Maurice, *Moral and Metaphysical Philosophy* (London, 1861), are by no means antiquated, although their "tendency" has to be allowed for. Leslie Stephen, *English Thought in the Eighteenth Century* (London, 1876), should be consulted for that period. Martineau's and Bain's (see below) ethical writings have historical sketches. Bonar, *Philosophy and Economics in their Historical Relations* (London and New York, 1893), contains much valuable historical material. Lecky's *History of European Morals* (2 vols., New York, 1870), is a history of customs rather than theories, but should be consulted.

In German the historical literature is much more abundant. Among earlier writings Schleiermacher, *Grundlinien einer Kritik der bisherigen Sittenlehre* (Berlin, 1834); Stahl, *Philosophie des Rechts* (vol. i., 5th ed. Tübingen, 1878); Raumer, *Die geschichtliche Entwickelung der Begriffe von Staat, Recht und Politik* (Leipzig, 3d ed. 1861); Mohl, *Geschichte u. Literatur der Staatswissenschaften* (Erlangen, 1855–58). Among the best of the recent histories is Jodl, *Geschichte der Ethik* (Stuttgart, 1889), dealing, however, only briefly with earlier thought and colored by a distinct tendency. In addition, we have Ziegler, *Geschichte der Ethik* (2 vols., Strassburg, 1881–86: a third still to appear); Köstlin, *Geschichte der Ethik* (Tübingen, 1887; as yet incomplete). In French we have Janet, *Histoire de la Philosophie morale et politique* (2 vols., Paris, 1858).

Limits of space compel us to keep detailed references to the ethical thought of the nineteenth century. The most important literature is Bentham, *Principles of Morals and Legislation* (vol. i. of *Works*, Edinburgh, 1838; also a separate ed. London, 1879); Austin, *Jurisprudence* (2 vols., London, 1869); Mill, *Utilitarianism, Dissertations and Discussions* (vol. iii., Boston, 1865; also separate ed. Boston, 1887); Bain, *Moral Science* (New York, 1869) and *Emotions and Will* (London, 3d ed. 1888); Sidgwick, *Methods of Ethics* (4th ed. London and New York, 1890); Wilson and Fowler, *Principles of Morals* (2 vols., Oxford, 1886–87). The foregoing are all utilitarian, though the last two in particular attempt a reconciliation with intuitional factors. The chief English writers who have made use of the evolutionary idea are Darwin, *Descent of Man* (New York, 1871), chs. v. and vi.; Spencer, *Data of Ethics* (New York, 1882; embodied also in *Principles of Ethics*, 2 vols., New York, 1893); Stephen, *Science of Ethics* (London, 1882). Accounts and criticisms will be found in Sorley, *Ethics of Naturalism* (Edinburgh, 1885); Schurman, *Ethical Import of Darwinism* (New York, 1887) and *Kantian Ethics and the Ethics of Evolution* (London, 1881); Williams, *Evolutional Ethics* (New York, 1893). Martineau, *Types of Ethical Theory* (2 vols., Oxford, 1885), continues more than any other one writer the English ethical traditions of the eighteenth century. In Germany, Kant, *Werke* (vol. v., Leipzig, 1867, ed. Hartenstein: trans. by Abbott as *Kant's Theory of Ethics*, London, 1883): Hegel, *Philosophie des Rechts*, *Werke* (vol. viii., Berlin, 1833; account of it in Morris, *Hegel's Philosophy of State* (Chicago, 1887), and trans. of selected portions in Sterrett's *Ethics of Hegel*, Boston, 1893). Among recent writers Steinthal, *Allgemeine Ethik* (Berlin, 1885; Herbartian, upon the whole), von Ihering, *Der Zweck im Recht* (Leipzig, 1877), Wundt, *Ethik* (2d ed. Stuttgart, 1892), Paulsen, *System der Ethik* (2d ed. Berlin, 1894), should be mentioned. Höffding, *Ethik* (German trans. Leipzig, 1888), gives what is probably the best existent statement of a social utilitarianism. The introduction of German philosophic concepts into English ethics is represented by Bradley, *Ethical Studies* (London, 1876); Green, *Prolegomena to*

Ethics (Oxford, 1883; and vol. ii. of *Works*, London, 1890); Caird, *Social Philosophy of Comte* (2d ed. New York, 1893); *Critical Philosophy of Kant* (2 vols., Glasgow and New York, 1889). Alexander, *Moral Order and Progress* (London, 1889), and Ritchie, *Darwin and Hegel* (London, 1893), are attempts to unite this mode of thinking with evolutionary concepts. JOHN DEWEY.

Moran, EDWARD: marine and genre painter; b. at Bolton, England, Aug. 19, 1829. He was a pupil of M. de Paris in Bolton, of Hamilton and of Weber in Philadelphia, and of the Royal Academy, London; came to the U. S. in 1844; is an associate of the National Academy; member of the American Water-color Society and of the Pennsylvania Academy of Fine Arts. His *Foggy Morning—English Channel* is in the collection of Thomas B. Clarke, New York. Moran is well known as an etcher. D. in New York city, June 9, 1901. W. A. C.

Moran, THOMAS: landscape-painter; b. at Bolton, England, Jan. 12, 1837; a pupil of his brother, Edward Moran; came to the U. S. in 1844; has painted pictures of Rocky Mountain scenery and other American views. His *Chasm of the Colorado* is in the Capitol at Washington; he became a National Academician 1884, and is a member of the Pennsylvania Academy of Fine Arts. He is a skillful and able etcher. Studio in New York. W. A. C.

Moratin', LEANDRO FERNANDEZ, de: dramatist; son of Nicolas F. Moratin; b. in Madrid, Spain, Mar. 10, 1760; was carefully educated for literary pursuits, though for some time he was engaged in the jewelry trade; received prizes from the Academy of Madrid in 1782 and 1785; visited Paris in 1787, where he made the acquaintance of Goldoni, and brought in 1770 his first and best comedy on the stage, *El Viejo y la Niña*. It was his object to reform the Spanish theater, and he succeeded. Godoy, Duke of Alcudia, gave him a pension; he traveled extensively in France, England, Holland, and Germany, and his later dramas, which were received with great applause, evince, besides a natural talent of considerable vigor, a highly developed taste. King Joseph made him his librarian, but after the restoration of Ferdinand VII. he left Spain, lived mostly in Paris, and died there June 21, 1828. His excellent work, *Orígenes del Teatro Español*, written in Paris, reaches only to Lopez de Vega.

Moratin, NICOLAS FERNANDEZ, de: poet; b. in Madrid, Spain, July 20, 1737; was of an ancient Biscayan family; received a careful education; became a lawyer and Professor of Poetry in the Imperial College at Madrid; was the founder of the literary club which took its name from the coffee-house of San Sebastian, and with the countenance of the court and of the great nobles undertook, amid great opposition, the reformation of the Spanish theater by substituting for the religious dramas, or *autos sacramentales*, pieces more in accordance with modern taste, especially as represented by the French school. He had previously published a comedy, *La Petimetra* (1762), and a tragedy, *Lucrecia*, as specimens of the new dramatic school, but neither of them had been placed upon the stage. *Hormesinda*, represented in 1770, achieved success, and *Guzman el Bueno* (1777) was much admired for its classic verse. Moratin was also the author of *Diana*, a didactic poem (1763), and *Las Naves de Cortés destruidas* (1765), a narrative poem on the conquest of Mexico, considered by Ticknor to contain the noblest verse of its kind produced by any Spanish writer of the eighteenth century. All his pieces are characterized by purity and correctness of diction and harmony of versification. D. in Madrid, May 11, 1780.

Mora'via (Germ. *Mähren*): province of Austria; bounded W. by Bohemia, N. by Bohemia and Silesia, E. by Hungary and Silesia, and S. by Hungary and the duchy of Austria. Area, 8,583 sq. miles. Pop. (1890) 2,276,870, of whom 600,000 are Slavonians and the rest Germans. It is almost entirely encircled by mountains—W. by the Moravian, N. by the Sudetic, and E. by the Carpathian—whose branches and spurs intersect the province, with exception of the southern part, which forms an elevated plain. Generally, the surface slopes toward the S., traversed by the Morava (or March) and a number of minor streams, which all send their waters to the Danube. The more elevated portions of Moravia are not fertile, but yield coal, alum, graphite, saltpeter, and metals, especially iron, copper, and lead; the valleys and the southern plains are very fertile, affording excellent pasturage and producing grain, potatoes, flax, hemp, hops, wine, chestnuts, and various kinds of fine fruits. Cattle, fine horses and sheep, geese, fowls, and bees are reared, and extensive manufactures of cotton, linen, silk, and woolen fabrics are carried on. In the twelfth century Moravia was made a margravate and declared a fief of the Bohemian crown, to be held by the younger sons; in 1526, on the death of Louis II. at the battle of Mohacs, it fell to Austria, together with Bohemia, from which it was formally separated in 1849. Revised by W. B. SHAW.

Moravia: village (settled and named The Flats in 1789, name changed to present in 1813); Cayuga co., N. Y. (for location of county, see map of New York, ref. 4–F); on the Owasco inlet, and the Lehigh Val. Railroad; 18 miles S. E. of Auburn, the county-seat. It is the center of a large grain-growing and dairying region; has good water-power, electric lights, and improved system of waterworks; and contains 5 churches, union graded school, public library, 2 national banks, a monthly and 2 weekly periodicals, 2 foundries, flour-mills, cheese-factory, and barrel, broom, furniture, and window-screen factories. Pop. (1880) 1,540; (1890) 1,486; (1900) 1,442.
EDITOR OF "REPUBLICAN."

Moravian Brethren: See MORAVIAN CHURCH and BOHEMIAN BRETHREN.

Moravian Church, The: an ecclesiastical organization owing its distinctive name to the fact that in the fifteenth and sixteenth centuries Moravia constituted one of its principal seats, and because it was renewed in the eighteenth by refugees from that country. Its official name, however, is the Church of the United Brethren, or the Unitas Fratrum, and it originated not only in Moravia, but also in Bohemia. The blood of the martyr Huss (see HUSS, JOHN) was its seed. It was founded by some of his followers in 1457 on the barony of Lititz, in Bohemia, on the following three principles: The Bible is the only source of Christian doctrine; public worship is to be conducted in accordance with the teaching of the Scriptures and on the model of the apostolic Church; the Lord's Supper is to be received in faith, to be doctrinally defined in the language of the Bible, and every human explanation of that language is to be avoided. Its first ministers were priests of the Calixtine or national Church, from which the Brethren had seceded. In 1467, however, they introduced a ministry of their own, and secured the episcopacy from Bishop Stephen of the Austrian Waldenses. In spite of frequent persecutions at the hands both of the Roman Catholics and of the national Church, they increased in numbers and influence. At the beginning of Luther's Reformation (in 1517) they had about 200,000 members and over 400 parishes. In the course of time they established colleges and theological seminaries, set up several printing-presses, and translated the entire Bible from the original into the Bohemian tongue. This version has remained a standard to the present day. About 1549 they spread to Poland; and in 1557 the Unitas Fratrum was divided into three ecclesiastical provinces—the Bohemian, the Moravian, and the Polish—each governed by bishops of its own, but all united as one Church. Religious liberty having been proclaimed in Bohemia and Moravia in 1609, the Brethren became one of the legally acknowledged churches of these lands. In the early part of the Thirty Years' war, however, Ferdinand II. inaugurated the so-called Counter-Reformation, which crushed evangelical religion out of Bohemia and Moravia. Only a hidden seed of the Church of the Brethren remained. The majority of its members, together with the Lutherans and the Reformed, were driven into exile (1620). A new center was now established at Lissa in Poland, and many parishes of refugees were formed, but Lissa was destroyed in 1656, in a war between Poland and Sweden, and the remaining parishes were gradually absorbed by other Protestant bodies. For more than half a century the Unitas Fratrum ceased to exist as a visible organization. Its hidden seed in Bohemia and Moravia, however, remained, and its illustrious bishop, Amos Comenius, filled with a prophetical anticipation of its renewal, republished its history, confession, and discipline, commended the future Church of the Brethren to the care of the Church of England, and took steps to perpetuate its episcopacy. Hence, for a period of fifty years, clergymen of the Reformed Church were consecrated bishops of the Unitas Fratrum, that the succession might not die out. On June 17, 1722, a few descendants of the Brethren, who had fled from their native land to Saxony, began to build the town of Herrnhut on an estate of Count Zinzendorf, where an asylum had been provided for them. This town

soon became the rallying-place for the remnant of the Church, descendants of which, to the number of several hundred, immigrated thither from Bohemia and Moravia. They introduced their ancient discipline, handed down by Comenius, and in 1735 received their venerable episcopate at the hands of its two last survivors, Daniel Ernst Jablonsky and Christian Sitkovius. At the same time, however, many Christians from different parts of Germany joined them, so that the renewal of their Church involved a union of the German element of pietism with the Slavonic element which they represented. The result was a development different from that in Bohemia and Moravia. Count Zinzendorf himself became the leading bishop of the resuscitated Church, and he strove to build it up in such a way as not to interfere with the rights and privileges of the state Church, in the communion of which he had been born, and to which he was sincerely attached. In carrying out this principle he did not let the renewed Unitas Fratrum expand as other churches expand, but established on the continent of Europe, in Great Britain, and in America exclusively Moravian settlements, from which the follies and temptations of the world were excluded, and in which was fostered the highest type of spiritual life. In doing this he carried out Spener's favorite idea of *ecclesiolæ in ecclesia*. Fifteen exclusive settlements still exist in Germany and four in Great Britain. In such towns, until recently, Moravians only were allowed to hold real estate, and the Church controlled not only religious but also municipal, and to some extent industrial, affairs. This fundamental principle is now undergoing a change which will gradually lead to the abolition of the entire system of exclusivism. In the U. S. it has been given up, the last vestige of it disappearing in 1856. The American Moravian Church now stands on the same footing as the other Protestant denominations of the republic, is pursuing the same polity of extension, has largely increased its membership, and is flourishing in other respects. Even in the period in which exclusivism was fully developed throughout the Unitas Fratrum, it did not remain idle or stand aloof from work for the spread of the kingdom of God. On the contrary, while its peculiar system necessarily kept it small at home, it began a very extensive mission in heathen lands, a no less influential domestic mission on the continent of Europe, and a number of educational enterprises that have given it a name far and wide. In 1857 its constitution was remodeled. The Unitas Fratrum now consists of three provinces—the German, British, and American—which are independent in all provincial affairs, but form one organic whole in regard to the fundamental principles of doctrine, discipline, and ritual, as also in carrying on the foreign and the Bohemian missions. Hence there is a provincial and a general government. Each province has a provincial synod, which elects from time to time a board of bishops and other clergymen, styled the "Provincial Elders' Conference," to administer the government in the interval between synods. To this board is committed the power of appointing the ministers to their several parishes. Every ten or twelve years a General Synod of the whole Unitas Fratrum is convened at Herrnhut in Saxony. It consists of delegates from each province and from the foreign missions, and elects a board of twelve bishops and other clergymen, styled the "Unity's Elders' Conference," which oversees the whole Church and superintends the foreign and Bohemian missions. The doctrine of the Church is set forth in its Catechism, its Easter Morning Litany, and in the statutes drawn up by the General Synod, and comprises all those points which are held by Trinitarian Christians as essential to salvation. The distinguishing feature of Moravian theology is the prominence given to the person and work of Christ, and a marked characteristic of the Church generally is its catholicity. The ministry consists of bishops, presbyters, and deacons. The episcopal office is not provincial and not diocesan, but represents the whole Unitas Fratrum. A ritual is used which comprises a litany for Sunday morning—free prayer being allowed at other times—forms for baptism, the Lord's Supper, confirmation, etc., services for the festivals of the ecclesiastical year, and a particular litany for Easter morning. Love-feasts are held, in imitation of the primitive *agapæ*, preparatory to the Lord's Supper and on other occasions. The use of the lot, which at one time was universal, is now greatly restricted, and in the American province resorted to only when a minister receiving an appointment requests its use. Foot-washing, too, has been abandoned. The enterprises of the Church are the following: (1) *Boarding-schools* for young people not connected with it, educating annually about 2,500 pupils of both sexes. There are, besides, numerous parochial schools, a college, a missionary institute, and three theological seminaries. (2) *Foreign missions*, begun in 1732, since which time more than 2,200 missionaries have been sent out, comprising the following 16 "mission provinces"—namely, Greenland, Labrador, Indian country of North America, St. Thomas and St. John, St. Croix, Jamaica, Antigua, St. Kitts, Barbados, Tobago, Mosquito Coast, Surinam, South African western province, South African eastern province, Alaska, Trinidad, Demerara, East Africa, North Queensland, Australia, and Tibet. (3) *Bohemian missions*, begun in 1870 in the early seats of the Unitas Fratrum, and numbering four stations. (4) *Domestic mission* on the continent of Europe, called the *Diaspora*, having for its object the evangelization of the European state churches, without depriving them of their members, who are organized into "societies" within the Church, and carried on in Germany, Switzerland, Denmark, Norway, Sweden, Poland, Livonia, Esthonia, and other parts of Russia. The whole number in the three provinces of the Unitas Fratrum is about 33,400, of whom 19,497 belong to the American province; the whole number of communicants in the foreign missions is about 31,600; of baptized adults, 55,860; the number of foreign missionaries, 347. Besides these there are about 80,000 connected with the Diaspora mission. See *Moravian Manual* (Bethlehem, Pa.); also histories in German by Bost (1848, Eng. trans.), in English by Schweinitz (1885), J. Taylor Hamilton (1894); Seifferth, on their constitution; Thompson, on their missions (1883); and *Moravian Schools and Customs* (1889).

Revised by Robert de Schweinitz.

Moray: See Elginshire.

Moray Firth; an inlet of the German Ocean, on the northeast coast of Scotland, 16 miles wide at the entrance, and stretching inland for about 39 miles, to the mouth of the river Beauly.

Moray, James Stuart, Earl of: See Murray.

Morazan', Francisco: soldier and politician; b. at Tegucigalpa, Honduras, Oct., 1792. About 1827 Honduras and Salvador broke out in open revolt against the arbitrary and unconstitutional acts of Arce, president of Central America, and Morazan as a military leader quickly became the foremost man in Central America. He assisted in gaining Honduras for the liberals; then marched into Salvador and Guatemala, took the capital of the latter state (and of Central America) in Apr., 1829, at once assumed the executive, proceeded to restore the constitution, and called a congress. In 1830 he was duly elected president of Central America. In the main he governed with wisdom and liberality. The opposition of the reactionist and Church parties soon produced a succession of revolts, and though Morazan was re-elected in 1834 he could not maintain order. At the end of his second term no provision had been made for electing his successor, and the Central American Confederation was *ipso facto* dissolved. Supported by Salvador he made a vain attempt to preserve the union by force; but he was finally defeated by Carrera at Guatemala, Mar. 18, 1840, and forced to fly to Peru; thereafter each state acted independently. In Apr., 1842, Morazan landed in Costa Rica, and again proclaimed the confederation. Carillo, president of Costa Rica, was deposed, and Morazan assumed the presidency at San José; but in September he was driven out of the city by a counter-revolution, was captured soon after, and shot at San José, Sept. 15, 1842. He was undoubtedly one of the ablest and best men that Central America has ever produced.

Herbert H. Smith.

Morbidity [from Lat. *morbiditas*, from *morbus*, disease]: liability to or relative prevalence of disease as shown by the ratio of the number of days of sickness to total number of days lived, or of the number of sick persons at a given time to the total number of persons in the community.

Death-rates, even when derived from complete and accurate data, can furnish only incomplete and imperfect information with regard to the relative prevalence of disease in different communities, or as to the amount of time lost by sickness. Many forms of disease which make life more or less a burden, and which partially or entirely disable a person, seldom or never appear in the registers as causes of death, and rarely can we find any definite and certain relation between the number of cases of a disease, or the

amount of time lost by the sufferers, and the number of deaths reported as caused by that disease. The proportion of deaths to cases in such acute diseases as scarlet fever, measles, whooping-cough, yellow fever, etc., varies greatly in different epidemics, and such chronic affections as consumption, Bright's disease, valvular heart disease, etc., differ much in different individuals as to the number of days or weeks of inability to work which they produce. From the results of data obtained from the records of mutual benefit and sickness assurance societies, it is usually estimated that, during a term of years, for every case of death in a community there are two persons constantly sick, which implies that there is an average of two years' sickness to each death, so that if the mortality of a place were 18 per 1,000, the morbidity would be 36 per 1,000. This is a high estimate, unless the word "sickness" be taken as including slight functional disturbances as well as disabling diseases.

Our sources of information with regard to sick-rates are very limited as compared with those for death-rates. The most reliable are the records of the army and navy, of the police force in some cities, and of certain societies for mutual aid in case of sickness. The following table shows the number per 1,000 constantly sick in the British army from 1868 to 1877, from 1878 to 1887, in 1888 and in 1889:

STATIONS.	1868–77.	1878–87.	1888.	1889.
Troops at home and abroad	46·56	54·64	54·52	58·14
United Kingdom	39·66	45·84	44·45	41·48
Gibraltar	34·16	49·68	36·47	39·47
Malta	40·56	50·01	33·24	36·81
Cyprus	.....	69·30	54·72	56·53
Egypt	.....	75·78	64·58	60·45
Canada	29·80	38·98	34·72	28·55
Bermuda	32·92	34·71	34·60	24·09
West Indies	40·58	46·42	55·55	52·49
South Africa and St. Helena	46·80	52·01	58·53	52·64
Mauritius	51·42	88·58	52·67	86·43
Ceylon	50·08	61·93	64·18	66·80
China	.....	.....	.....	53·38
China and Straits Settlements	49·55	50·61	64·59	* 99·84
India	55·88	68·67	72·34	87·36

* Straits Settlements only.

In the U. S. army the average number constantly sick per 1,000 of mean strength is about 41 for the white and a little more for the colored troops. These figures relate only to adult males, and would indicate about 3 cases of constant sickness to every death, but no doubt many of the cases are comparatively slight. The average time lost by sickness for each man during the year is, in the U. S. army, from 14 to 15 days; in the Italian army, from 13 to 14 days; and in the British army, from 19 to 21 days.

With these may be compared the figures for the sickness among members of friendly societies in England, as given in Mr. Finlaison's second report, published in 1884. For males between 21 and 50 years of age—i. e. the usual ages of those in military service—the average number of days' sickness per annum was, for those engaged in general labor, 8 days; for those employed in light labor, 7 days; and for those employed on heavy labor, 9½ days. Taking all the male members of these friendly societies, it was found that during the period of life between the ages of 15 and 85, each man has about 5 years of sickness, but that during the age of labor, from 16 to 66, the average annual time of sickness is about 1½ weeks, and of this the amount of sickness during the first half of working life is almost exactly half that of the second. In the U. S. census taken June 1, 1880, it was found that for the total living population of 15 years old and upward the number sick varied in different parts of the country from 7·17 to 22·7 per 1,000 for males, and from 8·1 to 17·5 for females. It should be remembered, however, that at this time of the year there is the least amount of sickness. The amount of sickness increases after the age of 15 in a definite ratio. Thus by the census report for 1880 it appears that the proportion of sick to the 1,000 of population of different ages was as follows:

AGE.	Males.	Females.
15–25	6·9	6·8
25–35	8·6	9·7
35–45	12·2	11·5
45–55	16·8	14·4
55–65	25·5	20·4
65 and over	44·5	35·3

The mean sickness-rate for the whole population 15 years of age and upward was 12·75 per 1,000. It will be seen that morbidity follows the same general law as mortality in respect to sex and age, being greater among males at advanced ages.

In the report on the census of Tasmania for 1881 the following table is given showing the number of cases of disabling sickness and accidents found on a given day in each 1,000 of living population:

AGE PERIODS.	SICKNESS.		ACCIDENTS.	
	Tasmania.	Victoria.	Tasmania.	Victoria.
All ages	15·13	11·81	1·94	1·80
0–15 years	5·42	3·89	0·70	0·44
15–30 "	9·20	8·73	1·44	1·57
30–50 "	15·60	15·99	1·84	3·06
50–70 "	40·10	41·30	5·52	5·15
70 and over	96·27	111·48	9·08	6·62

The comparatively high sickness-rate in children in Tasmania was, in part at least, due to the fact that measles was prevailing throughout the colony at the time the census was taken.

The difference in morbidity in cities and in the country is shown in the following table, giving average annual sickness-rates in males in the Foresters' Friendly Society for the five years 1871–75, and in the Manchester Unity of Odd Fellows for the years 1866–70, as given in Neison's work, *The Rates of Mortality and Sickness, etc.* (London, 8vo, 1882):

AGES.	Foresters' Friendly Society, 1871–75.				Manchester Unity of Odd Fellows, 1866–70.			
	Number of persons.		Sickness per member per annum in weeks.		Number of persons.		Sickness per member per annum in weeks.	
	Rural districts.	City districts.	Rural distr'ts.	City distr'ts.	Rural districts.	City districts.	Rural distr'ts.	City distr'ts.
18	5,268·0	2,179·0	0·926	1·251	3,521	1,965	0·571	0·470
20	73,565·5	55,525·5	0·799	0·833	51,175	44,741	0·744	0·713
25	87,558·5	97,182·0	0·829	0·853	63,659	71,999	0·840	0·778
30	77,862·0	104,286·5	0·912	0·996	50,605	61,871	0·924	0·929
35	61,046·0	87,231·0	1·060	1·228	34,920	43,704	1·053	1·034
40	44,186·5	65,969·0	1·210	1·491	25,644	30,485	1·254	1·343
45	28,893·5	40,659·0	1·464	1·870	20,832	28.334	1·702	1·685
50	17,782·0	23,014·5	1·778	2·589	16,677	25,512	2·298	2·474
55	10,984·5	12,573·0	2·726	3·673	12,981	21,065	3·024	3·448
60	6,983·5	7,208·0	4·001	4·919	7,516	11.668	4·467	4·957
65	4,482·0	3,568·5	7·252	7·714	3,827	6,079	6·088	8·423
70	2,390·5	1,134·0	11·244	11·219	1,276	2,267	11·744	12·984
75	670·5	257·0	16·789	14·490	265	546	16·115	17·671
80	101·0	46·0	22·422	13·581	56	117	20·784	16·792
85	14·0	11·0	22·551	7·273	13	3	19·769	27·095
90	5·0	6·0	6·771	1·929	2	4	.....	47·750
Totals	421,793·0	500,850·0	1·258	1·404	292,969	350,360	1·365	1·616

J. S. Billings.

Morbihan': department of France; a part of the old province of Bretagne, bordering S. on the Atlantic. Area, 2,625 sq. miles. The northern part is hilly, but the rest is low and level, forming large plains, in some places very fertile, in others occupied by heath or marshes. The islands along the coast are especially remarkable for their fertility. Horses, cattle, sheep, and bees are extensively reared; corn, hemp, flax, and apples are raised; cider, butter, and honey are the principal products. The fisheries are very important. Pop. (1896) 552,028. Principal towns, L'Orient and Vannes.

Mordants [plur. of *mordant* = Fr., liter., biting, pres. partic. of *mordre*, bite, etch]: substances used in dyeing and calico-printing to fix colors which have no affinity for the tissues; in gilding, any viscous or sticky matter employed in making gold-leaf adhere. Animal fibers, as silk and wool, generally attract coloring-matters; for them, therefore, mordants are less important, though they are often used, either to make the color more durable or to brighten or otherwise modify the tint. Few colors can, however, be made to adhere to vegetable fibers, cotton or linen, without the aid of a mordant. Colors which require mordants are called adjective; those which do not, substantive. Safflower is a substantive dye for cotton and linen; most other dyes are adjective for these fibers. The mordant has a positive affinity for both color and fiber, and binds the two together. The most important mordants are soluble salts of aluminium, iron, and tin. If cotton is immersed in a solution of acetate of aluminium, a basic acetate of aluminium will be fixed on the fibers so firmly as to resist removal by washing; if the cotton be now treated

with water and ground madder, the red coloring-matters of the madder, alizarin and purpurin, will unite with the acetate, and thus each fiber will become covered with the red madder lakes, or salts of alizarin and purpurin, together with the acetate of aluminium. If an iron salt be substituted for the acetate of aluminium, as acetate of iron, a similar result would follow the treatment with madder, exeept that, as the iron eompounds with alizarin and purpurin are purple, the cotton would be dyed of this eolor. Sometimes the mordant and color are applied simultaneously. Astringents, such as sumac, nutgalls, etc., are employed as mordants, and act by virtue of the tannic acid they contain. When mordants are printed on cotton cloth in stripes and figures, and the cloth thus mordanted is subjected to the action of the dyestuff, the color is fixed in similar stripes and figures, leaving the other portions of cloth white; this is calico. Sometimes the color is mixed with a salt of the mordant, and the two printed together ("topical printing"). On subjecting the cloth to the action of steam, the acid of the mordant, generally acetic, is expelled, and the base and color become fixed on the cloth.

The term *mordant* is sometimes applied to agents which act merely mechanically and cement the color to the fiber, as albumen, casein, etc., which are used for pigment colors, such as ultramarine, oxide of chromium, etc., and for aniline colors. The term is also applied to salts which furnish a part of the matter of which the color actually consists, as the iron salt in produeing Prussian blue or the lead salt in forming chrome yellow. In these colors there is no proper mordant, as the insoluble color is merely produced in the fiber by the combination of its component parts. This difference is more apparent than real, as the same is actually true when aluminium or iron is used with madder or with astringents. See CALICO-PRINTING and DYEING.

More, HANNAH: author; b. at Stapleton, Gloucestershire, England, Feb. 2, 1745; was educated at a seminary kept by her two elder sisters at Bristol, in whieh she afterward beeame a teacher; began writing poems, pastorals, romantic tales, and tragedies at an early age; made the acquaintance of Garrick, by whom her tragedies of *Percy* (1778) and *The Fatal Secret* were successfully produced at Covent Garden; obtained the warm friendship and admiration of Dr. Johnson, Burke, and the literary circle swayed by them; abandoned writing for the stage from religious scruples while in the height of suecess, and devoted her pen to the advancement of religion and education; settled at Wrington 1786; produced *Sacred Dramas* (1782), *Florio* (1786), *Thoughts on the Manners of the Great* (1788), and *Religion of the Fashionable World* (1791); established at Bath *The Cheap Repository* (1795), a monthly periodieal, in whieh she published a series of short moral stories, including the celebrated *Shepherd of Salisbury Plain*; acquired a competence by her writings and the management of her seminary; removed to Barley Wood, near Cheddart (1802), where she founded several charitable schools; published *Strictures on the Modern System of Female Education* (1799), which led to her being invited to draw up a programme for the education of Charlotte, the Princess of Wales; wrote in 1809 *Cœlebs in Search of a Wife*, her most popular book, followed by *Practical Piety* (1811), and numerous other works; settled at Clifton 1828; died in that place Sept. 7, 1833, leaving a fortune of £30,000, one-third of whieh was bequeathed for charitable purposes. A pleasing ineident in her later life was her affectionate interest in the boy Thomas Babington Macaulay, who resided a considerable time with her, and doubtless owed something of his extraordinary literary career to her watehful care. Her complete *Works* were published in eleven volumes (1830), and several of them are still frequently reprinted. See her *Memoirs*, by William Roberts (2 vols., 1838); the *Correspondence of Hannah More with Zachary Macaulay* (1860); and the *Life* by Miss Yonge (1888).

Revised by H. A. BEERS.

More, HENRY, F. R. S.: divine; b. in Grantham, Leicestershire, England, Oct. 12, 1614; was bred a Puritan; studied at Eton and Christ's College, Cambridge, where he took a fellowship (1639). D. at Cambridge, Sept. 1, 1687. He is remembered as a mystical philosopher and admirer of Plato and the Cabbalists; author of *Philosophical Poems* (1647); *Conjectura Cabbalistica* (1653); *The Mystery of Iniquity* (1664); *Divine Dialogues* (1668); *Enchiridion Ethicum* (1669); *Enchiridion Metaphysicum* (1671); and of a number of other works characterized by acuteness, great learning, and a thoroughly devout spirit.

More, Sir THOMAS: statesman and author; b. in London in 1478, son of Sir Thomas More, judge of the king's bench; studied Latin under Nicholas Hart; became at the age of fifteen a member of the family of Cardinal John Morton, Archbishop of Canterbury, for whom probably he acted as secretary or amanuensis in preparing *The Historie of the Pittiful Life and Unfortunate Death of King Edward V. and the Duke of York, his Brother, with the Troublesome and Tyrannical Government of the Usurpation of Richard III., and his Miserable End*, which has been called the first specimen of classical English prose; entered Canterbury College (now Christ Church), Oxford, where he learned Greek under Linacre; became an intimate friend of Erasmus; studied law at New Inn and Lincoln's Inn; lectured on jurisprudence at Furnival's Inn, and on St. Augustine's *De Civitate Dei* at St. Lawrence church; resided for some years in a Gray Friars monastery, partaking of the manual labors and spiritual exercises of the monks while pursuing classical studies and learning French and music; married Miss Jane Colt 1505; engaged in the practice of law; soon rose to great eminence; was elected to a magistracy of criminal causes and a member of Parliament for Middlesex; opposed the exactions of Henry VII. both before the courts and in Parliament, thereby incurring the wrath of that monarch, visited upon his father in the form of malicious prosecution, fine, and imprisonment. Soon after the accession of Henry VIII. Cardinal Wolsey was charged to secure for the crown the services of the brilliant young advocate, which he effected, not without difficulty, and More was successively made master of requests and confidential envoy to the Netherlands (1514 and 1515) to negotiate for the enlargement of commercial privileges. About this time he composed in Latin his most famous work, the *Utopia*, or account of an imaginary commonwealth in a distant island of the Atlantic, of which the manners, laws, and state of society were depicted as a model worthy of English imitation. This work, printed at Louvain, Antwerp, and Paris in 1516, and at Basel in 1518, was quickly translated into English, Dutch, French, and Italian, and excited universal admiration. More was made privy councilor and treasurer of the exchequer; was knighted 1521; was repeatedly sent by Wolsey on special commissions to France; became a favorite of the king through the wit and wisdom of his conversation; was chosen Speaker of the House of Commons 1523; made chancellor of the duchy of Lancaster 1525; accompanied Wolsey on his famous embassy to France 1527, and became Lord Chancellor 1529. The Reformation had then recently begun; Luther had violently assailed not only his cherished friend Erasmus, but his monarch, and More entered zealously into the lists, attacking the new doctrines upon their weakest points with inimitable learning and wit, as well as caustieity. More was by nature conservative; his religious convictions were of the strongest kind; his tendencies to asceticism were now reviving; it is not therefore surprising that he regarded the repression of heresy as a duty of paramount obligation, but the accusations of cruelty in the persecution of Protestants seem unfounded. However ready the chancellor might be to aid Henry VIII. as "defender of the faith," he could not be expected to acquiesce in the royal vagaries in dealing with the rights of Queen Catharine of Aragon, and his refusal to countenance the proceedings for divorce led to his retirement from the chancellorship in May, 1532. He thenceforth lived in seclusion at Chelsea; was one of the believers in the divine mission of Elizabeth Barton, the nun of Kent, and in Apr., 1534, was committed to the Tower for refusing to swear allegiance to the "act of succession," which excluded the daughter of Queen Catharine from the throne in favor of the offspring of Anne Boleyn; remained in prison above a year in free communication with relatives and friends; refused to take the oath of submission to the king in his newly assumed character of head of the Church, and all efforts by the council to change his resolution having proved fruitless, he was brought to trial before the high commission for constructive treason, condemned to death, and executed within the Tower, July 6, 1535. By the unanimous consent of historians, Sir Thomas More is considered one of the greatest minds and purest characters on record. One of his chief characteristics was his unconquerable pleasantry—a quality which did not desert him even upon the scaffold. His collected *Works*, Latin and English, were published at Louvain 1556–57; the best known, the *Utopia* and the Latin *Epigrams*, have often appeared separately. See biographies by his son-in-law, Roper, his great-grandson, Cresacre More, Cayley, Sir James Mackintosh, and Lord Campbell.

More'a: the ancient *Peloponnesus* (island of PELOPS, *q. v*)., the large southern peninsula of Greece, separated from the mainland by the Gulfs of Patras, Corinth, and Egina, and connected with it by the narrow Isthmus of Corinth. Area, estimated at 8,263 sq. miles. Pop. (1889) 813,954. It is an elevated table-land encircled with high mountains, often arid and unproductive on account of lack of water, but in many places intersected by very fertile valleys. The etymology of the name *Morea*, which in the early Middle Ages superseded the old name, Peloponnesus, is uncertain. Some derive it from *morus*, mulberry, because the outline of the country is like that of the leaf of the mulberry; others derive it from *more*, a Slavic word, signifying "sea," meaning by it the more maritime part of Greece. The latter seems the more probable, as the land was invaded in the eighth century by Slavic tribes, which settled and remained here, and gave many rivers and places new names of Slavic origin. The name is no longer in use. See Fallmerayer, *Geschichte der Halbinsel Morea* (Stuttgart, 1830–36).

Revised by J. R. S. STERRETT.

Moreale, Fra: See FRA MOREALE.

Moréas, mō'rā'aa', JEAN: poet, novelist, and romancer; b. at Athens, Greece, Apr. 15, 1856. His youth was passed mainly at Marseilles; then he traveled in Germany (studying for a time at Heidelberg), Switzerland, and Italy. In 1882 he went to Paris to live, and devoted himself to letters. In 1884 he published a volume of verses, *Les Syrtes*, which was received with acclamation by Mallarmé, Verlaine, and the other members of the group calling itself *Les Décadents*. Since then Moréas has been one of the leaders of the school. In 1886 appeared more verses, *Cantilènes*. The next year he wrote with Paul Adam the romance *Les Demoiselles*. Since that date still another volume of poems has appeared, *Iconostase*; also the impossible romance *La femme maigre*, and the fantastic story *Thé chez Miranda*.

A. R. MARSH.

Moreau, mō'rō', ADRIEN: genre-painter; b. at Troyes, France, Apr. 18, 1843; pupil of Pils; was awarded second-class medals at the Salon of 1876 and Paris Exposition of 1889; decoration of the Legion of Honor 1892. His works are notable for graceful drawing and spirited characterization. Studio in Paris. W. A. C.

Moreau, GUSTAVE: figure-painter; b. in Paris, Apr. 6, 1826; pupil of Picot; was awarded medals at the Salons of 1864, 1865, and 1869; second-class medal, Paris Exposition, 1878; was made an officer of the Legion of Honor 1883; member of the Institute 1889. His compositions are original in conception and of great variety and depth of color. *Orpheus* (1867) is in the Luxembourg Gallery, Paris. Studio in Paris. W. A. C.

Moreau, HÉGÉSIPPE: poet; b. in Paris, Apr. 9, 1810. His parents were very poor, and, after receiving a fair education in a charitable institution, he learned the printer's trade, but left it to become an usher in a school. For a time he lived a bohemian life in Paris in poverty and illness. Afterward he published at Provins a satirical periodical, *Diogène*, in which he gave vent to his bitterness against society. D. in wretchedness in a hospital Dec. 10, 1838. His reputation is due to his graceful short stories and the poems of the volume *Myosotis*, published shortly before his death, more noticeable for their decided promise than for much that they contained. A. G. CANFIELD.

Moreau, JACQUES JOSEPH, M. D.: alienist; b. at Montrésor, department Indre-et-Loire, France, in 1844; began his medical studies at Tours under Bretonneau, then went to the Paris school, graduating M. D. in 1830; was *interne* at Charenton under Esquirol until 1832; in that year traveled with a patient in the East; returned to Paris in 1840, and passed the competitive examination for attending physician to the insane asylums of Bicêtre and Salpêtrière. Among his important writings are *Du hachisch et de l'aliénation mentale* (Paris, 1845); *De l'étiologie de l'épilepsie* (Paris, 1854); *Traité pratique de la folie névropathique* (Paris, 1869). He was coeditor of the *Annales médico-psychologiques* from 1855 to 1862. D. June 26, 1884. S. T. ARMSTRONG.

Moreau, JEAN VICTOR: soldier; b. at Morlaix, in Bretagne, Aug. 11, 1763; studied first law, but in 1792 joined the army, and evinced under Pichegru such a military talent that in 1794 he was made a general of division. In 1796 he commanded the army of the Rhine and Moselle, and penetrated into the center of Bavaria, driving the Austrians under Archduke Charles before him; but after Jourdan's defeat at Würzburg (Sept. 3), he was compelled to retreat, and this retreat, while fighting a superior and victorious army, established his fame as one of the greatest living generals. Incidentally implicated in the conspiracy of Pichegru, he received no command for nearly two years; but in 1799 he commanded in Italy, and distinguished himself again. By those who wished to overthrow the Directory the dictatorship was offered him, but he declined the offer and gave his services to Napoleon. On Apr. 25, 1800, he crossed the Rhine at the head of an army of 100,000 men, and followed the campaign through Bavaria and Austria to the walls of Vienna, ending with the decisive victory at Hohenlinden, Dec. 3, which resulted in the Peace of Lunéville, Feb. 9, 1801; but from this moment a rivalry sprang up between him and Napoleon. He was arrested Feb. 15, 1804, as an accomplice of the conspiracy of Pichegru and Cadoudal against the life of the first consul, and although the proofs were insufficient, he was declared guilty June 10 and banished. He went to the U. S., and settled at Morrisville, Pa., but on the invitation of Alexander I. of Russia he returned to Europe in 1813, and was present at the emperor's side in the battle of Dresden, Aug. 27, 1813, when a cannon-ball fractured both his legs. He died Sept. 2, 1813, at Laun, in Bohemia.

Morehead City: city; Carteret co., N. C. (for location of county, see map of North Carolina, ref. 4–J); on Bogue Sound, and the Atlantic and N. C. Railroad; 5 miles W. by S. of Beaufort, 36 miles S. E. of Newbern. It is in an agricultural region, is connected with Beaufort by steam-ferry, and has regular steamship communication with New York city. Pop. (1880) 520; (1890) 1,064; (1900) 1,379.

Morel [also *moril*, from Fr. *morille*, from Dutch *morilje*: O. H. Germ. *morhila* > Mod. Germ. *morchel*, mushroom]: the name given to the members of the genus *Morchella*, belonging to the ascomycetous group of Fungi, and best known for their esculent qualities, being among those fungi which were first used as articles of food. The most widely known species of the genus is *Morchella esculenta*, which inhabits woody and bushy places, growing chiefly in the spring. The common morel is found in the U. S., as well as in most parts of Europe, but those in commerce come mostly from Germany.

Common morel, natural size.

Morelia, mō-rāl'yăă (originally VALLADOLID): capital and largest city of the state of Michoacan, Mexico; on the plateau; in lat. 19° 42′ N., lon. 100° 54′ W.; 6,370 feet above the sea (see map of Mexico, ref. 7–G). Like most Mexican towns it is very regularly laid out and has several large squares; the cathedral, one of the finest in the republic, faces the Plaza de lo-Mártires, where Matamoros was shot in 1814. The manufactures and export trade are unimportant. The climate is variable and, during the summer months, intestinal diseases and intermittent fevers are sometimes prevalent; these are owing to the flooding of low lands near the city. Water is supplied through a handsome arched aqueduct. Morelia was founded as Valladolid in 1541, and became the capital of Michoacan in 1582. In 1810–11 it was one of the principal centers of revolt. In 1863 the bishopric of Michoacan (Morelia) was raised to an archbishopric, with San Luis Potosí, Querétaro, Leon, and Zamora as suffragans. Pop. (1892) about 30,000. H. H. S.

More'los: a state of Mexico; surrounded by Mexico, Puebla, and Guerrero. It is the smallest Mexican state except Tlaxcala and Colima, having an area of 2,773 sq. miles. The surface is very irregular, rising in the N. to the snowy cone of Popocatepetl, and descending southward to warm valleys, where the greater part of the population is gathered. Sugar-cane is extensively cultivated in these valleys, and sugar and rum are the principal exports. Pop. (1895) 159,800. Capital, Cuernavaca. The largest town is Cuautla, with about 16,000 inhabitants. Morelos was separated from Mexico in 1869. H. H. S.

Morelos, or **Ciudad Morelos**: principal city of Morelos, Mexico. See CUAUTLA.

More'los y Pavon', JOSÉ MARIA: patriot; b. near Apatzingan, Michoacan, Mexico, Sept. 30, 1765. When thirty-

two years old he gained admission, as a poor student, to the college at Valladolid. In due time Morelos became a priest, receiving curacies near Valladolid, where he resided. In 1810 he joined the revolt which had been proclaimed by his old preceptor, Hidalgo (*q. v.*), and was sent to raise forces near Acapulco and Chilpancingo. After Hidalgo's defeat and death (1811) the patriots in the northern provinces were threatened with complete destruction. At this juncture Morelos formed a new center of resistance in the S. and saved the cause. He repeatedly defeated small Spanish forces, thus obtaining arms; and in November advanced on Puebla and Mexico. Gen. Porlier, who marched against him, was disastrously beaten (Jan. 22, 1812), and Morelos took up his position at Cuautla with about 3,000 men, subsequently increased to 5,550. The viceroy, in alarm, placed all his available forces under the command of Calleja, who on Feb. 19 attempted to take Cuautla by storm, but was repulsed. The siege of Cuautla, which followed, is one of the most famous episodes in the history of Mexico; it lasted for sixty-two days, and in the end Morelos escaped with a great part of his forces, after having inflicted incalculable injury on the royalists. During the succeeding two years he was a constant scourge to the Spaniards, moving rapidly from one region to another and winning repeated victories. In Oct., 1812, he took Orizaba, in November he stormed Oaxaca, and in Aug., 1813, he captured Acapulco after a long siege. Soon after he called a patriot congress at Chilpancingo, which made him captain-general, declared the abolition of slavery, and on Nov. 16, 1813, put forth a declaration of independence. Morelos now marched into Michoacan and attempted to take Valladolid, but was defeated by Iturbide (afterward emperor) Jan. 15, 1814. Thereafter the tide was against him. In Nov., 1815, he was captured, taken to Mexico, and, after being forced to do penance before the Inquisition, was shot near the city Dec. 22, 1815. H. H. S.

Morenci: village; Lenawee co., Mich. (for location of county, see map of Michigan, ref. 8–J); on the Lake Shore and Mich. S. Railway; 80 miles S. W. of Detroit. It is in an agricultural and dairying region; contains 7 Protestant churches, union schools, 2 banks, and a weekly newspaper, and has a creamery, cheese-factory, brick and tile yards, brick and tile machine-shops, and flour, saw, cider, and sorghum mills. Pop. (1890) 1,248; (1900) 1,334.

Editor of "Observer."

Moreno, Gabriel Garcia: See Garcia Moreno.

Moreno, Miguel: poet; flourished about 1650. Little is known of his life. He was a native of Villacastin (or Madrid, according to Montalbán, *Para todos*), a notary of the royal court, and secretary to Philip IV., who sent him on one occasion as a member of an important commission to the pope. The titles of various works have come down to us, among them a *Diálogo en defensa de damas*, and two novels—*La desdicha en la constancia* and *El curioso amante*. The only work we have, however, is a collection of epigrams, two hundred in number, which were published in Rome under the title *Flores de España* (1735), and are reprinted in vol. xlii. of Rivadeneyra's *Biblioteca de Autores Españoles* (2d ed. Madrid. 1875). A. R. Marsh.

Moreto y Cabaña, mō-rā'tō-ee-kaă-baan'yaă, Agustín: dramatist; b. in Madrid, Spain, Apr. 9, 1618. He began his studies at Alcalá in 1634, and received his licentiate Dec. 11, 1639. About 1640 he seems to have begun to produce plays upon the stage, and for a number of years he lived at Madrid in intimacy with Calderón, Vélez de Guevara, Rojas, Mira de Mescua, and other brilliant spirits of the time. Later, though exactly when is not known, he embraced the ecclesiastical career, and entered the household of the Cardinal-Archbishop of Toledo, who showed him much kindness and affection. When, in 1657, the prelate reorganized the brotherhood of San Pedro, associating with it the hospital of San Nicolás, he desired Moreto to superintend the business for him. Accordingly, in Dec., 1659, the latter entered the brotherhood, and much of the rest of his life was devoted to its affairs. The sincerity of his interest is proved by the fact that at his death he left all his property to the poor. D. in Toledo, Oct. 28, 1669. Moreto is one of the most important of the Spanish dramatists of the seventeenth century. Though at first he chiefly imitated the work of Lope de Vega, Calderón, and others of his great predecessors or contemporaries, he often did this with such success as to supersede his originals. As his talent matured itself, furthermore, he initiated a distinctly new movement in the drama. He first completely abandoned in certain of his pieces the romantic and fantastic elements of earlier comedy, and replaced them by the deeper interest of character and manners. In *El lindo Don Diego* he paints inimitably the contemporary fop, and *El desdén con el desdén* is one of the most perfect and delightful comedies in any modern language. The latter was imitated by Molière in his *Princesse d'Élide*, but with little success. We have 103 plays or dramatic pieces from his pen (nineteen of these, however, written in conjunction with others). There is, unfortunately, no complete and satisfactory edition of them. A volume entitled *Primera parte de las comedias de don Augustín Moreto y Cabaña* appeared in Madrid in 1654, and in 1676 three volumes with similar titles were published. Many plays, however, did not appear in these, and are to be found only separately, or in the collections of plays by various hands issued during the seventeenth century. The best modern edition, containing thirty-three pieces, is that of Luis Fernández Guerra y Orbe, with *Life*, in vol. xxxix. of Rivadeneyra's *Biblioteca de Autores Españoles* (Madrid, 1873). A. R. Marsh.

Moret'to, properly Alessandro Bonvicino: painter; b. at Brescia, Italy, in 1498; he studied under Ferramola. At the age of twenty-three he already was a distinguished painter, and worked with Romanino in the Corpus Christi chapel in San Giovanni Evangelista, where he first gave proof of his mastery of tone and color. His work can be best studied in Brescia and its neighborhood, but the Brera at Milan, S. Giorgio Maggiore at Verona, S. M. Maggiore at Trent, and S. M. della Pietà in Venice, and the chief European galleries possess fine examples of his work. His greatest pupil was Giambattista Moroni of Bergamo. D. at Brescia in 1555. W. J. S.

Morgan, Conway Lloyd: biologist and psychologist; b. in London, Feb. 6, 1852; was educated at the Royal Grammar School, Guildford, and the Royal School of Mines, London; was lecturer on Science at Rondebosch, South Africa, 1878–83; became teacher, professor, dean, and principal of University College, Bristol, England, in 1884. His principal works are *Animal Biology* (1887); *Animal Life and Intelligence* (1890); *An Introduction to Comparative Psychology* (1894). He is associate and medalist of the Royal School of Mines, correspondent of the Philadelphia Academy of Sciences, Murchison medalist, etc. J. M. B.

Morgan, Daniel: soldier; b. in Hunterdon co., N. J., 1736; removed to Virginia in early life, and in 1755 joined Braddock's expedition as a wagoner; received 500 lashes in 1756 for an alleged insult to a British officer. On the outbreak of the war for independence he raised a company of riflemen, with which he marched to Boston, and accompanied Arnold's expedition against Quebec, where, after a brave resistance, he was forced to surrender himself a prisoner; upon being exchanged he was appointed (Nov., 1776) colonel of a Virginia rifle regiment, which he commanded with great ability, and was conspicuous at Saratoga; promoted to be brigadier-general in 1780, he was attached to the Southern army, and Jan. 17, 1781, won the victory of Cowpens over Tarleton, successfully avoiding Cornwallis's subsequent pursuit and rejoining Gen. Greene. For this service Congress voted him a gold medal. In 1795, as major-general at the head of a large army, he was employed in suppressing the "whisky insurrection" in Pennsylvania; was a member of Congress 1795–99. D. July 6, 1802.

Morgan, Sir George O.: See the Appendix.

Morgan, George Washbourne: organist; b. at Gloucester, England, about 1821; at eight years of age he played the organ in the St. Nicholas church there; removed to the U. S. in 1853, and was organist successively of St. Thomas's church, Grace church (eighteen years), and St. Stephen's Roman Catholic church, all in New York, and the Brooklyn Tabernacle. He was a remarkable performer, and a wonderful sight-reader. His later years were spent in concert tours. D. at Tacoma, Wash., July 10, 1892. D. E. H.

Morgan, George Washington: soldier and ambassador; b. in Washington co., Pa., Sept. 20, 1820; fought in the Texan army for independence, attaining the rank of captain; was appointed cadet at the U. S. Military Academy in 1841, but without graduating settled in Mt. Vernon, O. (1843), and became a lawyer. In the war with Mexico he served a year as colonel of the Second Ohio Volunteers, and then as colonel Fifteenth U. S. Infantry, receiving the brevet of brigadier-general for Contreras and Churubusco, where he was severely wounded; was U. S. consul at Marseilles 1855–

58, in the latter year being appointed minister to Portugal. In the civil war he was appointed Nov., 1861, brigadier-general of volunteers. By reason of ill-health he resigned in June, 1863; was the unsuccessful Democratic candidate for Governor of Ohio in 1865; was elected M. C. in 1866 and 1870. D. at Fort Monroe, Va., July 27, 1893.

Morgan, Sir Henry John: buccaneer; b. in Wales about 1637; shipped as a sailor to Barbados; went thence to Jamaica; joined a band of buccaneers, of which he soon became the leader, and ultimately became possessed of a formidable fleet, with which he repeatedly captured important seaports and ravaged whole districts of the Spanish Main. Morgan's earliest exploits were on the coasts of Campeche, where he made many prizes. He then combined his forces with those of an older corsair named Manswelt or Mansfield, and the two adventurers advanced upon Cartagena, which they would have taken had not a quarrel between the English and French buccaneers broken out, in consequence of which they returned to Santa Catalina. Upon Mansfield's death Morgan became his heir and successor, and thenceforth meditated bolder enterprises. With a well-equipped fleet of twelve vessels he ravaged Los Cayos and the south coast of Cuba; marched inland; took and ravaged Puerto Principe after a formal battle; took Puerto Bello in New Granada 1668, carrying by assault its three fortresses. The city was evacuated only on payment of a heavy ransom by the governor of Panama. In the following year he assembled all the "brothers of the coast" (*hermanos de la costa*) for a raid upon Panama; made rendezvous at Cape Tiburon, Santo Domingo, Dec. 16, 1670, with thirty-seven vessels and 2,200 men; captured the island of Santa Catalina a second time, and took and destroyed the fort of San Lorenzo at the mouth of the Chagres river. The buccaneers then ascended the Chagres river in canoes with 1,300 men; had to fight with concealed Indians, but succeeded in crossing the isthmus, and appeared before Panama Jan. 26, 1671. The city was defended by four regiments of the line, besides 2,800 armed citizens and 2,000 savage Indians, but this considerable force was totally routed and the city taken, sacked, and burned. After a residence of a month at Panama the buccaneers returned to Jamaica with a booty of over $2,000,000. Morgan then returned to civilized life, was knighted by Charles II.; became commissary of the admiralty; published at London his *Voyage to Panama* (1683), and spent the last twenty years of his life in opulence in Jamaica, where he died in 1690. See J. C. Hutcheson, *Sir Henry Morgan* (1890), and Howard Pyle, *The Buccaneers and Marauders of America* (1891).

Morgan, James Appleton: See the Appendix.

Morgan, John Hunt: soldier; b. at Huntsville, Ala., June 1, 1826; served in a cavalry regiment in the Mexican war; became a manufacturer of bagging at Lexington, Ky., where in Sept., 1861, he organized the Lexington Rifles, with whom he joined Gen. Buckner in the Confederate service; commanded a squadron of cavalry at Shiloh, and soon afterward began a series of raids through the portions of Kentucky held by the Union forces, destroying railways, bridges, and supplies, and gaining a wide celebrity. In 1862 he was appointed major-general. In 1863 he crossed the Ohio river on a bold raid, but was captured with most of his command, and was confined in the Ohio penitentiary. He succeeded in escaping, and again undertook a raid in Tennessee, but was surprised during the night by Federal cavalry near Greenville, and killed, Sept. 4, 1864.

Morgan, John Pierpont: See the Appendix.

Morgan, John Tyler: Senator; b. at Athens, Tenn., June 20, 1824; moved to Alabama; received an academic education; was admitted to the bar 1845; served in the Confederate army; was raised to the rank of brigadier-general; was a presidential elector in 1876; was elected to U. S. Senate as a Democrat Mar. 5, 1877; re-elected 1882 and 1888; was appointed with Justice John M. Harlan arbitrator for the U. S. in the Bering Sea controversy with Great Britain.

Morgan, Lewis Henry: See the Appendix.

Morgan, Morris Hicky, Ph. D.: classical scholar; b. at Providence, R. I., Feb. 8, 1859; graduated A. B. at Harvard 1881; was head tutor at St. Mark's School, Southborough, Mass., 1881–84; Ph. D., Harvard, 1887; since 1887 instructor and Assistant Professor of Greek and Latin at Harvard; author of *De ignis eliciendi modis apud antiquos*, Diss. Inaugur. (1887); *Dictionary to Xenophon's Anabasis* (with J. W. White), 1892; *The Art of Horsemanship by Xenophon: Translated with Essays and Notes* (1893). B. I. W.

Morgan, Sydney Owenson, Lady: novelist; b. in Dublin, Ireland, about 1780; was the daughter of an actor, who anglicized his name from McOwen, and was said to possess some literary ability. She published in 1797 a volume of poems, and afterward wrote two novels, which met with little success. In 1806 her novel, *The Wild Irish Girl, a National Tale*, gained her a sudden popularity. This work introduced her into aristocratic English circles, and in 1812 she married Sir Thomas Charles Morgan, a distinguished physician. She continued for many years to write novels, songs, comic operas, biographies, and works of travel. Among her more popular novels were *Florence Macarthy* (1816); *The O'Briens and the O'Flahertys* (1827); and *The Princess* (1835). In other departments her most celebrated works were probably the *Life and Times of Salvator Rosa* (1823) and *Woman and her Master* (1840). Lady Morgan was long a leader in London literary society, where she gained warm friends and had no lack of bitter enemies. In the last year of her life she published *Passages from my Autobiography* (1858). D. in London, Apr. 13, 1859. An edition of her works was edited by herself in 1855–56. She is said to have gained £25,000 by her writings, in addition to a pension of £300 conferred upon her by the ministry of Lord Grey. See *Lady Morgan, her Career, Literary and Personal, with a Glimpse of her Friends and a Word to her Calumniators* (1860), by W. J. Fitzpatrick, and her *Memoirs*, edited by Hepworth Dixon (2 vols., 1862).

Revised by H. A. Beers.

Morganatic or **Left-handed Marriage** [*morganatic* is from Late Lat. *morganatica*, a morning gift, a kind of dowry given on the morning before or after the marriage, deriv. of O. H. Germ. *morgan*, morning]: a marriage between a man of noble birth and a woman of inferior station or rank, by the terms of which neither the woman nor her children have any right to the titles, arms, or dignity of the husband, nor any right to succeed to his estate except as provided by contract. These restrictions affect only the rank and property rights of the parties concerned, and do not affect the validity of the marriage, which in general is regularly celebrated, and the children of such a marriage are legitimate. Morganatic marriages are still common among the nobility of the Germanic states of Europe, but the morganatic wife is now the sole wife, and not, as was formerly frequently the case, a second wife taken over and above another wife of equal rank with the husband. In the Middle Ages it was unlawful among the German nations for a man and woman of different rank to intermarry, and severe penalties were attached to the act, the woman being liable in some cases to the death penalty. These penalties were later moderated, and the woman and the children, if any, were excluded from their rights to the rank and estate of the husband and father, the children taking the rank of the mother. These restrictions are now, however, done away with, except as to the reigning families and the highest nobility. The term left-handed marriage arose from the old custom that the children of such a marriage should follow on the inferior, that is, the left, hand. See *Chambers's Journal* (Edinburgh), vol. xxxvii., p. 1; Shelford *On Marriage and Divorce*; Zöpfl, *Ueber Missheiraten in den regierenden Fürstenhäusern* (Stuttgart, 1853); and Schulze, *Die Hausgesetze der regierenden deutschen Fürstenhäuser* (3 vols., Jena, 1862–83).

F. Sturges Allen.

Morgan (formerly Brashear) City: city; St. Mary's parish, La. (for location of parish, see map of Louisiana, ref. 11–D); on the Atchafalaya river, and the S. Pacific Railroad; 80 miles W. by S. of New Orleans. It has a good harbor and regular steamship communication with Texan, Cuban, and Mexican ports; is the central sugar dépôt of Southern Louisiana, surrounded by a strictly sugar-cane country; and has large oyster, fish, vegetable, and moss interests. Pop. (1880) 2,015; (1890) 2,291; (1900) 2,332.

Editor of "Review."

Morganfield: town (founded in 1811); capital of Union co., Ky. (for location of county, see map of Kentucky, ref. 3–D); on the Ohio Val. Railway; 5 miles S. of the Ohio river, 35 miles S. W. of Evansville, Ind. It is in an agricultural region, and contains five churches, graded public school, and a weekly newspaper. Pop. (1880) 744; (1890) 1,094; (1900) 2,046. Editor of "Sun."

Morganton: town; capital of Burke co., N. C. (for location of county, see map of North Carolina, ref. 3–D); on the Catawba river, and the Richmond and Danville Railroad; 55 miles W. of Statesville, 64 miles N. W. of Charlotte. It

is in an agricultural and mineral region, and has gold veins and a weekly newspaper. Pop. (1890) 1,557; (1900) 1,938.

Morgantown: town (incorporated in 1785); capital of Monongalia co., W. Va. (for location of county, see map of West Virginia, ref. 5–I); on the Monongahela river at the head of the slackwater improvement, and on the Balt. and Ohio Railroad; 106 miles S. of Pittsburg, Pa., with which it has regular steamboat communication. It is in an agricultural, stock-raising, and natural-gas region; is the seat of the West Virginia University (non-sectarian, chartered 1867), which in 1890 had 16 professors and instructors, 208 students, 6,000 volumes in the library, and $15,000 invested in scientific apparatus, $150,000 in grounds and buildings, and $108,000 in productive funds; and has water-works, electric lights, and a semi-monthly and two weekly periodicals. Pop. (1880) 745; (1890) 1,011; (1900) 1,895.

EDITOR OF "POST."

Morgar'ten: a mountain pass in the canton of Zug, Switzerland, between Morgarten Hills and Lake Egeri. On Dec. 6, 1315, the Swiss won here their first victory over the Austrians, though numbering only 1,400, while the Austrian army consisted of nearly 15,000 men. Services are performed on the anniversary of the battle in a chapel erected at the foot of the hill.

Mor'ghen, RAPHAEL SANZIO: engraver; b. in Florence, Italy, June 19, 1758. His father, an engraver, gave him early instruction in his art, and sent him to the school of Volpato in Rome. Volpato gave him his daughter in marriage, took him into partnership, and shared with him the labor of executing the plate of Raphael's *Parnassus* in the Stanze of the Vatican. The dedication of the plate of Raphael's *Transfiguration* to Napoleon in 1812 obtained for him honors and preferment. From Louis XVIII. he received the decoration of the Legion of Honor and the cordon of St. Michael. D. in Florence, Apr. 8, 1833. The entire work of Morghen is estimated to comprise 254 pieces, eighteen of which are from Raphael; seventy-three are portraits. The most celebrated plates are *The Last Supper*, after Leonardo da Vinci; the *Madonna del Sacco*, after Andrea del Sarto; the *Madonna della Seggiola* and *The Transfiguration*, after Raphael; the *Aurora* and *St. John in the Wilderness*, after Guido Reni; and portraits of Dante, Boccaccio, Petrarch, Ariosto, Tasso, Leonardo da Vinci, Raphael, and Francesco Monçada. Palmerini, the pupil of Morghen, published in 1824 a *Life* and portrait of his master, with a catalogue of his works.

Revised by RUSSELL STURGIS.

Mori, mō'rĕē, ARINORI, Viscount: scholar and statesman; b. in the province of Satsuma, Japan, in 1848. Being a gentleman's son, he had every advantage of education, and studied abroad 1866–68. Appointed to a legal post soon after, he early associated himself with educational matters as a commissioner of schools, and this predilection continued to develop itself. When *chargé d'affaires* in Washington he arranged the postal convention with the U. S. He afterward served as minister plenipotentiary at Peking and London, and in the latter city was intimate with Spencer, Huxley, and other advanced thinkers. He returned to Japan with distinct educational views, and was given the portfolio of education in 1885, which he held until his death, on the day of the proclamation of the constitution, Feb. 11, 1889. He had been guilty of some negligence or breach of etiquette in visiting the sacred shrines at Ise, and a Shinto fanatic, Nishino Buntaro, working himself up to frenzy, stabbed the viscount in his own house. J. M. DIXON.

Mori'ah [the feminine of *Moreh*]: a district in Palestine, on one of whose mountains Abraham attempted the sacrifice of Isaac (Gen. xxii. 2) and Solomon afterward built the temple (2 Chron. iii. 1). This identity was affirmed by Josephus (*Antiq.*, i. 13, 2) and is accepted by a majority of the best scholars. See also JERUSALEM.

Mo'rier, JAMES: traveler and author; b. in England in 1780, was a nephew of William Waldegrave, Lord Radstock; early entered the diplomatic service; was private secretary of Lord Elgin in his embassy to Constantinople; accompanied the grand vizier in the campaign in Egypt against the French. Having acquired an intimate knowledge of several Oriental languages he spent many years as secretary of legation or as *chargé d'affaires* in Persia; published *A Journey through Persia, Armenia, and Asia Minor to Constantinople in the Years 1808 and 1809* (London, 4to, 1812), *A Second Journey through Persia, etc., between the Years 1810 and 1816, with a Journal of the Voyage by the Brazils and Bombay to the Persian Gulf* (1818), and attained great celebrity through his romances describing Persian manners and customs—*The Adventures of Hajji-Baba of Ispahan* (5 vols., 1824–28), which was followed by three others upon the same theme—*Zohrab the Hostage* (3 vols., 1832), *Ayesha, the Maid of Kars* (3 vols., 1834), and *Mirza* (3 vols., 1841). D. at Brighton, Mar. 23, 1849.

Mö'rike, EDUARD: poet; b. at Ludwigsburg, Würtemberg, Sept. 8, 1804; studied theology at Tübingen; was active as a minister for a number of years, but retired on account of ill-health, and was in 1851 appointed Professor of Literature at a girls' school in Stuttgart. Here he taught successfully until 1866, when he again retired. He died June 4, 1875. Mörike, who in his early youth was deeply influenced by the Romanticists, but kept himself free from their extravagances owing to his classical training, may justly be called the greatest German lyrist after Goethe. Like the latter, he understood how to transform life into poetry, and how to remain a naïve poet in Schiller's sense despite the influences of abstract modern thought. In his *Gedichte* (1838) he gives expression to the deepest and most tender emotions of the human heart, reminding us by the melody of his rhythms, his graceful humor, and his classic repose, of the best productions of German popular poetry as well as of the Greek lyrics. Mörike's prose writings also bear a classic stamp. His famous novel *Maler Nolten* (1832) can in many respects be compared with Goethe's *Wilhelm Meister*, and some of his smaller stories, like *Mozart auf der Reise nach Prag* and others, are masterpieces of their kind. His translations of Anacreon and Theocritus also deserve high praise. See his *Gesammelte Schriften* (Stuttgart, 1890); Fr. Th. Vischer, *Kritische Gänge* (1844, vol. ii.); Friedrich Notter, *Eduard Mörike* (1875); Julius Klaiber, *Eduard Mörike* (1876). JULIUS GOEBEL.

Morillo, mō-reel'yō, PABLO: soldier; b. at Fuente de Malva, Spain, 1777. He was a sergeant at the battle of Trafalgar, and during the French invasion (1808–09) was a noted guerrilla chief in Murcia. In 1809 he joined the regular army, and in 1814 was made general of division and given command of 10,600 men (subsequently re-enforced) to put down the rebellion in the northern part of South America. He occupied the coast provinces of Venezuela almost without opposition (Apr.–May, 1815), and in August appeared before Cartagena, which was only taken in December, after hundreds of the inhabitants had died of famine; Morillo himself lost 3,000 men, mainly by disease. In May, 1816, he entered Bogotá, and within a few weeks hardly a patriot soldier was left in New Granada. Morillo used his victory with merciless severity, and several hundred persons were executed, including many of the foremost citizens. For his successes he was created Count of Cartagena, with the title of Pacificator. Meanwhile the patriots had organized new forces in Venezuela, and he marched into that country, leaving part of his forces at Bogotá. After Bolivar's victory over these Morillo was confined to Venezuela; in Nov., 1820, he was forced to sign an armistice, and soon after he was relieved at his own request. He subsequently held several high commands in Spain, and was created Marquis of Fuentes; but his vacillations during the contest between Ferdinand VII. and the Cortes ended in his disgrace in 1823, and he retired to France, settling at Rochefort. In 1826 he published an account of his American campaigns. D. at Rochefort, July 27, 1838.

Morine, ALFRED BISHOP: See the Appendix.

Morisonianism: See EVANGELICAL UNION.

Morlaix, mōr'lā': town; in the department of Finisterre, France; at the confluence of the Jarleau and Kerlent; 6½ miles distant from the sea (see map of France, ref. 3–B). Its harbor has 13 feet of water at ordinary and 23 feet at spring tides. The railway from Paris to Brest is here carried across the river on a viaduct 934 feet long and 207 feet high. Morlaix has some manufactures of tobacco and paper, and considerable coasting trade. Pop. about 14,860.

Morley, HENRY: biographer and literary historian; b. in London, Sept. 15, 1822; was educated at King's College, London; practiced medicine 1844–48; was two years a successful instructor; became in 1851 a London journalist, and afterward edited *The Examiner*; was lecturer on English literature at King's College, London, 1857–65; and from 1865 to 1889 was Professor of English Language and Literature at University College, London; then became emeritus

professor; was examiner in English language, literature, and history, at the University of London, 1870–75 and 1878–83; from 1878 to 1889 held the same professorship at Queen's College, London; and from 1882 to 1889 was principal of University Hall, London. D. in Carisbrooke, Isle of Wight, May 14, 1894. He was the author of *How to Make Home Unhealthy* (1850); *Defense of Ignorance* (1851); *Lives* of Palissy, Cardan, Cornelius Agrippa, Marot, etc.; *English Writers before Chaucer* (2 vols., 1864–67), revised and continued as *English Writers* (8 vols., 1887–93); *Tables of English Literature* (1868); *A First Sketch of English Literature* (1873); *English Literature in the Reign of Victoria* (1881); and has edited many important series, such as The Library of English Literature (1881, vols. i.–v.); Morley's Universal Library (begun in 1884); Cassell's National Library (begun in 1886), etc. Revised by H. A. Beers.

Morley, John: author and statesman; b. at Blackburn, Lancashire, England, Dec. 24, 1838; educated at Cheltenham and Lincoln College, Oxford, graduating in 1859. He was admitted to the bar in 1873; was editor for some years of *The Literary Gazette*, of *The Fortnightly Review* from 1867 to 1882, of *The Pall Mall Gazette* from 1880 to 1883, and of *Macmillan's Magazine* from 1883 to 1885. He is the editor of the valuable biographies known as the English Men of Letters Series, and is the author of many noteworthy critical and biographical studies, including *Edmund Burke* (1867), *Critical Miscellanies* (1871–77), *Voltaire* (1872), *On Compromise* (1874), *Rousseau* (1876), *Diderot and the Encyclopædists* (1878), *Cobden* (1881), *Emerson* (1884), and *Walpole* (1889). An edition of his *Works* was published in 1886–88 (10 vols.). In 1883 he became member of Parliament for a division of Newcastle-on-Tyne, but was defeated in the general elections of 1895. He is an advanced Liberal in politics, an advocate of Home Rule, and was Chief Secretary for Ireland in Gladstone's cabinet in 1886 and again in 1892–95.

Morley, Samuel: philanthropist; b. in Well Street, Hackney, London, Oct. 15, 1809; increased his inherited wealth as a manufacturer of hosiery; took prominent place in his religious denomination, the Congregational, but refused to hold the office of deacon; was a leader in the "blue-ribbon" or total abstinence movement; sat in Parliament as member for Bristol from 1868 to 1885, when he retired in broken health, after declining a peerage. He was a munificent patron of philanthropic, religious, and political enterprises, and left an enormous fortune. D. at his house, Hall Place, near Tonbridge, Sept. 5, 1886. See his *Life*, by Edwin Hodder (London, 1889).

Morley, Thomas: composer; b. in England about 1545; was a pupil in music of William Birde; studied at Oxford; imitated the Italian style; was a skillful performer and a prolific composer of anthems, church services, ballets, canzonets, and madrigals. He published four books of *Madrigals* (1594–1601); *A Plaine and Easie Introduction to Practicall Musicke* (1597); and *The Triumphs of Oriana* (1601), an extraordinary performance, being a collection of twenty-four madrigals in honor of Queen Elizabeth (Oriana) by as many English verse-writers, set to music by "Thomas Morley, Bach. of Musicke and Gentleman of Her Majesty's honorable Chapell." One of the verse-writers was John Milton, father of the celebrated poet. Morley died in London in 1604.

Mormon, Book of: See Mormons and Smith, Joseph.

Mormons, or, as they call themselves, the Church of Jesus Christ of Latter-day Saints: a religious sect founded by Joseph Smith, Jr., at Fayette, Seneca co., N. Y., Apr. 6, 1830, since 1847 having its center and chief seat in Utah. The membership in 1900 was about 375,000, including 20,000 living in other countries than the U. S. The Mormons are Christians, their articles of faith declaring belief in God, the Eternal Father, and his Son, Jesus Christ, and in the Holy Ghost; that men will be punished for their own sins, and not for Adam's transgression; that through the atonement of Christ mankind may be saved by obedience to the laws and ordinances of the Gospel, those ordinances being: First. Faith in the Lord Jesus Christ. Second. Repentance. Third. Baptism for the remission of sins. Fourth. Laying on of hands for the gift of the Holy Ghost. They also believe that a man must be called of God to preach the Gospel; in a Church organization comprising apostles, prophets, pastors, teachers, evangelists, etc.; in the gifts of tongues, prophesy, revelation, visions, healing, etc.; in the Bible as the word of God, "as far as it is translated correctly," and in the *Book of Mormon* as the further word of God; in the literal gathering of Israel and the restoration of the Ten Tribes; in the building of Zion on the American continent; and in the coming of Christ to reign in person. The Church organization is a theocracy, pure and simple, the officers forming a complete priesthood. The supreme authority is vested in the First Presidency, comprising the president, who is also designated prophet, seer, and revelator, and two counselors, all being chosen by the body of the Church. Then follow the apostles, of whom there are twelve; the patriarch, seventies, high priests, elders, bishops, priests, teachers, and deacons. A distinguishing characteristic is belief in continuous divine revelation, and all are entitled to such revelation, but only the communications from the Lord which come through the prophet-president are authoritative and necessarily binding on the Church. The first president was Joseph Smith, Jr.; his counselors, the three comprising the original First Presidency, were Sidney Rigdon and Frederick G. Williams. The first patriarch was Joseph Smith, Sr., father of the founder of the Church. Joseph Smith's successors have been Brigham Young, chosen in 1847, at Kanesville, Ia., now Council Bluffs; John Taylor, elected in 1880; and Wilford Woodruff, who was chosen in 1887. The authority of the president extends to temporal as well as spiritual affairs, although the exercise of mandatory power by the priesthood in temporal matters has been falling into disuse.

With the *Book of Mormon* and present revelation as a basis Joseph Smith began to preach a new religion, and in a little time succeeded in gathering a small congregation, but he soon incurred the enmity and aroused the active hostility of his neighbors in New York, and at the beginning of 1831, less than a year from the date of the organization of the Church, he led his followers westward, settling at Kirtland, O. There the sect increased in numbers and wealth through the efforts of missionaries who were sent out by the prophet. A temple was built and the city flourished, but the animosity of the people of the neighborhood had been aroused, and seven years later the Mormons found it necessary to flee. Headquarters were next set up at Far West, Mo., and at that point the great majority of the saints rallied; but their sojourn was brief. The hatred which it seemed to be their fate to excite became so intense in Missouri that open war between them and the people resulted. The Mormons were forced by superior numbers to retire from the State, which they did in 1838, settling near Commerce, Ill., where they built the city of Nauvoo, and at once became an important factor in the commercial and political affairs of the State. An extraordinary charter was granted to the city, which made the corporation almost independent of the State government, and gave to Smith civil and military authority within the city very nearly equal to the religious power which he exercised over his people. Nauvoo flourished wonderfully and the Church gained in membership, proselytes gathering from New England and the Middle States and from Europe, many missionaries having been sent to foreign lands. Here, however, the popular enmity was as keen or even more bitter than it had been elsewhere. Dissensions also arose within the ranks of the saints themselves. There was a clashing of authority between the State and the city. Finally, in 1844, an ambitious but discontented member of the Church, backed by a considerable following, issued a newspaper at Nauvoo, vigorously assailing the prophet and threatening to expose some of his alleged immoralities and misdeeds. The printing-office was at once destroyed by Smith, for whose arrest a warrant was issued at the instance of the editor. The warrant was issued by a justice of Carthage, a neighboring town, but Smith refused to submit to arrest. He went before a friendly justice at Nauvoo, who discharged him. The Carthage justice issued another warrant, in which the prophet was charged with treason against the State, but Smith again refused to obey the writ, claiming the right to give bond to the Nauvoo justice to stand trial. The militia was summoned to make the arrest, and the Mormons armed to resist the attack. Civil war was imminent; indeed, there had been engagements between the saints and the militia, when by personal intercession the Governor of the State induced Smith to surrender and go to Carthage. This was on June 26, 1844. On the following day a mob gathered from the surrounding country, attacked the jail, and, overpowering the guard, killed Smith and his brother Hyrum, and wounded others of the prophet's party who had accompanied him to prison. It was thought that the death of Smith would put an end to the society, but the

Church continued to grow rapidly. Brigham Young, an organizer and leader and a man actuated by ambition, had joined the Church in 1832, and by reason of his earnestness in the work and his devotion to the prophet had risen in the organization until at the time of the assassination of Smith he was at the head of the quorum of apostles. He at once assumed the leadership, a position which his strong character and his place in the affections of the people enabled him to maintain, although the claim was disputed by some who declined to accept his rulership. Young immediately planned another removal, and the following year there was a general emigration from Nauvoo, temporary headquarters being set up at Council Bluffs, Ia. In the spring of 1847 Brigham Young, with a company of 143, again turned his back on the advancing civilization, and went in search of a new abiding-place. After months of traveling, much of the distance traversed being through an unexplored wilderness, the party, on July 24, 1847, arrived in the Salt Lake valley, which Young proclaimed the sought-for land. Salt Lake City was founded, and Young returned to the Missouri river to direct the movement of the people to the new home. Since then the headquarters and the gathering-place of the saints, their Zion, has been Utah. That is the "center stake," as they term it, but by direction of the leaders Mormons have gone into the surrounding States, and they now form a considerable percentage of the population of Idaho, Wyoming, Colorado, Arizona, and Nevada, while they have large colonies in Old Mexico. The Church seems to be increasing in membership, though the growth is by no means so rapid as it was in its earlier days. The missionary service is extensive, hundreds of elders being kept constantly in the field, and missions are maintained in various countries of Europe, in Asia, in Australia, and the Pacific islands. The British isles and Scandinavia furnish most of the converts.

The distinctive characteristic which has given the Mormons notoriety and trouble is polygamy. A plurality of wives is not merely allowed, but is held to be a means of grace, the number of a man's wives and children increasing his honor and glory in the world to come. The practice of polygamy was denied by the Mormons in early days, and the alleged divine revelation permitting or commanding it was not openly published, nor was the principle publicly preached until the saints were settled in Utah; but it has been proven that Smith had several wives, as did a number of the leading Mormons of his time. Of late years it has been maintained that the revelation sanctioning polygamy was received by the prophet as early as 1831, and was withheld from the body of the Church and from the world, although trusted ones were advised of it and permitted to practice the doctrine. Since 1852 polygamy has been publicly preached and practieed, and while a plurality of wives was not essential to a man's good standing in the Church, the leading men generally were polygamists and were favored over the monogamists. As early as 1862 the Federal Government undertook to stamp out the practice, a law forbidding it being enacted in that year. The efforts to enforce the statute, however, were weak and spasmodic, and the Mormons paid little or no respect to the law. In 1882 Congress put a more severe statute into the books, and two years later determined efforts to enforce it were made, the Mormons resisting through the courts until they could oppose no longer, the constitutionality of the law being established by the opinion of the Supreme Court of the U. S. Scores of polygamists fled or went into hiding while hundreds, without effort at resistance, accepted the situation, pleaded guilty to violation of the law, and went to prison. More than 1,100 men were convicted and sent to the penitentiary, the usual term of imprisonment being six months and the fine $300. In 1887 another law was enacted by Congress, which disincorporated the Mormon Church and confiscated its immense property in excess of $50,000. The Emigration Company, an extensive transportation association which managed the immigration business of the Church, was also disincorporated, and its resources were taken possession of by the Government. The Mormons resisted this law also without success. After hundreds had endured imprisonment and millions of dollars had been spent in payment of fines, feeing lawyers, and so on, and the vast property holdings of the Church had been lost, finally, in Sept., 1890, President Woodruff issued a pronunciamento against polygamous marriages. His action was approved by the body of the Church in general conference in the following October, and since that time there has been no evidence of a plural marriage sanctioned by the Church. There have been a few convictions of parties for living with several wives to whom they were married previous to the proclamation of the president, but it may be said with confidence that whereas the celestial marriage revelation is still in the books and its divinity is believed by the faithful, actual polygamy is an institution of the past.

The *Book of Mormon*, above referred to, which is esteemed by the saints a divine work, is merely what purports to be the historical account of the occupation of the American continent. In brief, the story is that after the destruction of Babel and the confusion of tongues America was settled by one of the peoples. Afterward, in the sixth century B. C., Lehi and his sons went to South America, and from them were descended the Indians. It is also related that after the Resurrection Christ went to America and preached to the people. At the final destruction of the civilized people, after a series of bloody wars, God commanded the prophet Mormon to record the events that had taken place and secrete the record. Mormon obeyed, and it was the claim of Joseph Smith, firmly believed by the saints, that an angel pointed out to Smith the spot on a hill near Palmyra, N. Y., where golden plates bearing Mormon's record were hidden. The characters on the plates were said to be "Reformed Egyptian." With them was found the "Urim and Thummim," by which the prophet was enabled to translate. The book was first published in 1830, and with it the certificates of three men that the angel had exhibited the golden plates to them, also the testimony of eight other men to whom Smith had exhibited the plates. The *Book of Mormon* is not a doctrinal work, as so many believe, but merely a narrative or record. The Mormon doctrines not contained in the Bible are stated in purported divine revelations, and these are contained in a volume entitled *Doctrine and Covenants*, many editions of which have been published. There has been very little revelation of late years, though the right and privilege to receive communications and instructions direct from the Almighty still exist. BYRON GROO.

Morning-glory Family: the *Convolvulaceæ*, a group of dicotyledonous plants, mostly twining or trailing herbs, with alternate leaves, gamopetalous flowers, and a superior two or three celled ovary. The 870 species are distributed widely throughout the globe, about 100 being natives of the U. S. Many species are favorite ornamental plants, as the morning-glories (species of *Ipomœa*), bindweeds (species of *Convolvulus*), *Evolvulus*, etc. The sweet potato (*Ipomœa batatas*), originally of India, has long been cultivated in warm and temperate climates for its nutritious roots. The parasitic dodders number about eighty species of the genus *Cuscuta*. They are to be regarded as morning-glories which have become degraded through parasitism.

CHARLES E. BESSEY.

Morny, mōr'nee', CHARLES AUGUSTE LOUIS JOSEPH, Duke de: soldier and politician; b. in Paris, Oct. 23, 1811; son of Queen Hortense of Holland and Count de Flahault, and consequently a half-brother of Napoleon III. His birth was kept a secret, however, and he was adopted by a Count de Morny, a resident of Mauritius, and educated by his paternal grandmother, Madame de Souza. He entered the army, fought with distinction in Algeria, and was made a chevalier of the Legion of Honor. Queen Hortense having died in 1837 and left him an annuity of 40,000 francs, he abandoned his military career, returned to Paris, and divided his time and energy equally between dissipation and financial speculation. As Minister of the Interior he was the executor, and probably also the instigator, of the *coup d'état*; and though he soon retired from the cabinet and contented himself with the chair of president of the *corps législatif*, he continued to exercise a considerable influence on the emperor. He was, indeed, next to the Empress Eugénie, the most characteristic figure of the second empire. D. Mar. 10, 1865.

Moro, or **Moor**, ANTHONY: painter; b. in Utrecht in 1510. He was a pupil of John van Schorel; also studied in Italy and gained a reputation as a portrait-painter. Charles V. appointed him court painter in 1552. The emperor sent him to Portugal to paint portraits of King John and his family, for which he was splendidly remunerated. He was then sent to England to paint the portrait of Queen Mary, the bride of Philip II., for which he received a gold chain and a yearly pension of £100 sterling, besides being knighted on his return to Spain. Notwithstanding the great favor shown him by Charles V. and Philip II. he had to fly from Spain for fear of imprisonment on account of a breach of

court etiquette. He received permission of the emperor to go to Brussels, and remained there. The Duke of Alva took him under his protection, showed him great favor, ordered portraits of his mistresses in the style of Titian, and conferred on him and all his family pensions, appointments, and canons' places. Besides portraits, Moro painted historical subjects. D. in Antwerp in 1568. His chief works are a *Resurrection*, now in London, and a *St. Peter and St. Paul*, which belonged to the Prince of Conti. The Louvre possesses three of his finest portraits. W. J. Stillman.

Moroc'co: sultanate of Northwestern Africa; situated between lats. 27° and 36° N., lons. 1° and 11° 50′ W., bounded by Algeria, the Mediterranean, the Strait of Gibraltar, the Atlantic, and Sahara. The area is estimated at about 219,000 sq. miles. The coast along the Atlantic is generally low, flat, sandy, very dangerous to navigate, and affords only a few harbors—El-Araish, Rabat, Casablanca, Mazagan, Safi, and Mogador; of these the best and most important are Mazagan and Casablanca. The coast from the Strait of Gibraltar eastward along the Mediterranean is high, bold, and rocky. The principal harbors here are Tangier, on the Strait of Gibraltar, and Tetuan. Spain owns Ceuta and several other points on this coast. A beautiful and very fertile plain, containing all the large cities, Morocco, Fez, etc., extends between the coast range and the Atlas Mountains, which in several parallel lines traverse the country from N. E. to S. W. None of the peaks of the Atlas reaches the line of perpetual snow; Miltzin, the highest point, 30 miles S. E. of the city of Morocco, rises to a height of 11,500 feet, but is often entirely free from snow. A number of rivers originate in the Atlas—the Draa, Sus, and several smaller rivers flowing to the Atlantic and the Muluia to the Mediterranean—but none of them is navigable. They are generally rapid and even turbulent in the spring, but often disappear altogether during the summer. The climate in the plain is delightful, tempered by cool breezes from the Atlas, which keep off the scorching winds from Sahara; in the wet season, from November to March, showers are frequent. In the mountains and on the southern slope extreme heat and cold alternate, and the changes are often very sudden. Excellent marbles of different kinds are found; gold, silver, copper, tin, nickel, rock-salt, and sulphur occur; iron is abundant and of good quality, and traces of ancient mines, probably worked by the Carthaginians, are met with in several places. The luxuriant forests which clothe the mountains contain oak, cedar of Lebanon, pine, and many kinds of valuable timber-trees. In the valleys and the plain all the cereals, fruits, and vegetables of the warm and temperate zones can be cultivated—wheat, maize, rice, sugar, cotton, tobacco, grapes, oranges, figs, almonds, dates, beans, peas, saffron, etc., but agriculture is generally in a very backward state, and the country sometimes does not produce sufficient wheat for its own demand. Large herds of cattle, horses of a small but spirited breed, goats whose skins furnish the famous morocco leather, and camels, are reared, but exportation is forbidden. The lion and panther are frequent in the forests, the hyæna, jackal, and wild boar in the plain, the gazelle and the ostrich in the regions bordering on Sahara; serpents, scorpions, lizards, and insects abound. Manufactures of fine woolens and silks are carried on at Fez, one of the capitals, and of bricks and silver-ware in other places; the fez, a well-known red cloth cap, takes its name from this city and is exported in large quantities to all Mohammedan countries. The only branch of industry extensively developed is that of leather. The commerce is inconsiderable; the traffic with the southern and eastern countries is carried on by caravans. The inhabitants, estimated at 5,000,000, are Berbers (generally agriculturists), Arabs (nomadic Bedouins), Moors, Jews, and Negroes. The Government has very indifferent control over the mountain tribes, particularly those among the Er-Rif Mountains in the N., who are chiefly Berbers. Nothing but good government is needed to make Morocco one of the most flourishing parts of Africa. The languages spoken are dialects more or less corrupted of the Berber, Arabic, Spanish, and Negro tongues from the interior of Africa. The reigning religion is Islam. In ancient times the country formed part of Mauritania (*q. v.*); in the seventh century it was conquered by the Arabs, whose religion and customs the Moors adopted. In 787 the kingdom of Fez was founded; in 1058 that of Morocco. In 1648 the present dynasty ascended the throne. In 1814 slavery of Christians was prohibited, and in 1817 piracy was suppressed. Revised by Cyrus C. Adams.

Morocco: one of the capitals of the sultanate of Morocco; situated in a plain at the foot of the Atlas, 1,500 feet above the level of the sea (see map of Africa, ref. 2–B). It is surrounded by a wall 23 feet high, 7½ miles in circuit, pierced by seven gates, and flanked with numerous towers, but now generally in a dilapidated condition. The city was founded in 1072, and was in the thirteenth and fourteenth centuries a famous seat of learning, to which the Moors of Spain sent their children to be educated, and is said to have contained 100,000 houses and 700,000 inhabitants. It contains still many large mosques and a magnificent palace, otherwise its splendor has decayed. Of its manufactures, that of red and yellow morocco is famous; its commerce is chiefly carried on by the Jews, who number about 6,000, but live in an abject condition. The climate is fine, and the city is well watered, but its streets are very dirty and crooked, and the sultan and court spend little time there. Pop. estimated at 50,000. Revised by C. C. Adams.

Morocco Leather: the name originally given to leather made from goatskins tanned with sumach, but now applied also to the inferior sort (roan) made from sheepskins. The name appears to be derived from the superior excellence of the leather formerly obtained from Morocco. The goatskins are steeped in water to remove the hair, and are then scraped clean and smooth on the fleshy side, and placed in milk of lime. From the lime-pits they are drawn out from time to time, laid to drain, and then steeped afresh. When the hair has become thoroughly loose, it is scraped off with a double-handled steel knife. After a few more days' steeping it is scraped on the flesh side until it is smooth and even. The skins are then placed in a liquid made from the dung of pigeons and hens. This done, they are sewn up in a bag-shape, the grain being outside. A small orifice is left, and in this a funnel is inserted and a strong infusion of sumach is poured in. A number of the skins thus filled are rolled about in a large tub containing a weaker solution of sumach. The object of this motion is to accelerate the action of the liquid contained in the skins, as well as to subject all portions of them to the equal action of the bath. They are then heaped upon a wooden rack, and pressure brought to bear until the sumach penetrates the pores and brings the tannin into the closest relationship with the fibers. The tanning is completed by a repetition of the process described, which can all be accomplished in one day. The bags are unsewn, scraped, and hung up in the drying-loft. When again wetted and smoothed with a rubbing instrument they are ready for dyeing, being sewn together at the edges, as only one side has to be colored. The mordant used is a solution of tin or alum-water. The dye used is chiefly cochineal; boiled with alum, it forms a red liquid which is filtered through linen into a cask. The skins undergo immersions in this dye. They are then rinsed and tanned with sumach, and afterward fulled with beetles, polished, and dried. Variations in color are obtained by the use of other dyestuffs. The final operation is that of currying. The process varies according to the purpose for which the skins are intended.

Enamel oilcloth, made to look like morocco leather, is now extensively used. Morocco leather is considered to be the best material for bookbinding, and the estimation in which it is held has led to extensive counterfeiting, inferior sheepskins being dressed and dyed to resemble it as much as possible. The preparation of imitation morocco from sheepskins does not vary greatly from that used for the genuine article. The color of the leather is not always given by dyeing, as almost any hue can be obtained by topical application. Aniline dyes have been used, but are said not to be durable.

Morone, mō-rō′nā, Giovanni Battista: painter; b. at Albino, near Bergamo, about 1510; was a pupil of Moretto of Brescia, whose manner he strictly adhered to in his fine pictures in several churches of Bergamo and the neighboring country. Morone was famous for his portraits. Titian was in the habit of advising gentlemen going to Bergamo to be painted by Morone. Examples of his work are in all the principal national European collections. D. Feb. 5, 1578. W. J. S.

Morot, mō′rō′, Aimé Nicholas: historical and genre painter; b. at Nancy, France, June 16, 1850. He studied under Cabanel; was awarded the Grand Prix de Rome 1873; medals at the Salons of 1876, 1877, and 1879; medals of Honor at the Salon of 1880 and Paris Exposition of 1889; decoration of the Legion of Honor 1883. His pictures are

marked by admirable qualities in drawing and color. Among his principal works are *The Good Samaritan* (1880), which is in the Luxembourg Gallery, Paris; *Toro Colante* (1885); and *Reichshofen—Charge of the Eighth and Ninth Cuirassiers.* Studio in Paris. W. A. Coffin.

Mor'pheus [= Gr. *μορφεύς*, liter., fashioner]: the god of sleep, son of Somnus. The name is first found in Ovid (*Met.* xi., 634, 647).

Morphia: See Opium.

Morphol'ogy, Animal [*morphology* is from Gr. *μορφή*, form + *λόγος*, reason, discourse]: that branch of zoölogy which treats of the general form and organization of animals, and the principles involved in their structures. It relates to the nature and origin of structures and organs, but has no reference to the uses or functions of parts. It thus contrasts with animal physiology, which treats of adaptation to surroundings in the organism as a whole, and of the use and functions of the diverse parts. To trace the unity of organization in the widely diverse forms of the animal kingdom, and the essential similarity in their mode of evolution, are the principal problems within the province of morphology.

Characteristics and Method.—The science thus distinguished is of comparatively late development, as the tendency of the human mind is to determine organs and parts from their uses, rather than from their intimate structure. In ordinary language, as well as in the earlier stages of science, the organs of less-known animals are named from their correspondence in function with those of man. Thus the fore limb of a dog is called a leg, though its real correspondence in structure, or homology, is with the arm of man, not with the hinder limb or leg. The fore limb of a bird, corresponding part for part with the arm of man, is called a wing, and the fore limb of a fish a fin. Yet the same word wing is used for the flying apparatus of the insect, although the wing of the insect has structurally nothing in common with the wing of the bird. In the same way the words gills, lungs, jaws, etc., are applied to organs with analogous functions, regardless of the way in which they are formed, and regardless of their method of evolution.

The discovery of the truth in such matters is the function of morphology. It is the science that treats of homologies, and its progress has been in direct opposition to our prepossessions. Its growth has been so gradual that it is difficult to assign the proper meed of praise to those who have contributed to the progress. Cuvier's recognition of the four branches of the animal kingdom (Radiates, Mollusks, Articulates, and Vertebrates) limited the search for homologies in each group to members of the same branch or sub-kingdom. Von Baer at nearly the same time recognized still more distinctly the principles of morphology and the limitations of homologies. The transcendental philosophy of Geoffroy Saint-Hilaire, Goethe, Oken, and others, though barren in results in other fields, and even misleading to a great extent, was of some use in the diffusion of morphological ideas. Morphology and physiology were, however, in spite of the growth of science, long confused together, and the latter employed at the expense of the former in morphological questions.

A principal object of morphology is the discovery and correct appreciation of the fundamental nature and correspondence of the respective regions and organs in different animals. Comparative anatomy (i. e. the structure of the adult animal), comparative embryology in its utmost details (i. e. the anatomy of the fœtus or young in its several stages of youth), and histology, are all invoked for the solution of the questions involved in this search. Physiology is rarely of value as a guide in such investigations. The student must be ever on his guard against being influenced by apparent similarity of functions, or superficial similarities of parts which are subservient to a common purpose. The natural prepossessions with which all must to a greater or less degree start in the consideration of natural history must be also kept in check. Modifications and deviations are so innumerable, and parts that are insignificant in some become of such overshadowing importance in others, and *vice versa*, that extreme caution is necessary in making comparisons and deciding on the correspondence or homologies of parts.

Subdivisions and Definitions.—Morphological problems admit of being grouped according to the aim in view by the investigator, and the various problems which fall within this domain have been classified primarily under (1) anatomy (which again has been divided into tectology and promorphology), and (2) morphogeny (including ontogeny or embryology and phylogeny, which is based chiefly on palæontology). Such are the divisions advocated in an extensive work on morphology by Haeckel (*Generelle Morphologie der Organismen*), who defines them as follows: *Anatomy* is morphology in the narrowest sense, and treats of the entire structure of the organism. *Tectology* (or the doctrine of structure) is that science which treats of the composition of the organism from organic elements or entities of different degrees. *Promorphology* (or the doctrine of fundamental form—*Grundformenlehre*) is that science which treats of the superficial form of organic individuals, or their stereometric fundamental form. *Morphogeny*, or developmental history, is the general science of the developing form of the organism. *Ontogeny* (or embryology) is the developmental history of the organic individuals (*onta*). *Phylogeny* (or palæontology) is the developmental history of organic stems or genealogical stocks (*phyla*).

The necessity for exact expression has also given rise to a number of terms of which only those most generally used need be referred to. *Homological* parts are those which agree in structural relations, however much they may differ in functions, and presumably are modified from corresponding primitive elements. Thus the arms of man, the fore limbs of quadrupeds, the wings of birds, and the pectoral fins of fishes (and of whales) are homologues of each other; so are also the lungs of the air-breathing vertebrates and the swim-bladders of fishes. *Analogous* parts are those which agree in function, however much they may differ in structure, and may be (but not necessarily) modified from entirely different primitive elements. Thus the wings of birds and of insects are analogues (but not homologues) of each other. Of course those organs which are homologous in detail, such as the wings of different flying birds, are also analogous. *Metameric* or *serially homological* parts are those which agree in general characters and relations, and are developed in an analogous manner, but not from the identically corresponding elements. Thus the fore and hind limbs are the serial homologues of each other, as are also the different vertebræ in the same individual.

Examples.—The branch of vertebrates being that whose representatives are best understood, as well as most familiar to the educated, the application of morphological principles will be best illustrated in their case. This may be done by first taking two extremes of the class craniata, and then endeavoring to ascertain the meaning and relations of the members by the intercalation of intermediate types.

On the one hand, as the highest expression of the animal kingdom, we have man. Man is a vertebrate, erect in stature, with two limbs developed as legs and two as arms; breathing air through the medium of lungs; with a highly developed brain divided into cerebrum and cerebellum, and with a definite number of nerves connecting with certain organs and parts; a bony skeleton divided into well-marked regions —the skull, for example (in which are to be distinguished the brain-case, the lower jaw directly articulated with the former, several small ear-bones, and the hyoid apparatus), the limbs, etc. On an examination of the abdomino-thoracic cavity we find, besides an intestinal canal, a pair of lungs connecting directly with the oral cavity; a quadrilocular heart; a distinctly differentiated liver; kidneys for the secretion of urine; and highly specialized organs of generation (in the female, in connection with the ovaries, a uterus, in which the young are for some time borne, and in the male, in connection with the testicles, certain other very complicated parts).

On the other hand, by far the lowest of the craniata stands the Lancelet (*Branchiostoma lanceolata*). Although a vertebrate, inasmuch as it has a nervous chord incased in a sheath and separated by a vertebral axis from the abdominal cavity, it is without a distinct head, and has rather the aspect of a worm than of a vertebrate; the body is horizontal, and pointed at both ends; entirely destitute of limbs, as well as scapular and pelvic arches; breathes air through the medium of water; has no distinctly differentiated brain (the several regions in the higher forms not being represented as distinct elements), and the skeleton is represented by a simple notochord or persistent cartilaginous axis, which ends in a point forward, no skull being developed; the viscera are also few in number; the intestinal canal has a large perforated pharynx, and thence runs straight and without lateral curvature backward; there are no lungs or air-bladder; the heart is tubular, and not divided into partitions;

the liver is a diverticulum of the intestinal canal; the kidneys are extremely rudimentary, and the organs of generation very simple, and scarcely differing superficially in the two sexes.

Such are the extremes exhibited by the members of a universally accepted branch. If we compare these two extremes together, it is at first impossible to perceive any resemblance in whole, or even to recognize the similar or homologous parts in each. The statement so often made in popular works that all the representatives of a single branch or sub-kingdom are built upon the same pattern, and that the corresponding parts are reproduced in all, is most evidently falsified by a comparative examination of the animals in question. It would be indeed absolutely impossible to obtain an adequate conception of the correspondence of these two forms were it not that numerous intermediate types exist which enable us, by successive steps, to trace the development of the various organs and parts. The examination of these intermediate forms in their adult as well as in their embryonic condition shows us that not even the rudiments of several parts exist as such in the inferior type. It becomes evident in the course of our examination that the limbs are the development of buds which spring from the side, and these are first developed in selachians (sharks, rays, etc.). The brain becomes gradually developed and differentiated into regions, which finally become subordinate to a central mass (the cerebrum) as we ascend the animal scale, and in the lowest form the nerves alone are present to remind us of the relations of the simple brain—if so it may be called—to the specialized organ of the higher forms. The notochord in *Branchiostoma* does not represent even potentially the skeleton of the higher vertebrates, inasmuch as in them it is the result not only of development and ossification of that notochord, but also of the union therewith of elements which have originated independently of the axial skeleton: e. g. the skull in the higher forms is composed of cartilage bones (bones formed in the cartilage), as well as membrane bones, and, in part at least, the latter are the homologues of dermal plates in the sturgeon and some other fishes. The lungs in the higher forms can be readily connected by regular gradations with the single air-bladder of fishes; and the relations which that has in the generalized or lower fishes, as well as its absence in the selachians, marsipobranchiates, and *Branchiostoma* shows that it was primitively a simple diverticulum of the alimentary canal, and consequently only potentially represented by the undifferentiated surface of the intestinal canal in *Branchiostoma*. In that form, likewise, the liver, so distinct in the higher forms, is represented by merely a diverticulum of the intestinal canal, but already specialized, so as to be actually comparable with the liver.

Causes of Morphological Correspondence.—The "reason why" of the coincidences thus indicated will naturally be called for. The older naturalists assumed that they were in accordance with a "plan" instituted by the Creator in the beginning, and that the representatives of the several great branches or sub-kingdoms of the animal kingdom were constructed after an ideal pattern common and peculiar to the various members of each branch. This, however, was only another way of expressing the fact that the animals of the respective groups agree in structure. If a "plan" had been predetermined upon, and "patterns" selected for the construction of animals, any deviation therefrom would indicate subjection to a higher power and failure in ability to carry into execution the original plan. If, therefore, the plan would be evidence of prescience, the failure of execution would prove impotence in ratio to the failure. Now, as already pointed out, every type is deviated from, and innumerable exceptions interfere with every extensive generalization respecting community of structure. The idea of plan, therefore, not only fails to give any explanation for morphological correspondences, but in its actual application and failures is really in antagonism to the conception of divine creative power. The consideration of morphological problems has resulted in a general adoption of the theory that the correspondences in question are the results of generic development from the most generalized common stocks, that homology is in all cases the expression of blood relationship. This theory, at first a "working hypothesis," is now universally accepted by students of morphology, because all contrary hypotheses have long since ceased to work. For further discussion of this subject, see ANATOMY, COMPARATIVE; BIOLOGY, SKELETON, ZOÖLOGY, etc.

THEODORE GILL. Abridged by D. S. JORDAN.

Morphology, Vegetable: the comparative anatomy of plants, including a discussion of the structure, transformations, and homologies of their cells, tissues, and external parts. It has often been restricted in botanical text-books to the external parts of the higher plants, but in modern biological botany it has the scope here given.

Morphology may well begin with the cell, whose identity is recognized whatever changes of form and function it undergoes. Whether its wall be thin or thick, uniform or elaborately marked; whether it be spherical or elongated into a mere thread; whether it be simple or branched, its identity is not lost. Modern botany recognizes the fact that every cell is an organism which lives, grows, and becomes modified not only by its growth, but by external influences also. See HISTOLOGY (*Vegetable*).

In like manner the tissues and groups of tissues are recognized as special modifications of masses of originally similar cells. We may thus study the comparative anatomy of the boundary tissue (epidermis), or of the skeletal tissues (fibro-vascular bundles), or of the mass of cells constituting the bulk of any organ (fundamental tissues).

In the study of the external organs of plants many homologies may be recognized. Thus botanists now are able to reduce all the organs of plants to five categories, viz., thallomes, phyllomes, caulomes, rhizomes, and trichomes.

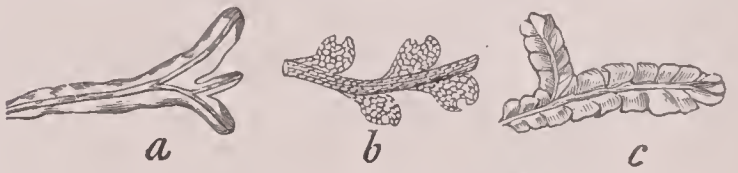


FIG. 1.—Transition from thallome to shoot: *a*, *Metzgeria*; *b*, *Cephalozia*; *c*, *Fossombronia* (all magnified).

The *Thallome* is primitively a row of cells, as in the confervas, but it soon becomes several or many celled in cross-section (as in *Enteromorpha*), or a flattened mass of one or more layers of cells (as in *Ulva* and some liverworts, Fig. 1, *a*). From this condition the passage is easy to the lobed form, with an axial portion somewhat differentiated (Fig. 1, *b*), and finally to the leafy shoot (Fig. 1, *c*).

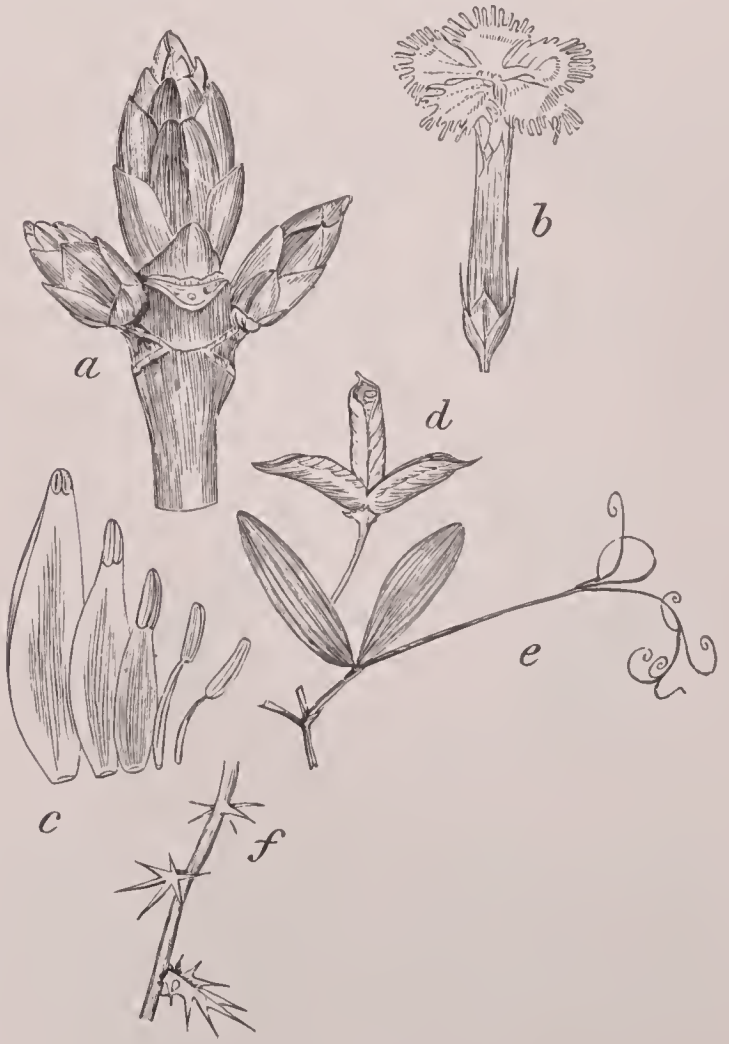


FIG. 2.—Some phyllome forms.

The *Phyllome* is always a lateral member upon an axis (caulome), and in its simplest form is derived from a lobe of the thallome. It is therefore primitively a flat struc-

ture, which is its usual form in the *green leaf*, very properly taken as the type of the phyllome. *Bracts* are underdevelopments of leaves, although still green; *scales* are not only underdevelopments, but their cell-walls have become firmer (Fig. 2, *a*); the outer *floral envelopes* (sepals) are usually similar to bracts, while the inner (petals) usually have a more delicate tissue, which is rarely green (Fig. 2, *b*); *stamens* have a petal-like tissue, usually little expanded, bearing pollen-sacs (Fig. 2, *c*); *carpels* bear ovules, around which they fold, making the ovary, or ovule cavity (Fig. 2, *d*). In *leaf-tendrils* and *leaf-spines* the framework grows much more than the parenchyma (Fig. 2, *e*, *f*).

The *Caulome* is the axial portion of the plant upon which the phyllomes are borne. The caulome with its phyllomes is the "shoot," and this is morphologically equivalent to the thallome. The typical caulome is the *stem*, which bears ordinary leaves. Other forms are *runners*, which are bract-bearing, slender, weak, and trailing (Fig. 3, *a*); *root-stocks*, more or less slender, bearing bracts or scales, and growing underground (Fig. 3, *b*); *tubers*, short and thickened, bearing scales, and growing underground (Fig. 3, *c*); *corms*, short and thickened, leaf-bearing, and subterranean (Fig. 3, *d*); *bulb-axes*, short and conical, leaf-bearing, and subterranean (Fig. 3, *e*); *flower-axes*, short and conical, bearing bracts, perianth, stamens, and pistils, and aërial (Fig. 3, *f*); *tendrils*, aërial, slender, flexible, nearly destitute of phyllomes (Fig. 3, *g*); *thorns*, aërial, conical, rigid, pointed, and nearly destitute of phyllomes (Fig. 3, *h*, *k*).

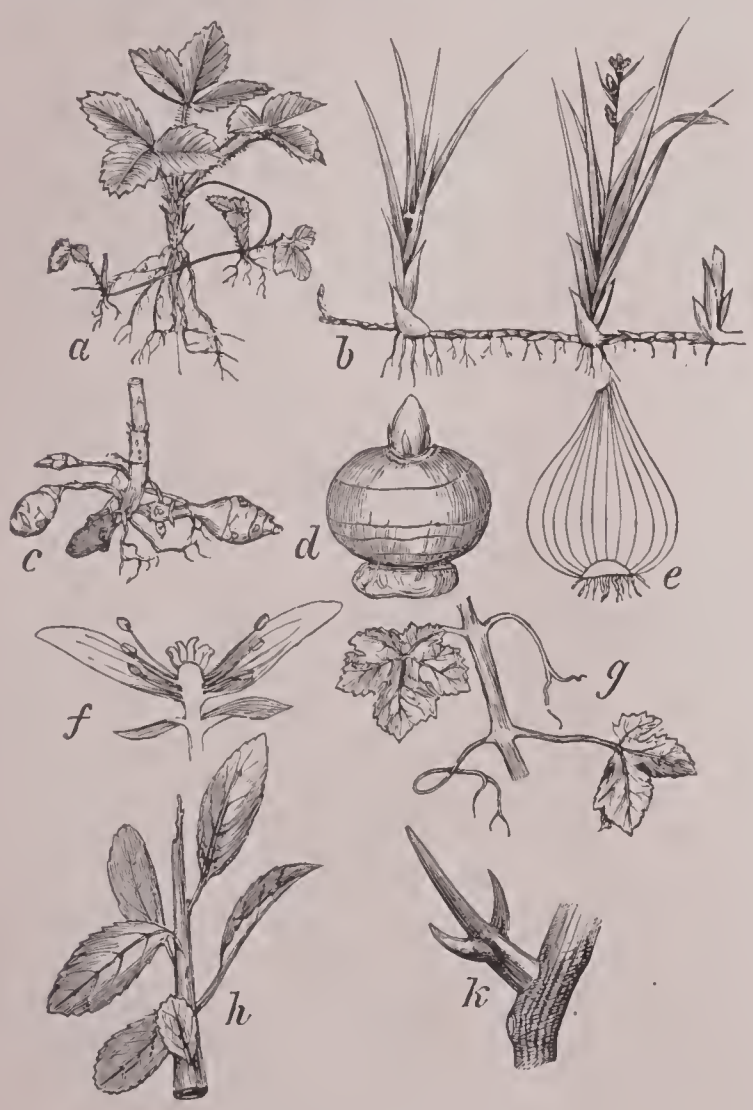


FIG. 3.—Caulome forms.

The *Rhizome** is the naked axial portion of the plant, which is terminated by a "root-cap." The *subterranean roots* of ordinary plants are typical. Common modifications of these are the *fleshy roots* of many plants. *Aërial roots* grow in the air, and often have their epidermis peculiarly thickened, as in the epiphytic orchids. The *roots of parasites* are peculiarly modified to enable them to penetrate their hosts.

The *Trichome* is a surface appendage, consisting of one or more cells usually arranged in a row, sometimes in a mass. The typical form is seen in the common *hairs* of many plants, especially those on the leaves and stems. (See HAIRS.) *Bristles* consisting of a single cell, or a row of cells, hardened and pointed at the apex; *prickles*, still stronger, and usually with a mass of cells below; *scales* (scurf) in which the terminal cell gives rise by fission to a flat, dry plate of cells; *glands* in which one or more of the cells, usually terminal, secretes a gummy, waxy, or other substance, are common examples of other trichome forms. In the *root-hairs* the single elongated cell (or in the moss-worts the row of cells) is an organ of absorption. The *spore-cases* of the FERNWORTS (*q. v.*) are trichome structures, therefore the *ovules* of flowering plants must be regarded as having the same morphological significance. See BOTANY, HAIRS, HISTOLOGY (*Vegetable*), and LEAF. CHARLES E. BESSEY.

* The prevailing use of this word for a root-stock is indefensible. The root-stock is not a root but a stem, and should not bear a name which is absolutely false, though sanctioned by long usage. It is time that this ancient error was abandoned and the term restored to its proper application.

Morphy, PAUL CHARLES: See the Appendix.

Morrill, JUSTIN SMITH: Senator; b. at Strafford, Vt., Apr. 14, 1810; engaged in mercantile business, and in 1848 became a farmer; was M. C. from Vermont 1855–67; chairman of committee of ways and means and author of the Morrill tariff of 1861; was U. S. Senator 1867–73, and was re-elected in 1872, 1878, 1884, 1890, and 1896. His term of consecutive service in Congress exceeded that of any of his colleagues. He wrote *Self-consciousness of Noted Persons* (1886). D. in Washington, D. C., Dec. 28, 1898.

Morrill, LOT MYRICK, LL. D.: legislator; b. at Belgrade, Me., May 3, 1813; was educated at Waterville College (now Colby University); became a lawyer in 1839, and removed to Augusta, Me.; entered the Legislature in 1854; was president of State Senate 1856; Governor of Maine 1858–60; U. S. Senator 1861–76; and was Secretary of the Treasury June 21, 1876–Mar., 1877; declined a foreign mission in 1877; was collector of Portland, Me., from Mar., 1877, till his death at Augusta, Jan. 10, 1883.

Morrilton: city (founded in 1880); capital of Conway co., Ark. (for location of county, see map of Arkansas, ref. 3–C); on the Arkansas river, and the St. L., Iron Mt. and S. Railway; 50 miles N. W. of Little Rock. It has cotton and grist mills, manufactories of lumber, glass, and furniture, and a monthly and two weekly newspapers. Pop. (1890) 1,644; (1900) 1,707. EDITOR OF "PILOT."

Morris: city; capital of Grundy co., Ill. (for location of county, see map of Illinois, ref. 3–F); on the Illinois river, the Illinois and Michigan Canal, and the Chi., Rock Is. and Pac. Railroad; 21 miles W. S. W. of Joliet, 61 miles S. W. of Chicago. It is one of the largest grain-markets in the West, and has extensive mines of bituminous coal in operation. There are manufactories of iron novelties, builders' hardware, paper car-wheels, tanned leather, brick and tile, oat-meal, and plows; and a Normal and Scientific School, 2 national banks with combined capital of $125,000, and 2 daily and 3 weekly newspapers. Pop. (1880) 3,486; (1890) 3,653; (1900) 4,273. EDITOR OF "HERALD."

Morris: village; capital of Stevens co., Minn. (for location of county, see map of Minnesota, ref. 8–B); near the Pomme de Terre river, which affords excellent power for manufacturing, and on the Great N. and the N. Pac. railways; 159 miles N. W. of St. Paul, 180 miles S. W. of Duluth. It is in a stock-raising and grain-growing region, and has a number of picturesque lakes in its vicinity affording good fishing. There are 6 churches, a State high school, 2 public-school buildings, 4 large grain elevators, and 2 weekly newspapers. Pop. (1880) 743; (1890) 1,266; (1900) 1,934. EDITOR OF "SUN."

Morris, ALEXANDER, D. C. L.: statesman; b. at Perth, Ontario, Canada, Mar. 17, 1826; was educated at the University of Glasgow and McGill College, and admitted to the bar in 1851. He sat for South Lanark in the Parliament of Canada 1861–72; for East Toronto in the Legislative Assembly of Ontario 1878–86; was Minister of Internal Revenue 1869–72; chief justice of the court of queen's bench of Manitoba 1872, and Lieutenant-Governor of Manitoba and Northwest Territories 1872–77. As commissioner of Indian affairs for Manitoba and Northwest Territories, he negotiated treaties with Saulteaux and Cree tribes of Indians 1873–74; acted as a commissioner for treaties with the Indians of Lake Winnipeg region in 1875, and with the Plain Crees at Forts Carlton and Pitt in 1876; and was appointed (1876) a commissioner to investigate conflicting claims to lands in Manitoba. Both as a speaker and writer he contributed much toward the adoption of the policy of confederation of the

provinces. He wrote *Treaties of Canada with Indians* (1880), and *Nova Britannica* (1884). D. at Toronto, 1890.
NEIL MACDONALD.

Morris, CLARA: actress; b. at Cleveland, O., about 1846. She received the first elements of dramatic education as a member of the ballet corps at the Academy of Music in her native city. In 1869 she played juvenile parts at Wood's theater in Cincinnati, and was afterward leading lady there. She then went to New York, and appeared at the old Fifth Avenue theater, where she excited admiration by her impersonation of Annie Sylvester in *Man and Wife*. Her success was still greater in *Divorce*, *Article 47*, *The Geneva Cross*, *Alixe*, *Camille*, and *Miss Multon*. In 1873 she made a tour through the western part of the U. S., and in 1880 fulfilled an engagement in San Francisco. For about ten years she was compelled frequently to retire temporarily from the stage through ill-health. She regained her strength, and has traveled with her own company on the Pacific coast and in the Northwest with great success. In the spring of 1894 she played an engagement in New York. Her present repertory is limited to a few plays, including *Camille*, *Renée*, and *Miss Multon*. Her forte is the emotional rather than the passionate, especially sorrow, grief, and suffering. She married F. C. Harriot in 1874, and published her memoirs in 1901. Revised by B. B. VALLENTINE.

Morris, EDWIN DAFYDD, D. D., LL. D.: minister; b. at Utica, N. Y., Oct. 31, 1825; graduated at Yale College in 1849 and at Auburn Theological Seminary in 1852; was pastor of the Second Presbyterian church, Auburn, N. Y., 1852–55; of the Second Presbyterian church, Columbus, O., 1855–67; was Professor of Church History 1867–74; and has been Professor of Theology in Lane Theological Seminary since 1874. He was moderator of the General Assembly at Cleveland in 1875; delegate to the councils of Reformed Churches (Pan-Presbyterian) in Edinburgh 1877, Philadelphia 1880, and Belfast 1884; and is (1894) a member of the committee on the revision of the Confession of Faith. He has contributed articles to various reviews, and has published *Outlines of Christian Doctrine* (Cincinnati, 1880; for use in his classes); *Ecclesiology* (New York, 1884); *Salvation after Death* (1887); *A Defense of Lane Seminary* (1893); and has edited *Scripture Readings* (1886). C. K. HOYT.

Morris, GEORGE POPE: journalist and song-writer; b. in Philadelphia, Oct. 10, 1802; removed in early life to New York, where he soon began to write for the press; published the New York *Mirror*, in connection with Samuel Woodworth, 1823–42; was the associate of N. P. Willis in publishing *The New Mirror* (1843), *The Evening Mirror*, assisted by N. P. Willis and Hiram Fuller (1844), *The National Press* (1845–46), and, assisted by N. P. Willis, *The Home Journal* (1846–64). Morris wrote a number of popular songs, including *Woodman, Spare that Tree*, *My Mother's Bible*, *We were Boys Together*, and *Near the Lake where Droops the Willow*. A complete edition of his *Poems* appeared in 1860. D. in New York, July 6, 1864.
Revised by H. A. BEERS.

Morris, GEORGE SYLVESTER: philosophical writer; b. at Norwich, Vt., Nov. 15, 1840; graduated with highest honors at Dartmouth College 1861; served in the Union army during the civil war; was tutor at Dartmouth 1863–64; studied theology and spent several years in Germany, chiefly in philosophical studies; translated Ueberweg's *History of Philosophy*, with additions (1871), and became Professor of Modern Languages and Literature in the University of Michigan 1870; resigned this position in Feb., 1880, and in the following year was appointed Professor of Logic, Ethics, and the History of Philosophy in the same institution; from 1878 to 1885 was lecturer on Ethics and the History of Philosophy in the Johns Hopkins University, Baltimore, Md. He wrote on philosophical topics in various reviews and in the *Transactions* of the Victoria Institute, London, and was the author of the following works: *British Thought and Thinkers* (Chicago, 1880); edited Grigg's *Philosophical Classics* (German), for which he wrote two works; *Kant's Critique of Pure Reason: a Critical Exposition* (Chicago, 1882); *Philosophy and Christianity*, being the Ely Lectures for 1883 (New York, 1883); and *Hegel's Philosophy of the State and of History* (Chicago, 1887). D. at Ann Arbor, Mich., Mar. 23, 1889. Revised by W. T. HARRIS.

Morris, GOUVERNEUR: lawyer and statesman; b. at Morrisania, N. Y. (now in New York city), Jan. 31, 1752; was of a wealthy family which produced many distinguished public men of New York; graduated at King's (now Columbia) College, N. Y., 1768; was admitted to the bar in 1771; was in the provincial congress of New York 1775; assisted in drafting the State constitution 1776; was in the Continental Congress 1777–80; became in 1781 assistant superintendent of finance and afterward was Robert Morris's partner in mercantile business; was one of the committee which drafted the Federal Constitution 1787; was engaged in business in France 1788–91; U. S. agent in London 1791; minister to France 1792–94; was U. S. Senator 1800–03, displaying remarkable ability and eloquence; was one of the fathers of the New York canal system, and president of the canal commission 1810–16; author of numerous essays, etc. D. at Morrisania, N. Y., Nov. 6, 1816. See Sparks, *Memoirs of Gouverneur Morris, with Selections from his Papers and Correspondence* (3 vols., Boston, 1832); Roosevelt, *The Diary and Letters of Gouverneur Morris* (1888): Annie Cary Morris, *The Diary and Letters of Gouverneur Morris* (2 vols., 1889).—His elder brother LEWIS (b. 1726, d. Jan. 22, 1798) was one of the signers of the Declaration of Independence.

Morris, JOHN GOTTLIEB, D. D., LL. D.: clergyman and author; b. at York, Pa., Nov. 14, 1803; graduated at Dickinson College, Carlisle, 1823; studied theology at Princeton, N. J., and Gettysburg, Pa., having been a member of the first class in the latter seminary; founded the first English Lutheran church in Baltimore, Md., and was its pastor 1826–59, and after intervals was pastor of Luther chapel in the same city, and at Lutherville, Md. He was the first librarian of the Peabody Institute in Baltimore, and upon him chiefly devolved the selection of the beginning of the large and valuable library, as well as its thorough organization. From his entrance into the ministry he was prominent in all movements connected with the Americanized portions of the Lutheran Church. He was a member of the first board of trustees of Pennsylvania College in 1832, and delivered annually a course of lectures on the connection between science and revelation, and on elocution in the Theological Seminary of that institution. He was the founder and in 1831–32 the first editor of *The Lutheran Observer*, and a constant contributor to the weekly church papers. He also wrote frequently for *The Evangelical* and *The Quarterly Reviews* (Gettysburg). He was the author of a number of volumes, especially *Popular Exposition of the Gospels* (1840); *Life of John Arndt* (1853); *Blind Girl of Wittenberg* (1856); *To Rome and Back Again* (1856); *Quaint Sayings and Doings concerning Luther* (1859); *Bibliotheca Lutherana* (1876); *Fifty Years in the Lutheran Ministry* (1878); translation of *Koestlin's Life of Luther* (1883); *Lives of C. A. G., T.*, and *C. A. Stork* (1886). In 1893 he organized the Academy of Lutheran Church History, and presided at its first sessions in Philadelphia in Mar., 1894. Dr. Morris also gave especial attention to entomology, and wrote two volumes on the *Lepidoptera of North America*, published by the Smithsonian Institution (1860–61). He was a contributor to *Silliman's Journal*, and a member from the beginning of the American Association for the Advancement of Science, and was the president of the Maryland Historical Society. D. in Lutherville, Md., Oct. 10, 1895. HENRY E. JACOBS.

Morris, LEWIS: poet; b. at Carmarthen, Wales, in 1834. He was educated at Jesus College, Oxford, and graduated in 1855. He was admitted to the bar in 1861, and practiced law till 1881. In 1877 he was elected honorary fellow of Jesus College and secretary of University College, Wales. He is a resident of Carmarthenshire and a justice of the peace for that county. He has published *Songs of Two Worlds* (1871; second series 1874; third series 1875); *The Epic of Hades* (1876); *Gwen: a Drama* (1879); *The Ode of Life* (1880); *Songs Unsung* (1883); *Gycia: a Tragedy* (1886); *Songs of Britain* (1887); *A Vision of Saints* (1890). H. A. BEERS.

Morris, MICHAEL: See the Appendix.

Morris, RICHARD, LL. D.: philologist; b. at Bermondsey, London, England, Sept. 8, 1833; was educated at St. John's College, Battersea; was appointed lecturer on the English Language and Literature in King's College School in Apr., 1869; was ordained curate of Christ Church, Camberwell, 1871; was elected head master of the Royal Masonic Institution for boys in 1875. Dr. Morris has been for many years one of the most efficient members of the Chaucer, the Early English Text, and the Philological Societies, and was chosen president of the latter in 1874. He published *The Etymology of Local Names* (1857); *Specimens of Early English* (1867); *Historical Outlines of English Accidence*

(1872); *Elementary Lessons in Historical English Grammar* (1874); *Primer of English Grammar* (1875); *Report on Pāli Literature* (1880); *Folk-tales of India* (1884–85), and other volumes. He has edited for the publishing societies numerous early texts, among which are *Early English Alliterative Poems* (1865); *Chaucer's Poetical Works* (1866); *Selections from Chaucer's Canterbury Tales* (1867); *Old English Homilies* (1867–73); *Spenser's Works* (1869); *Legends of the Holy Rood* (1871); *Cursor Mundi* (1874–75). D. May 12, 1894. Revised by H. A. Beers.

Morris, Robert: financier; b. Jan. 31, 1734. A native of England, he was taken by his father to North America in 1747, and after serving in the counting-house of Charles Willing in Philadelphia until 1754, formed a partnership with that gentleman's son, which continued with great success until 1793. Morris strongly opposed the Stamp Act, and against his business interests signed the non-importation agreement of 1765. In 1776 he was a delegate to the Continental Congress, and voted against the Declaration of Independence, but signed that paper on its adoption, and was twice re-elected to Congress. Throughout the war the services of Mr. Morris in aiding the Government in its financial difficulties were of incalculable value; he freely pledged his personal credit for supplies for the army, at one time to the amount of $1,400,000, without which the campaign of 1781 would have been almost impossible; he also established the Bank of North America, in 1781 was appointed superintendent of finance, and held the post until 1784, continuing to employ his personal credit to facilitate the needs of his department. Subsequently he was a member of the Pennsylvania Legislature, of the convention which framed the Federal Constitution, and from 1789 to 1795 was U. S. Senator, declining in the meantime the proffered post of Secretary of the Treasury, and suggesting the name of Alexander Hamilton for that office. After engaging in the China trade, he in his later years became involved in land speculations which resulted ruinously, and three years and a half were passed in confinement for debt. D. in Philadelphia, May 8, 1806. See Prof. W. G. Sumner, *Financier and Finances of the American Revolution* (New York, 1891); also, by same author, *Robert Morris* in Makers of America Series (New York, 1892).

Morris, William: poet and artist; b. at Walthamstow, near London, England, in 1834; was educated at the Forest School, Walthamstow, at Marlborough, and at Exeter College, Oxford; studied painting, but in 1863 devoted himself to the designing and manufacture of artistic household furniture, wall-paper, stained glass, and other decorations. In 1858 he published a small volume entitled *The Defense of Guinevere, and Other Poems*, and in 1867 *The Life and Death of Jason*, a narrative poem. His principal work, *The Earthly Paradise*, consisting of legendary and romantic tales in verse, appeared in four parts in 1868–71; *Love is Enough; or, the Freeing of Pharamond*, a morality, appeared in 1873; *The Æneid of Virgil*, translated into English verse (1876); and *The Story of Sigurd the Volsung and the Fall of the Niblungs*, a poem (1877). In collaboration with Erick Magnusson he has translated from the Icelandic *The Story of Grettir the Strong* (1869); *The Story of the Volsungs and the Niblungs* (1870); *Three Northern Love Stories* (1875); in 1887 appeared a prose translation of the *Odyssey*; in 1889 *The House of the Wolfings*; and in 1890 *The Roots of the Mountains*. In 1890 he began to publish English versions of the *Sagas*. In 1882 he published *Hopes and Fears for Art*, five lectures delivered during the five preceding years in London, Birmingham, and Nottingham. He later became a leading spirit in the Socialist League and a contributor to *The Commonweal*. A volume of socialist lectures, *Signs of Change*, appeared in 1888. D. in London, Oct. 3, 1896. Revised by H. A. Beers.

Morris, William Walton: soldier; b. at Ballston Springs, N. Y., Aug. 31, 1801; graduated at West Point 1820; promoted second lieutenant Sixth Infantry; transferred to the artillery 1824; served against the Arickaree Indians 1823; was major of mounted Creek volunteers in the Seminole war 1836–37; was breveted for gallant conduct, and during nine years' garrison duty (1837–46) gained a brilliant reputation as a military lawyer; was attached to the judge-advocate's department of Gen. Taylor's army on the Rio Grande 1846; was actively engaged in the battles of Palo Alto and Resaca de la Palma; was made prefect of police and alcalde of Tampico on the occupation of that port, and of Puebla 1847–48; in garrison New York harbor 1850–56; in Florida 1856–57; on frontier duty in Kansas 1857–58; and in Minnesota 1859–61. He was in command at Fort McHenry, Baltimore, 1860–61, where he promptly brought his guns to bear on the rioters in the memorable affray of Apr. 19, 1861. He was promoted to a lieutenant-colonelcy May 14, 1861, and shortly afterward refused to answer a writ of *habeas corpus* granted by a Maryland judge, on the ground that it had become invalid by the outbreak of hostilities. He was made full colonel of the Second Artillery Nov. 1 of the same year, brevet brigadier-general in the regular army June 9, 1862, and brevet major-general Dec. 10, 1865. He remained in command of Fort McHenry throughout the war, and died there Dec. 11, 1865. Revised by James Mercur.

Morrisburg: port of entry of Dundas County, Ontario, Canada; on the St. Lawrence, at the foot of the Rapide du Plat Canal, and on the Grand Trunk Railway; 92 miles above Montreal and opposite the village of Waddington, N. Y. (see map of Ontario, ref. 2–I). It has fine water-power, well improved, and does a large shipping business. Pop. (1891) 1,859.

Morris Dance [probably *Moorish* dance]: a rude dance common in England in the Middle Ages, and even now occasionally performed in the rural districts. The dragon or hobby-horse, Robin Hood, Maid Marian, and other fantastic characters often bore a part in it. It was generally performed by young men gaudily decorated with colored ribbons and using bells, castanets, swords, etc.

Morris Island: a low, narrow sand-island on the south side of the entrance into Charleston harbor, South Carolina, a little more than 3½ miles long, lying broadside to the ocean. Soon after the outbreak of the civil war (1861) the Confederates erected Fort Wagner and several batteries on Morris island as part of the exterior line of defenses for Charleston. The south end of the island was captured by an assault made from small boats by Union forces, July 10, 1863, and two unsuccessful assaults upon Fort Wagner, located near the north end of the island, followed July 11 and 18, the object being to get within effective breaching distance of Fort Sumter, occupying an interior line about 2,700 yards distant from Fort Wagner. After the assault of the 18th, it was determined to reduce Fort Wagner by a regular siege and this was prosecuted vigorously, a fourth parallel being established Aug. 21 at an average of 300 yards from Fort Wagner. On the 26th a sand-ridge about 100 yards in advance of the fourth parallel and 200 yards from Fort Wagner was carried by assault, and the fifth parallel established thereon. Between this parallel and the fort the island narrowed to about 30 yards in width and 2 feet in depth above high water. The navy occupied the main channel abreast the island, and co-operated in keeping down the fire from the fort. The trenches were pushed forward by the evening of Sept. 6 to the outer edge of the ditch on the side next the sea, completely masking the enemy's guns, and orders were given to carry the place by assault on the following morning. During the night the enemy evacuated the fort, and Morris island came into possession of the Union forces. See Bombardment.

Morrison: city (founded in 1855); capital of Whiteside co., Ill. (for location of county, see map of Illinois, ref. 2–D); on the Chi. and N. W. Railway; 124 miles W. of Chicago. It is in an agricultural, dairying, and stock-raising region; contains 6 churches, a large graded school, public library and museum, a national bank with capital of $100,000, a private bank, and 2 weekly newspapers; and has water-works supplying natural-spring water, thorough sewerage, electric-light plant, and several manufactories. Pop. (1880) 1,981; (1890) 2,088; (1900) 2,308.

Editor of "Sentinel."

Morrison, Robert, D. D., F. R. S.: first Protestant missionary to China; b. at Morpeth, Northumberland, England, of Scottish parentage, Jan. 5, 1782; had but an elementary education, but in 1803 succeeded in gaining admittance to the Independent Academy at Hoxton; in 1804 entered the mission college of Gosport; in 1807 was sent by the London Missionary Society to Canton, and in 1808 was appointed translator to the East India Company's factory there. While in that position he published a Chinese grammar and translated the Bible into Chinese, the New Testament appearing in 1814 and the Old, executed with the collaboration of Milne, in 1818. He next founded, at Malacca, an Anglo-Chinese college, which in 1845 was removed to Hongkong. In 1823–26 he visited England, where he created a great in-

terest for the Protestant mission in China. Immediately after his return to Canton, in 1827, he entered upon new literary undertakings in behalf of the mission. His greatest literary work is his Chinese dictionary (5 vols.), printed at the expense of the East Indian Company in Macao (1815–23), a work of great industry and scholarship, though now superseded by later works of the same kind. He died in Canton, Aug. 1, 1834. His *Memoirs*, compiled by his widow with critical notices of his Chinese works by Samuel Kidd, appeared in London (1839, 2 vols.). See his *Life*, by S. Wells Williams in the *Lives of the Leaders of the Church Universal* (Philadelphia, 1879, pp. 819–837); also W. T. Townsend's *Robert Morrison* (Chicago and New York, 1888).

Morrison, William Rails: legislator; b. in Monroe co., Ill., Sept. 14, 1825; was educated in the common schools and at McKendree College, Illinois; was admitted to the bar; was clerk of the circuit court; was four terms member and one term Speaker of Illinois House of Representatives; member of Congress 1863–65 and 1873–87. He was the leader of the tariff-reform Democrats in Congress, and was appointed an interstate commerce commissioner by President Cleveland Mar. 22, 1887.

Morristown: city; capital of Morris co., N. J. (for location of county, see map of New Jersey, ref. 2–D); on the Del., Lack. and West. Railroad; 30 miles W. of New York city. It is one of the oldest places in the State; was twice the headquarters of the American army during the Revolutionary war, and has a memorial monument on the site of Fort Nonsense, which Washington had built on top of one of the surrounding hills. The building occupied by Washington as his headquarters in 1780 was built in 1772, was purchased by the Washington Association of New Jersey in 1873, and contains priceless relics of Revolutionary days. The city is in the great Morris County peach and rose belt, has an elevation of nearly 700 feet above sea-level, and is the home of many New York business men. At Morris Plains, 4 miles from the city, is the New Jersey State Lunatic Asylum, the largest institution of its kind in the U. S. when completed, which cost $2,500,000, and has accommodations for 1,000 patients. The city has 11 churches, Young Men's Christian Association building, Young Men's Catholic Association building, 2 graded public schools, 2 parochial schools, St. Elizabeth's convent, 2 seminaries for young ladies, a classical school for boys, public library with over 10,000 volumes and lyceum hall, 2 hospitals (founded by Mrs. Brookfield and the Very Rev. Dean Flynn), 2 national banks with combined capital of $300,000, a savings-bank, a public park containing a soldiers' monument, and a monthly and 4 weekly periodicals. Pop. (1880) 5,418; (1890) 8,156; (1900) 11,267.

Editor of "Evening Express."

Morristown: town; capital of Hamblen co., Tenn. (for location of county, see map of Tennessee, ref. 6–J); near the Holston river, and on the East Tenn., Va. and Ga. and the Mor. and Cumber. Gap railways; 42 miles N. E. of Knoxville. It is in an agricultural and mineral region; has extensive quarries of variegated marble, flour-mills, stove-foundry, sash and blind and wagon factories, and 3 periodicals. Pop. (1880) 1,350; (1890) 1,999; (1900) 2,973.

Morse, Edward Sylvester, Ph. D.: biologist; b. in Portland, Me., June 18, 1838; was educated in Lawrence Scientific School, Cambridge, Mass.; from 1866 to 1871 he lived in Salem, Mass., where he aided in founding the Peabody Academy of Sciences, of which he has been curator since 1881, and in establishing *The American Naturalist*, of which he became an editor; was Professor of Comparative Anatomy and Zoölogy in Bowdoin College, Maine, 1871–74; Professor of Zoölogy in the Imperial University of Tokio, Japan, 1877–79; president of American Association for Advancement of Science 1885–87. He is the author of *Terrestrial Pulmonifera of Maine* (1864); *Early Stages of Terebratulina* (1870); *Embryology of Terebratulina* (1872); *Tarsus and Carpus of Birds* (1872); *Systematic Position of the Brachiopods* (1873); *First Book in Zoölogy* (1875; trans. into German and Japanese); *Shell-mounds of Omori* (1879); *Early Race of Man in Japan* (1879); *Ascending Process of the Astragalus in Birds* (1880); *Ancient and Modern Methods of Arrow Release* (1885); *Japanese Homes and their Surroundings* (1886); *On the Older Forms of Terra-cotta Roofing Tiles* (1892).

C. H. Thurber.

Morse, Richard Carey: general secretary of the American international committee of Young Men's Christian Associations; b. in New York city, Sept. 19, 1841; graduated at Yale College in 1861; studied at Princeton and Union Theological Seminaries; was connected editorially with *The New York Observer*, of which his father, Rev. R. C. Morse, had been a founder, until 1869, when he was called to the editorship of *The Association Monthly*, one of the early periodicals published by the international committee. Two years later he was elected to the general secretaryship of the international committee. The Christian Associations were few in number at that time, and most of them were very weak. The wonderful growth of the work in North America since then has been largely due to his efforts. He was for years the U. S. representative upon the world's committee.

Morse, Samuel Finley Breese, LL. D.: inventor, painter, and author; b. in Charlestown, Mass., Apr. 27, 1791; was the son of a clergyman; was educated at Yale College, taking his bachelor's degree in 1810. He decided to become a painter, and went to London in 1811 with Washington Allston to study in the Royal Academy under Benjamin West. In 1813 he received the gold medal for his first effort in sculpture, *The Dying Hercules*. Returning to the U. S. in 1815, he followed his profession, at the same time prosecuting his scientific studies, for which he had great fondness. He was one of the founders of the National Academy of Design in New York, and was its annually elected president for many years. He was one of the first professors of the University of the City of New York, filling the chair of Fine Arts. In 1835, in his rooms in the university, he set up his rude telegraphic apparatus, but it was not till 1844 that he was enabled to bring his invention fully before the world. By the aid of the Government he established a telegraphic line between Washington and Baltimore, a distance of 40 miles. Over this line, on May 24, 1844, from the rooms of the U. S. Supreme Court, a message was sent to Baltimore, instantaneously received, and immediately returned. From this moment the triumph of Prof. Morse was complete. He became a member of many learned societies in Europe and the U. S., and the recipient of the most flattering foreign distinctions, and at a congress of representatives of ten of the governments of Europe, specially convened for the purpose in Paris in 1858, at the suggestion of the Emperor Napoleon, it was unanimously decided that the sum of 400,000 francs should be presented to him. He wrote controversial pamphlets, poems, and magazine articles, and published *Foreign Conspiracies against the Liberties of the United States* (1835) and a few other works. D. in New York city, Apr. 2, 1872. See his *Life*, by Samuel Irenæus Prime (New York, 1875). Revised by Russell Sturgis.

Morse, Sidney Edwards: journalist; brother of Samuel F. B. Morse; b. at Charlestown, Mass., Feb. 7, 1794; graduated at Yale College in 1811; wrote for *The Columbian Sentinel* 1812–13; studied law in Judge Reeves's school at Litchfield, Conn.; established in 1815 *The Boston Recorder*, the first religious newspaper in the U. S.; was associated with his brother in inventing and patenting the flexible piston-pump 1817; published a school geography 1820, and a larger geographical treatise 1822; founded in May, 1823, with his younger brother, Richard C. Morse, *The New York Observer*, the first religious newspaper, and now the oldest weekly newspaper in New York; invented with Henry A. Munson the cerographic method of printing maps in 1839; brought out the *North American Atlas*, the *Universal Atlas*, and a new school geography, of which 100,000 copies were sold; remained senior editor of *The Observer* until 1858; spent his later years in inventing and improving a "bathometer" for deep-sea soundings. D. in New York, Dec. 24, 1871.

Morse: See Walrus.

Morselli, Enrico Agostino, M. D.: alienist; b. at Modena, Italy, July 17, 1852; graduated M. D. at the University of Modena in 1874; studied psychiatry under Livi in Reggio and anthropology under Mantegazza in Florence; subsequently became physician in charge of the Turin Insane Asylum, and Professor of Psychiatry in the medical school in that city. He was coeditor of the *Rivista sperimentale di freniatria e di medicina legale* in 1875, and of the *Archivo di psichiatria, antropologia criminale e scienze penali* in 1885. He is the author of a number of medico-legal and neurological papers. Among his published works are *Critica e riforma del metodo in antropologia* (Rome, 1880); *Suicide: an Essay on Comparative Moral Statistics* (New York, 1882); *Manuale di semejotica delle malattie mentali* (Milan, 1885); *Il magnetismo animale* (Turin, 1886).

S. T. Armstrong.

Mortality [Lat. *morta'litas*, from *morta'lis*]: liability or tendency to death; as commonly used, the ratio of deaths to population during a year, stated as being a certain number—such as 16 or 20—per 1,000, by which is meant that out of each thousand of the mean or average population of the place during the year, 16 or 20 died during the year. This ratio is also called the death-rate. For methods of ascertaining the mortality of particular localities or groups of men, and the conclusions to be drawn from comparisons of such mortalities, see LIFE-INSURANCE, VITAL STATISTICS, and LONGEVITY. In medical and hospital statistics, mortality is used to signify the ratio between the number of cases of a particular disease and the number of deaths occurring in those cases. For example, the mortality of Asiatic cholera is said to be about 50 per cent. of the cases; of yellow fever, from 15 to 50 per cent. in different epidemics; of typhoid fever, from 10 to 20 per cent.; of smallpox in unprotected persons, from 25 to 30 per cent.; of scarlet fever, from 5 to 20 per cent. in different epidemics; of diphtheria, from 10 to 25 per cent.; of pneumonia, 25 per cent.; and of women in childbirth, from 0·2 to 0·6 per cent., meaning always percentage of the number of cases observed.

J. S. BILLINGS.

Mortars [so called from resemblance to a mortar in which substances are pounded with a pestle]: short cannon for throwing shells, usually fired at angles from 35° to 45° elevation, called "vertical fire," in contradistinction to the fire of long cannon, usually made at low angles. Mortars are believed to have been the first guns used, and, though changed from age to age frequently in form of chamber, size, and projectile, in all ages they have been found too useful in their special way to be given up, or, until very recently, to be essentially altered. The "Coehorn" mortar—so called from the famous Dutch engineer, Gen. Coehorn, who first proposed them in 1674—is to-day in use, of the pattern and for the service then suggested. Monster mortars have been constructed from time to time, in the hope of producing immense destruction in bombardments with single shells each containing a large quantity of powder. (See BOMBARDMENT.) The monster mortar made by Mallet for the British Government, weighing 114,000 lb., with a bore of 36 inches and a shell of 2,912 lb., failed to be of any service; 13-inch seacoast mortars and 8-inch and 10-inch siege mortars are calibers still in use in the U. S. and some other countries. These are smooth-bores firing spherical projectiles. Recently, however, great improvements have been made in mortars by lengthening them and rifling the bore, until they are really more properly *rifled howitzers* than *mortars*. They are designed, however, for "vertical fire," are accurate, and have long range, are made of all calibers up to 12 inches or larger, fire elongated projectiles with any desired velocity up to 1,000 feet or more. The projectiles are loaded with large charges of gunpowder or high explosives, and are capable of producing very destructive effects. The mortars of 12-inch caliber have been introduced largely in the proposed armaments of the U. S. seacoast defenses.

Revised by JAMES MERCUR.

Mortar-vessels: vessels strongly built for the purpose of carrying mortars for bombardment. The bomb-ketch was of this class, but is now disused. Sometimes steam-vessels are employed. In the civil war in the U. S. a class of wide, light-draught schooners, carrying each a 15-inch mortar and a 32-lb. rifle gun, were used upon the lower Mississippi river. Against Island No. 10 mortar-vessels of another class were used. See BOMBARDMENT.

Morte d'Arthur: See MALORY, Sir THOMAS.

Mortgage [(adapted to Fr. *mortgage*) from O. Fr. *morgage*, liter., dead pledge; *mort*, dead + *gage*, pledge]: a term used in law. It will be considered under two principal divisions: I. Mortgages of land; II. Mortgages of chattels.

I. A mortgage of land is, when regular in its form, a conveyance of land for the purpose of securing the payment of a debt or the performance of an act at a specified time, with a condition that if the payment is made or the act performed at the time and in the mode prescribed, the conveyance shall be void. On the other hand, if payment, etc., is not made, the conveyance, strictly speaking, becomes absolute in the mortgagee. By the rules of the common law the enforcement of the condition was rigorous if redemption was not made on the stipulated day, no matter how insignificant the debt might be, or how great might be the value of the mortgaged estate. Furthermore, notwithstanding the fact that the mortgagee had acquired an absolute title to the property by the failure of the mortgagor to pay the debt on the day named, the debt still remained unpaid, and an action could be brought to recover the same at law. This was a necessary result of treating the mortgage, not as a security for a debt, but as a conveyance of property, title to which the grantor might reacquire by performing a stated condition. It was not until the courts of equity gained a strong foothold that any modification of the severity of this doctrine took place. The right of redemption has now become positively settled, and is regarded to be inherent in the very nature of a mortgage. The present theory in a court of equity is that a mortgage is a mere security for a debt, and that, accordingly, any attempt on the part of the creditor to obtain more than his debt and interest from the land is in the nature of a penalty, against the effect of which the court will relieve on payment of the amount actually due. On this theory the debt is the principal thing, and the land accessory. When the debt is transferred the assignee thereof is equitably entitled to the benefit of the mortgage, even without special mention; so when the debt is paid the mortgage is really extinguished, though it may in form continue. A mortgage as thus explained, being regular in point of form, has all the requisites of a deed or conveyance of land. It is signed, sealed, and delivered. There is a clause of defeasance in the deed, or if separate it is executed with due formality. The effect of the "defeasance clause" is to declare that if the debt is punctually paid or the act performed the deed is void.

There usually accompanies a legal mortgage a bond or promissory note, or other promise to pay the debt. This is advantageous to the creditor, since, if the land does not yield enough to pay the debt, he has a further remedy upon the bond or note or promise for the deficiency. Where there is no such promise the mortgagee is confined in his remedies on the mortgage. It is not material which form the contract assumes. Where no negotiable note is given, the mortgage, both in the hands of the mortgagee and assignee, is subject to all the defenses which are applicable to the debt, so that if the debt can not be collected by reason of fraud or duress or want of consideration, the mortgage can not be enforced. On the other hand, if it accompanies a negotiable note which is not yet due, it is held to be the rule in a number of States that a transfer before maturity, which would preclude a defense to the note, will have a like effect upon the mortgage. It is a cardinal rule that no agreement between the parties can take away or restrict the right of redemption. Such an agreement is regarded as a "penalty," and is accordingly inoperative. This rule does not preclude an agreement that on default of payment of interest for a specified time the entire mortgage, though not yet mature, shall become due. Such a stipulation enters into the contract, and does not curtail the right of redemption. So an agreement made after the execution of the mortgage for a new and sufficient consideration that the mortgagor shall convey his interest to the mortgagee is valid, if not under the special circumstances of the case unfair and oppressive. It is necessary to distinguish carefully between a mortgage and a conditional sale. In the one, there is an inherent right to redeem; in the other, there is not. By a conditional sale is meant a transfer of land upon a condition that on the happening of a specified event the vendor shall have the right of repurchase. There is no relation of debtor and creditor in this case, and the former owner must comply with the contract.

It is quite common to insert in a mortgage a power of sale enabling the mortgagee to sell in case of default of payment, and thus obtain the amount of his claim. This is deemed to be a valid power. It does not resemble an ordinary power of attorney, which is revocable in its nature. The power is irrevocable, being in legal phraseology "coupled with an interest"—that is, the mortgagee, having an interest in the property, has the power conceded to him as connected with his interest in order to make it more completely available. Should he transfer or assign his mortgage, the power would accompany it. When the mortgage is paid the power is extinguished. A mortgagee, though having such a power of sale, is not obliged to resort to it. He may "foreclose" in the manner hereafter explained, so that the remedies become cumulative. If on the sale a surplus is received, it belongs to the mortgagor, or if he is then dead, it passes to his heirs as the proceeds of real estate. This power is of an important nature, and liable to abuse. To guard against oppression it is regulated in a number of the States by statute, prescribing the mode of giving notice of

the foreclosure to the mortgagor and to incumbrancers, as well as of conducting the sale and giving title to a purchaser. It is not necessary that a mortgage should be given directly to a creditor. It may be executed to some person in trust for him. This is a very common case in mortgages of railway property. A single mortgage is given to a trustee to secure a number of bonds. The mortgagee is thus a trustee, and the bondholders are *cestui que trustent* or beneficiaries. As between the trustee and the debtor all the ordinary relations of mortgagor and mortgagee would attach.

Reference will now be made to the rights acquired by a mortgagee. In a common law court he is deemed to be an owner of the land by a defeasible title until the mortgage is due. After it has matured his title is absolute, subject of course to the interference of a court of equity. Confining the attention for the moment to the courts of law, it may be affirmed that, as a strict rule, the mortgagee may exercise the ordinary rights of ownership. He may, in the absence of statutes to the contrary, eject the mortgagor and take possession of the estate. He may notify a lessee whose estate has been acquired before his own to pay rent to him. So he may convey his interest to another termed an assignee, who will stand in his position and possess his rights.

A court of equity, however, will impose an equitable obligation upon the mortgagee while thus exercising his legal right. For example, if he should be in possession of the land, then called a "mortgagee in possession," he could not, as an absolute owner might do, wilfully allow the property to lie idle. He would be required to act with ordinary diligence and prudence. Should he collect any rent, it would be applied on the mortgage. After his entire claim, including interest, is paid, he is a mere trustee for the mortgagor and others interested in the land.

The theory on which the court of equity in framing its rules proceeds is that the relation of debtor and creditor exists, and that the claim upon the land is a mere security. The mortgage partakes of the nature of that which it is given to secure. When the opposing views in the two courts come in conflict, the equity doctrine modifies that which prevails in law.

From what has been said, it may readily be inferred that the rules concerning mortgages are complex and difficult of comprehension in all their branches to any but professional men. The decisions of the courts on a cursory examination seem strangely conflicting when they may in fact be harmonized by considering that the subject is being regarded either from the law or equity point of view. Thus it will be found to be stated on the one hand that the mortgage is a conveyance; that the title has passed to the mortgagee, and on his death descends to his heirs; and that he can only assign it by an instrument in the nature of a conveyance. On the other hand, it is affirmed with equal positiveness in another set of decisions (equity) that the mortgage is a mere attendant upon the debt; that the assignment of it carries the mortgage with it, even without special mention, as an incident; that the debt and mortgage both belong, in case of the mortgagee's death, not to the heirs, but to the personal representatives (executors or administrators). To reconcile these views it has only to be supposed that the equity theory fastens a trust upon him who would be deemed owner in a court of law. For example, a sale by a mortgagee to an assignee, though in the form of a conveyance, is accepted by him as qualified by the rights of the mortgagor. So if a mortgagee dies, his heir, if he takes the title, holds it in trust for the executors, etc. In some of the States this double view has almost disappeared, and the equity rule has become so predominant as substantially to displace that of the common law. Such is the case in New York and California, and some other States. These States would hold that, for nearly all purposes, the mortgagor was owner, and the mortgagee had only a lien for his debt. The only way that he could acquire any more than this would be by foreclosure.

Something further should be said in respect to assignment. In the ordinary case of an assignment of a non-negotiable debt secured by mortgage the rule of equity is that the assignee must abide by the position of the one of whom he buys. If he for any reason can not enforce the claim, the assignee can not. It is therefore a usual and wise course before purchasing to inquire of the mortgagor whether he has any defenses to the claim. If he states that he has not, and the assignee purchases on the faith of the statement, the mortgagor will be estopped from denying its truth. It is judicious, though not necessary, to take the statement in writing. After the assignment notice should be given to the mortgagor, otherwise he will be allowed any payment which he may have made to the mortgagee in ignorance of the assignment. There are certain cases in which a person can compel an owner of a mortgage to make an assignment to him. An illustration is found in the case of a first mortgagee being about to foreclose, and a second desiring to take an assignment of the prior claim, in order to protect his right.

Without further treatment of the rights of the mortgagee, reference may now be made to the estate of the mortgagor. In this respect legal opinions are not so divergent. It is now agreed that for most purposes the mortgagor is the owner. Thus when a mortgagor dies his estate descends to his heirs, and his widow has dower. He can only part with his residuary interest by a regular conveyance. So the State treats him as owner in laying taxes and in taking possession of the land under the doctrines of eminent domain. A mortgagor may carve out of his estate other mortgages, which will have priority (in the absence of statutes requiring registration) in the order of their execution.

The right of redemption in the law of mortgages is of high consequence, and distinguishes the transaction from an absolute sale. Not only the mortgagor, but every one deriving an interest from him subsequent to the mortgage, may "redeem" or, in other words, may pay the debt and the interest, and thus be relieved from the mortgage. Among those who have a right to redeem may be mentioned, by way of illustration, subsequent mortgagees and judgment creditors, heirs, tenants by the curtesy and in dower, lessees, and persons having incorporal interests, such as easements. One who redeems must take up the entire mortgage. This rule will be applied to an owner of a fractional interest in the equity of redemption, who may then enforce against the owner of other interests such portion of his claim as is equitable and just. The right to redeem can be barred by the proceeding termed a "foreclosure," to be hereafter explained. So the right to redeem may be lost where the mortgagee is in possession by a neglect to call him to account for a considerable period of time. This time is sometimes fixed by statute, as, for instance, in New York at twenty years. Still, even then, should the mortgagee by some appropriate act recognize the existence of the mortgage—as if, for example, he should begin an action to foreclose the mortgage—the right to redeem will remain.

Notice should be taken of the grounds on which a mortgage may be treated as void or voidable, or, if originally valid, of the manner in which it may lose its force and effect. A mortgage is void or voidable for any of the reasons which make contracts in general invalid, such as for want of consideration, duress, fraud, illegality, or the like. It is a frequent practice in these cases for the mortgagor or other person standing in his place to begin an action to set aside the mortgage. Mortgages having once been valid may become inoperative by reason of a material or fraudulent alteration made by the creditor, or by merger or extinguishment, by release or other discharge, or by payment or by tender. Payment of the debt has the effect of extinguishing the mortgage. No reconveyance to the mortgagor is in general necessary. In order to remove from the registry all appearance of a claim upon the land, a written statement in a form prescribed by law, setting forth the fact of payment, is taken from the mortgagee. This is also registered. Such statement may be exacted by a court of equity, should a mortgagee decline to give it. The tender of the amount of the debt upon the prescribed day, though unaccepted, destroys the lien of the mortgage, though it does not discharge the debt. Some of the States give the same effect to an unaccepted tender made after the mortgage has become due. Lapse of time, according to the ordinary rules of law, may lead to a presumption of payment, which may, however, be rebutted. Sometimes there is a positive bar to any claim by force of the Statute of Limitations. (See LIMITATION OF ACTIONS.) The debt may in some instances be barred by this statute when the mortgage is not, as where different periods of time limit the right to proceed upon the debt and the mortgage respectively. While the debt continues no change in its form is fatal to the mortgage. Thus if a new note is given in the place of an old one, or the time of payment is extended, the debt remaining unchanged, the mortgage is still in force.

On the death of a mortgagor an important question frequently arises as to the fund from which satisfaction of the mortgage is to be made, or, in other words, whether pay-

ment is to be made from the real or personal estate. The general rule is that it must be made from the personal property rather than from the real estate. As the real estate, by the rules of the common law, passes to the heirs, and the personal property to the executors or administrators, the latter are accordingly primarily liable to pay the debt. A result of this rule is that the heirs become "sureties" for the executors, and if they are made to pay are allowed to proceed against the personal property. This rule has been changed by statute in England and in a number of the U. S., and the burden of paying the mortgage cast primarily upon the heirs. Under these statutes the executors become sureties for the heirs. The rule may be affected by evidence of the intent of the mortgagor that the burden of the debt shall be cast on either the one or the other portion of his estate. It has no application to the case of one who did not himself borrow the money, but acquired the estate subject to the mortgage, for in that instance his successor takes the property with its burdens.

Questions frequently arise as to the apportionment of the burden of the mortgage among different owners. It is a general rule that where a number of owners of land affected by a single mortgage stand in the same position as to rights, they must bear the burden equally. Accordingly, if one is called upon to pay the whole, he has a right to enforce a proportionate part of the mortgage against the owners of the remaining lots. This case may be illustrated in this wise: Suppose that there is a mortgage upon a farm which is subsequently divided into village lots and sold in such a way to purchasers that one is entitled to no preference over another. In this case every purchaser should pay a proportional part of the mortgage. This would be plain if the lots were sold to different persons contemporaneously. If, on the other hand, they had been sold successively to purchasers paying the full price, the earliest purchasers, according to the present prevailing opinion, have a superior right or "equity" to the later ones. The lots last sold would be primarily liable to pay the mortgage. If a foreclosure should take place and a sale be had to satisfy the mortgage, the lots would be sold in the "inverse order of alienation," i. e. the lots sold last by the mortgagor would be sold first on the foreclosure to pay the mortgage. The result would be that as soon as enough had been realized to pay the mortgage, further sales would not take place, and the lots first sold by the owner would accordingly be altogether relieved. These principles would not be recognized in case the earlier purchaser bought subject to a portion of the mortgage or assumed its payment. In that case he would be obliged to bear the burden that he had taken upon himself.

It is proper to state more comprehensively the general effect of a purchase of land subject to a mortgage. There are several forms of expression used in conveyances which must be carefully distinguished. Thus one may buy "subject to the mortgage," or he may "assume its payment." In the first case he is not personally chargeable. The land may be taken, but he is not required to pay from his own means. On the other hand, if he "assumes the payment" he becomes personally liable. The importance of the distinction may be seen from the following supposition: If one had bought "subject to a mortgage," and the land had diminished in worth so that its value was greatly inadequate to satisfy the debt, the land would be relinquished, but no further charge upon the purchaser could be made; if he had "assumed the mortgage," he would be personally responsible for the deficiency. These rules will be applied if the clauses referred to are in the purchaser's deed, even though he does not attach his signature to it. He can not take title under the instrument without accepting all its provisions.

Whenever a person holding the position of a surety is made to pay a mortgage, he is entitled to stand in the mortgagee's place and enforce the mortgage for his own benefit. This is known as the doctrine of subrogation. See SUBROGATION.

It remains to refer to the matter of foreclosure. The effect of the court of equity taking jurisdiction to allow a mortgagor in default to redeem the land, was to allow the mortgagee to file a bill in equity for the purpose of having the time fixed within which the mortgagor should exercise his right to redeem. Originally the only object in filing the bill of foreclosure was to fix a time within which the mortgagor must pay the debt or lose the property. This was called a bill of strict foreclosure. The object of the foreclosure suit is usually to obtain a decree that the property be sold, and the proceeds applied in payment of the debt. The surplus, if any, goes to the mortgagor. The mortgagee begins his proceedings by making parties to it all who have a right to redeem. If they are omitted, the proceedings are ineffectual as far as they are concerned. The creditor may at his option refrain from a foreclosure, and may collect his debt by an ordinary action. In some of the States he is allowed by statute in a single action to foreclose his mortgage and to have a judgment for any deficiency. The subject is largely regulated by statute, and is a matter of detail which must be examined in the books of practice in the respective States. After foreclosure the title vests absolutely in the mortgagor or purchaser, as the case may be. There may also be a foreclosure under a power of sale. There are also special statutory modes adopted in some of the States. For further information on the general subject, see Jones *On Mortgages*, Fisher *On Mortgages*, Washburn *On Real Property*, Kent's *Commentaries*, title *Mortgages*.

A mortgage, as heretofore explained in this article, has all the requisites of a deed or conveyance of land. It is signed, sealed, and delivered; there is a clause of defeasance in the deed, or, if separate, it is executed with due formality. The effect of the defeasance clause is to declare that if the debt is not punctually paid, or the act performed, the deed is to be void. While every mortgage is in form a conveyance of property, it is evident that where property is conveyed by a deed absolute on its face, with an oral understanding between the parties that the grantee is to hold the land only as security for the payment of the debt, the deed can not be treated at law as a mortgage. A court of equity, however, in such a case will confer upon the creditor the same rights and impose upon the grantee the same obligations that would have been created had the mortgage in fact been executed. Hence it is often said that a deed absolute on its face, if in fact intended only as security of the payment of a debt, is considered in a court of equity a mortgage. A court of equity will in certain cases where a mortgage has not been created by the parties recognize an equitable right in a creditor to treat land as security for the payment of his debt. Thus in England it is held that an equitable mortgage can be created by the mere deposit of title deeds. The theory upon which this doctrine is established is that the deposit of the title deeds is evidence of an agreement on the part of the person depositing them that the land shall stand as security for the payment of the debt, and that he will execute a mortgage thereof. The equitable mortgagee is therefore in such a case entitled either to ask that the land be sold, and the proceeds thereof applied in extinguishment of the debt, or that the equitable mortgagor execute a legal mortgage thereof. This doctrine is inconsistent with the statutes of frauds, and has been adopted only to a very limited extent in the U. S. (Jones *On Mortgages*, 4th ed., § 185.) The lien which a court of equity gives an unpaid vendor of land to secure the payment of the purchase money is another instance of a so-called equitable mortgage. This doctrine rests not upon the contract or agreement of the parties, but upon the broad principle that it would be unjust if the vendor were not allowed to look to the land as security for the purchase money.

II. CHATTEL MORTGAGES.—This subject has assumed much importance in modern times, though it received scarcely any attention in the earlier law-books. A mortgage of personal property is in law a conditional sale. It differs from a pawn or pledge in the fact that the latter is a bailment (see BAILMENT), the ownership remaining still in the bailor. If the debt is not paid on the appointed day, the title to the mortgaged chattel becomes, in the view of a court of law, absolute in the mortgagee. Still, even in that case a court of equity may interfere and enforce in favor of the mortgagor an "equity of redemption."

There is considerable danger that chattel mortgages may be resorted to by unscrupulous debtors as a mere pretext, and with a view to withdraw their property from the reach of their creditors. Such an act of withdrawal would be regarded as a fraud upon the creditors, and might, at their instance, be declared void. To insure publicity in this class of cases, it is provided by legislation in a number of States that the mortgage, when there is no change of possession, shall be filed in some public office. A failure to comply with this regulation would usually make the transaction void as to creditors and as to purchasers in good faith from the mortgagor, though the mortgage would still be binding as to the original parties and as to purchasers with notice of all the facts. It is in some instances further provided that

if the debt secured by the mortgage duly filed is not paid within a brief period (e. g. a year), there shall be a public declaration, filed by the mortgagee in the same office, of the continuance of the indebtedness. A non-compliance with this regulation is visited with similar penalties.

If the mortgage be valid, and be not paid at the appointed day, the remedy of the mortgagee to cut off the right of redemption is to foreclose by an action in equity. So he may sell under a power of sale, giving due notice to the debtor of the time and place of sale, and holding himself accountable to the mortgagor for any surplus realized above the amount of his claim. The subject may be further pursued in the works on mortgages already referred to, and in the statutes of the respective States, and in the reports.

Revised by WILLIAM A. KEENER.

EUROPEAN LAW.—*Historically*, the law of pledge or mortgage has regularly developed in one of two ways: 1. The earliest form, especially applicable to chattels, is the pledge *with possession* (Lat. *pignus*, Old German, *wette*, Mediæval Lat. *vadium*, French, *gage*). The pledgee has the right to keep the pledge until the debt is paid; by agreement he may also have the right of selling the pledge if the debt is not paid at the proper time. When this form of pledge is extended to realty, the right of using the property, of enjoying its yield or income (*fructus*), is regularly accorded to the pledgee: so in the Græco-Roman *antichresis*, and the Old German *Sate* or *Satzung*. In the Greek law it came to be recognized that the rights of a pledgee (right to possess, right to sell) might be created by contract without delivery of possession, and the Romans borrowed from the Greeks both the institution and the name (*hypotheca*). 2. A second and very early form of pledge or mortgage, which is especially applicable to realty, appears as soon as methods are devised for conveying title or ownership *without possession*. Debts are then secured, as in the English law, by conveying to the creditor full ownership of a piece of land or other property, with an agreement for a reconveyance whenever the debt shall have been paid. The older Roman law had such a form of mortgage in the *fiducia*; but this was afterward discarded in favor of the *hypotheca*, and in the later Roman law *pignus* and *hypotheca* were practically identical. Among the Teutonic peoples, in the Middle Ages, two methods of conveying title without delivering possession were gradually worked out—(*a*) by delivery of a deed, with a purely symbolical (i. e. fictitious) investiture; and (*b*) investiture in court, at the close of a real or fictitious law-suit. Both methods were employed to furnish security for the payment of debts. The delivery of a deed or "book" of land was a common method of establishing mortgage in Saxon England. In the Frankish empire judicial conveyance was usually employed to create the rights of ownership and of mortgage. A notice of the transaction was regularly entered in the records of the court. As early as the thirteenth century special registers of conveyances and mortgages were kept in some of the German cities. The reception of the Roman law, toward the close of the Middle Ages, brought two antagonistic systems face to face. Teutonic custom recognized no mortgage of realty without judicial registration, no pledge of personalty without possession (*Faustpfand*, *nantissement*). The Roman law recognized secret contractual mortgages of realty and personalty alike. In Teutonic custom all mortgages and liens were special; the Roman law recognized general mortgages and liens. In the main, the Teutonic rules held their own in Germany and in Northern France, and in modern European legislation they have more than held their own.

Modern legislation tends to require *publicity* of conveyances and mortgages, and *specialty* of mortgages and liens. As regards realty, secret (unregistered) mortgages either affect the parties only or are wholly ineffective. General mortgages and liens are abolished or are limited in their operation by requiring them to be imposed by registration on special pieces of property. The most advanced legislation, in these respects, is to be found in the states of the German empire, especially in Prussia. Out of the mediæval city registers have grown the modern German land-books (*Grundbücher*). They are judicial records, kept by the ordinary court of first instance in each judicial district, and they are arranged on the "lot system," i. e. a special page is devoted to each city lot or country field. (See RECORDING, etc.) These land-books enjoy *publica fides*, i. e., he who obtains an entry of conveyance or of mortgage from the person registered as owner, or an assignment of mortgage from the registered mortgagee, is protected against all claims and defenses which do not appear on the register.

Other European countries have registers of conveyances and mortgages, but they are usually kept like the registers used in the U. S., with no attempt to separate the entries affecting special pieces of property, and the registration of a mortgage simply gives it priority over earlier unregistered mortgages. Where registers are kept in this fashion no attempt is made to give them *publica fides* in the German sense.

As regards movable property, the tendency of European legislation is to require the transfer of the things mortgaged into the hands of the mortgagee and to refuse recognition to the chattel mortgage without possession. This is the system of the *Code Napoléon* and of European commercial codes generally.

LITERATURE.—Gide, *Le Régime Hypothécaire en Prusse* (Paris, 1873); Achilles, *Grundeigenthum und Hypothekenrecht* (Berlin, 1881). MUNROE SMITH.

Mortier, mōr'ti-ā', ÉDOUARD ADOLPHE CASIMIR JOSEPHE: soldier; b. at Cateau-Cambrésis, in the department of Nord, France, Feb. 13, 1768; received a mercantile education, but entered the army in 1791; was made a general of division in 1799, and marshal in 1805; fought with distinction in Germany, Spain, and Russia; was made Duke of Treviso after the battle of Friedland 1808, and a peer of France during the first Restoration; accompanied Louis XVIII. across the frontier, but returned to Napoleon during the Hundred Days; was commander-in-chief of the Fifteenth Military Division after the second Restoration; went as ambassador to St. Petersburg in 1832; took charge of the ministry of War for a short time in 1834, and was killed by Fieschi's infernal machine on the Boulevard du Temple, Paris, July 28, 1835.

Mortification: See GANGRENE.

Mortimer, ROGER: Earl of March, Baron of Wigmore; b. on the Welsh frontier about 1287; was knighted, and served under Edward I. in the Scottish war 1306–07; was employed in high offices under Edward II. in Scotland and France; joined the Earl of Lancaster in his rebellion against the king's favorites 1320; was captured at the battle of Boroughbridge 1322, and imprisoned in the Tower; escaped to France by the connivance of Queen Isabella; entered the service of King Charles IV. of France, then at war with England; met Isabella at her brother's court at Paris 1325; plotted with her against her husband; obtained possession of the young Prince Edward, heir to the throne; landed with Isabella at Orwell, Sept. 24, 1326; was joined by the great nobles; deposed Edward II. Jan., 1327; proclaimed the young prince as king (Edward III.); ruled the kingdom in his name; was created Earl of March; murdered the deposed king at Berkeley Castle Sept. 21, 1327; offended the people, the nobles, and the king by his cruelty and arrogance; was seized by the king and Lord Montacute at Nottingham Castle; attainted by a new Parliament called at Westminster, and was hanged at Tyburn, Nov. 29, 1330. His attainder was reversed as illegal in 1354, and the title and estates restored to his grandson, who by alliance with the royal family was ancestor of the Tudor and all later sovereigns of England.

Mort'main [from O. Fr. *mortemain*; *mort*, fem. *morte*, dead + *main*, hand. Cf. Fr. *main morte*]: the perpetual tenure of land by corporations. More commonly, however, the term is used to designate the holding of land by the Church, by religious corporations and pious foundations. The expression *manus mortua*, which occurs in public documents as early as the middle of the ninth century, is probably derived from the fact that persons who became members of religious corporations and ecclesiastical communities were civilly dead—that is, were regarded in the law as dead, so that property held by them was, as it were, in dead hands. The amount of the lands which during the Middle Ages and the centuries immediately succeeding passed into the hands of ecclesiastical proprietors, of churches, cathedrals, chapters, abbeys, convents, and every other species of religious corporation, and which were thus in mortmain, throughout all the countries of Europe was enormous. The influence of the Church was constantly exerted to procure additional gifts from the laity, and its policy permitted no alienation of what had once been obtained. This policy tended more and more to bring about a condition of affairs which was wholly incompatible with the welfare of the state and of society. The feudal system was a vast pyramidal organization of society, supported in every part, on its political as well as its social and economic sides, by

the feudal tenure of lands. This was a qualified and precarious land ownership, in which every man was the tenant of a superior owner or lord; a tenure based on an inflexible obligation to render military or other service to such lord, so qualified that it could be continued in the tenant and his heirs only at the cost of many burdensome exactions, and so precarious that any one of several causes might bring it to an end and throw the estate back into the hands of the lord. It was out of the precarious and incidental features of this tenure—the successions upon the death of tenants, the wardships and marriages of tenants' children, the escheats upon the failure of heirs—that the feudal state drew most of its nourishment. It was with this condition of things that the Church, by her policy above described, found herself at war. In consequence of the perpetuity of the ecclesiastical organizations, the tenacity with which they clung to all lands that came into their grasp, and their guaranteed freedom from ordinary feudal exactions, they withdrew, so far as the state was concerned, so much land from productive to non-productive uses—in other words, from living to dead hands—that they constituted a serious menace to the safety of the state. It was from sound considerations of policy, therefore, that the governments of Europe at an early day resorted to repressive measures against mortmain. The first of these measures subsequent to the overthrow of the Western Roman empire was an edict of the Emperor Frederick Barbarossa, who in 1158 prohibited the transfer of fiefs to the Church without the consent of the superior lord, and the same was subsequently enacted by Louis IX.

English legislation against mortmain begins with *Magna Charta* (A. D. 1217), and continues down to the fifty-second year of Victoria (1888). The provision in *Magna Charta* (cxliii.) went no further than to forbid the giving of lands to a religious house to be taken back again by the donor as tenant of the corporation; but it was construed by the courts as an absolute prohibition against the granting of lands to religious houses. The law must have speedily fallen into disuse, however, for the complaints against the practice of mortmain are almost continuous from the era of the Venerable Bede, in the eighth century, down to the statute *de viris religiosis*, "the statute of mortmain" *par eminence*, in 1279. (7 Edw. I., stat. ii., c. 13.) The preamble to this act recites the fact that notwithstanding the prohibition of Magna Charta, religious men continue to acquire the fee of lands, "whereby the services that are due of such fees, and which at the beginning were provided for defense of the realm, are wrongfully withdrawn, and the chief lords do lose their escheats of the same," and it is thereupon ordained that no alienation of lands by or to "any person, religious or other," "whereby such lands or tenements may anywise come into mortmain," should be valid. The act provided for its own observance by ordaining further that the lands so attempted to be conveyed should be forfeited to the next chief lord of the fee or to the crown.

Although this statute applied to all corporations, whether religious or secular, it was the ecclesiastical establishments that were most affected by it, and the next 100 years were occupied with the strenuous but futile struggle of the Church to evade or destroy the legislation against mortmain. This conflict was in part a diplomatic struggle between Rome and Westminster, but the real contestants were the lawyers on the part of the Church and the Parliament on behalf of the crown and the territorial lords. The fictitious suit known as a *recovery*, the practice of conveying lands to certain persons to hold to the *use* of others, were among the devices originated and carried into effect by the ingenuity of the lawyers in order to evade the Mortmain Act. They were so far successful that Parliament was compelled to meet each legal device with new and more radical legislation. The practice of conveying lands to be held in mortmain by "suffering a recovery," as it was technically known, was swept away by the second statute of Westminster (13 Edw. I., c. 32, A. D. 1285), and the similar abuse of the doctrine of *uses* by an act passed in 1391 (15 Ric. II., c. 5). Neither of these acts infringed upon the new modes of conveying lands by recovery or by use, except to render them invalid for the purpose of conveying lands to be held in mortmain. As will be noticed, the mortmain acts applied only to alienations *inter vivos*, there being at common law no right to devise lands by will, and the Statute of Wills (32 Hen. VIII., c. 1, A. D. 1540), which first made it possible to dispose of lands by will, expressly excluded corporations from its benefits. The subsequent history of the law of mortmain can be briefly stated. The principles of the legislation which has been sketched above, as well as the laws themselves, have kept their place in English jurisprudence. A few changes have nevertheless been made. By a series of judicial interpretations the power of *devising* lands to corporations for *charitable uses* was established and the object of the mortmain acts to that extent frustrated, but it was still held that the corporation must have the license of the crown to hold the lands, and by recent legislation the power to make any gift of lands to charity *by will*, whether to a corporation or not, has been wholly taken away, though there are a few exceptions in favor of gifts to the two universities and for certain educational and other public purposes. Cf. 9 Geo. II., c. 36; 51 and 52 Vic., c. 42.

There are, strictly speaking, no general laws against mortmain in the U. S., except in Pennsylvania. The absence of the feudal *régime*, for whose protection such laws were rendered necessary in Europe, and still more, perhaps, the lack of any causes of irritation—owing to the comparative poverty of religious corporations and the cheapness and abundance of land in the Western World—sufficiently account for the dearth of such legislation in the U. S. There are not wanting signs, however, that this indifference to corporate and especially to ecclesiastical ownership of land may not be the permanent attitude. The growing wealth of the churches and the increasing value of landed property may, before many years, require some readjustment of the relations of corporations to the state and society. The symptoms of such a tendency are already observable in the growing sentiment in favor of the taxation of Church property for the support of the state, as well as in the general disposition to limit the amount of property which even charitable corporations, as the higher institutions of learning, may hold.

Corporations are legal persons, and at common law, unrestrained by statutes of mortmain, have the same capacity to take and hold lands that natural persons have. In the U. S., as in England, they are usually prohibited from acquiring or holding more land than is necessary for the purposes of their incorporation. Ordinary or business corporations can not take land by devise; charitable corporations, however, are usually allowed to take it both by deed and by will. In a few of the States there are statutes restricting the creation of charitable uses by will, somewhat resembling the English statute of 9 Geo. II. Thus it is provided in New York that no testator leaving a wife, child, or parent shall devise or bequeath to a charitable institution or association more than one-half of his property, deducting his debts; but this is not, properly speaking, a statute of mortmain, not being aimed at the ownership of lands by corporations as such, but being a paternal limitation on the power of devise in favor of the natural objects of a testator's bounty. See Shelford *On Mortmain*; Digby's *History of the Law of Real Property*; Leake's *Digest of the Law of Land*.

GEORGE W. KIRCHWEY.

Morton, HENRY, Ph. D.: physicist; b. in New York city, Dec. 11, 1836; graduated at the University of Pennsylvania 1857, and then studied law in Philadelphia for nearly two years, and during that time lectured on chemistry and physics at the Episcopal Academy, originating the scientific course in the curriculum of that institution, and filling a chair created for him, when his growing predilection for physical and for chemical science induced him to give them his entire attention. In 1863 he was elected Professor of Chemistry at Philadelphia Dental College; in 1864 became resident secretary of the Franklin Institute of Pennsylvania, and in April of that year began the delivery in the Academy of Music of Philadelphia of a course of sixteen lectures on light, which excited great attention both in the U. S. and in Europe, on account of the originality and brilliancy of their experimental illustrations. (See *Les Mondes*, vols. xviii., *seq.*) These lectures were the first of their kind. In 1867 Prof. Morton became editor of the *Journal* of the Franklin Institute, and during the academic year 1867–68 filled temporarily the chair of Chemistry and Natural Philosophy in the University of Pennsylvania. In 1869 he organized the photographic parties sent to observe the solar eclipse of Aug. 7, under the auspices of *The Nautical Almanac* office. In 1869 he was elected Professor of Chemistry in the University of Pennsylvania, and in 1870 was appointed president of the Stevens Institute of Technology at Hoboken, N. J., then just founded. President Morton has published a number of papers in scientific

journals. Among them may be noted those *On the Giffard Injector*, *On the Bright Line beyond the Moon's Edge in Partial Phase-eclipse Photographs*, *On the Fluorescent Relations of Anthracene and Chrysogen*, *On the Fluorescent Relations of Some Solid Hydrocarbons found in Petroleum Distillates*, *On the Fluorescent Relations of Pyrene and Chrysene*, *On Thallene, a Solid Hydrocarbon produced in the Destructive Distillation of Heavy Petroleum Oils*, *On the Basic Salts of Uranium*, *On the Fluorescent and Absorption Spectra of Uranium Salts*, the latter comprising seven papers prepared in conjunction with Dr. H. C. Bolton (*Chemical News*, vol. xxviii., 1873; *Moniteur Scientifique*, vols. xv. and xvi.). COLEMAN SELLERS.

Morton, JAMES DOUGLAS, Fourth Earl of: regent of Scotland; b. at Dalkeith about 1530; was a younger son of the family of Angus, and succeeded to the earldom and estates of Morton in right of his wife 1553. He became a lord of the Congregation 1557, and Lord High Chancellor 1563. He took a leading part in the murder of Rizzio 1566; escaped to England, but was soon pardoned and returned. He joined the confederacy of the nobles against Mary and Bothwell, discovered the Casket Letters, and led the van in the battle of Langside, where the forces of the queen were routed. He was elected regent in Nov., 1572, but his policy raised up enemies on all sides. In 1577 he resigned and retired to Lochleven Castle, and though he recovered his authority soon afterward, was overthrown by the influence of the new royal favorites, Esme and James Stewart; tried and convicted of participation in the murder of Darnley, and executed in Edinburgh, June 3, 1581.

Morton, JAMES ST. CLAIR: military engineer; b. in Philadelphia in 1829; graduated at the U. S. Military Academy in 1851; rose to be major of engineers in July, 1863. After various services he became engineer in charge of the Potomac aqueduct; led the Chiriqui expedition, Central America, in 1860; on his return resumed charge of the Potomac waterworks, and subsequently superintended the fortifications on the Tortugas; in May, 1862, reported to Gen. Buell as chief engineer of the Army of the Ohio; in Oct., 1862, was chief engineer of the Army of the Cumberland; commanded the pioneer bridge-brigade of that army, and became brigadier-general of volunteers, dating from Nov. 29, 1862; constructed the intrenchments about Murfreesboro; took part in the capture of Chattanooga, and superintended the engineering operations at Chattanooga under Gen. Rosecrans; in the Richmond campaign of 1864 served as chief engineer of the Ninth Army-corps, and was killed at the assault of Petersburg, Va., June 17, 1864. He wrote *A Memoir on American Fortifications*, etc.

Morton, JOHN: cardinal and Archbishop of Canterbury; b. at Bere, Dorsetshire, England, about 1420; educated at Cerne Abbey and Baliol College, Oxford; became prineipal of Peckwater Inn, now Christ Church; was present at the battle of Towton, and escaped with Queen Margaret to Flanders; attainted of high treason 1461; pardoned and attainder reversed 1471; made master of the rolls 1472; Archdeacon of Winchester 1474; appointed by Edward IV. ambassador to the Emperor of Germany and the King of France; Bishop of Ely and Lord Chancellor 1478; imprisoned by Richard III. 1483, but escaped to the Earl of Richmond in Flanders; was made privy councilor by Henry VII. 1485, Lord Chancellor 1486, and Archbishop of Canterbury in July of the same year; was made cardinal by Pope Alexander VI. 1493. D. at Knoll, Kent, Sept. 15, 1500.

Morton, LEVI PARSONS, LL. D.: Vice-President of the U. S.; b. in Shoreham, Vt., May 16, 1824; in 1840 engaged in mercantile business at Hanover, N. H., in 1848 in Boston, Mass., and in 1854 in New York, where he became a banker in 1863; was Republican M. C. from New York 1879–81; U. S. minister to France 1881–85; candidate for U. S. Senator from New York in 1885 and 1887, but was not elected. He was elected Vice-President of the U. S. by the Republicans Nov. 6, 1888, and Governor of New York, Nov. 6, 1894.

Morton, NATHANIEL: historian; son of George Morton, an early emigrant to Plymouth, Mass., and author of *Mourt's Relation*, an account of the founding of Plymouth colony; b. at Leyden, Holland, in 1613; was taken by his parents to Plymouth, Mass., on the Ann, in 1623; after his father's death was taken into the family of Gov. Bradford, whose wife was his mother's sister; early became assistant to his uncle in the management of public affairs, and by annual popular election was secretary of the colony from Dec. 7, 1647, until his death at Plymouth, June 29, 1685. In 1669 he published at Cambridge the first regular history of the colony, under the title *New England's Memoriall, or a Brief Relation of the most Memorable and Remarkable Passages of the Providence of God manifested to the Planters of New England*. Other editions were printed in London (1669), Boston (1721, with supplement by Josiah Cotton), Newport (1772), Plymouth (1825), Boston (1826, with valuable notes by Judge John Davis), and Boston (1855, with notes). The work was compiled at the request of the commissioners of the four united colonies, was chiefly based upon MS. of Gov. Bradford, was attested as correct by the most eminent survivors of the earlier generation, and until the recovery of Bradford's own history (1855) was the chief early authority for the history of Plymouth colony. Morton also wrote a synopsis of the Church history of Plymouth (1680, published by Young in his *Chronicles of Plymouth*, 1841), etc.

Morton, OLIVER PERRY: See the Appendix.

Morton, THOMAS: adventurer; b. in England about 1575; was a lawyer at Clifford's Inn, London; was leader of the colony sent by Weston to settle in Massachusetts June, 1622; went back to England; returned with Capt. Wollaston in 1625; settled at Mt. Wollaston, now Braintree, where on May Day, 1626, he presided over a scene of merriment very obnoxious to Puritan ideas, setting up a May-pole and naming the spot Ma-re Mount or Merry Mount. The people of Plymouth, hearing of these proceedings, came in force two years later, headed by Capt. Miles Standish, cut down the pole, carried Morton away, and sent him back to England. He returned to Massachusetts in 1629, but was again seized and transported, and his house torn down 1630. He published a satirical work, *The New English Canaan* (Amsterdam, 1637); went again to Massachusetts 1643; was imprisoned a year for his "scandalous book"; removed to what is now Maine. D. about 1646. See John L. Motley's novels, *Morton's Hope* (1839) and *Merry Mount* (1849); also Hawthorne's story, *Merry Mount*.

Morton, W. T. G.: See the Appendix.

Mortuary: a building for the temporary care of dead human bodies; a dead-house. The chief purposes of a public mortuary are to relieve poor people from the necessity of eating and sleeping in the same room with a corpse during the interval between death and burial, to isolate and properly to treat the bodies of those who have died of contagious and infectious diseases so as to prevent them from being the means of the spread of such diseases, and to provide for the care and identification of the unknown dead and of those bodies which require judicial investigation. Such institutions were first established in Austria in 1771, and by Hufeland in Weimar in 1791; they were also proposed by Thiery in his *La vie de l'homme respectée et défendue dans ses derniers momens* (Paris, 1787), were built in Berlin in 1797, in Munich in 1818, and since then have been erected in most of the large cities of Europe. One of the original arguments for their construction was that they would prevent the danger of premature interment, a danger which was then supposed to be much greater than it is now believed to be.

In Europe, as a rule, mortuaries are placed either in or near cemeteries, but such a location greatly interferes with their utility as a means of helping the poor, since they are too far from their habitations. To induce those for whose benefit they are especially designed to make use of them they should be near at hand, and in a large city they should not be with the morgue, although in cities having less than 100,000 inhabitants the two may be combined. As a specimen of a large mortuary and morgue combined one of the best is that of Berlin, of which a description, with illustrations, is given by Dr. Liman in the *Vierteljahrsschrift für gerichtl. Med. und öffentl. Sanitätswesen*, n. f. xliv. (Berlin, 1886), p. 170. It is easy to manage such buildings and the bodies received in them in such a way that there will be no possible risk of infection or offense from them, even when located amid crowded dwellings. J. S. BILLINGS.

Morula: a stage in the development of many animals, when the egg in its segmentation has become converted into a solid mass of cells, presenting an appearance much like that of a mulberry (Lat. *morum*), whence the name. See EMBRYOLOGY.

Morungen, mō-roong'en, HEINRICH, von: minnesinger; probably born at the castle Morungen, near Sangerhausen, Germany, during the latter part of the twelfth century. He is mentioned as Henricus de Morungen, *miles emeritus*, during the years 1213–21, in a document by Margrave Dietrich

IV. of Misnia, who at one time also had friendly relations with Walther von der Vogelweide. The fact that Heinrich very probably participated with Dietrich IV. in the crusade of 1297 may have given rise to the legendary story which forms the basis of the later popular song, *Vom edelen Moringer*. As a minnesinger Heinrich von Morungen ranks among the very best poets living previous to Walther. Though he imitated the troubadours, his poetry is characterized by a marked originality. See Ferdinand Michel, *Heinrich von Morungen und die Troubadours* (1880); E. Gottschau, *Ueber Heinrich von Morungen* (1880); F. Vogt, *Der edele Moringer, Paul u. Braunes Beiträge*, vol. xii., 431–453.

JULIUS GOEBEL.

Mosaic [from Mediæv. Lat. *mosa'icum*, for **musaicum* = Mediæv. Gr. μουσαϊκόν, mosaic (liter., neutr. of μουσαϊκός, pertaining to the Muses, deriv. of μοῦσα, Muse), for anc. Gr. μουσεῖον, mosaic, deriv. of μοῦσα, a Muse]: the art by which ornamental patterns, and even elaborate pictures, are made up of small pieces of different colors; or, in its simplest form, the art of making pavements and the like of hard material in small pieces, which surfaces, even if not varied in color, have a decorative appearance caused by the play of light on the different *tesseræ*. The word is used in a more general sense for any artistic composition made up of different pieces of material fitted together, as some ornamental windows are said to be *mosaics* of stained glass, and even mosaics of wood are sometimes spoken of. In a stricter sense the term is confined to what is made up of hard substances, generally stones or glass. Inlay differs from mosaic in that for inlaying smaller pieces are let into the surface of a large piece; but a patch of mosaic may be inlayed in a larger solid surface, as was often the case in both ancient and mediæval work. The mosaics of ancient Greece were rather of this character, so far as is known to us. Pieces of blue glass were inserted in marble or in metal frames. In like manner the work of the COSMATI (*q. v.*) was commonly delicate mosaics of glass inserted in bands and circles, and in surfaces of white marble; an inlaying of mosaic. The cutting of sunken patterns in marble or stone in *intaglio*, and the filling of these sunken parts with some colored substance, as is often practiced, is rather inlaying than mosaic.

Roman floors were commonly in mosaic of white or light-gray marble made up of tesseræ about an inch square or smaller; the borders and other ornamental parts made by the use of dark-colored tesseræ of the same size. Large fragments of such work may be seen in the baths of Caracalla in Rome. The tesseræ are fitted together very roughly, with no attempt to make invisible joints; indeed, they are ranged in curves, etc., so as to produce certain effects of light and shade by means of the darker joints themselves, so that these joints are much wider in one place than in another. In this way large rough figures and scrolls, leafage, and the like are produced. Many mosaic floors have been found in Pompeii. On the other hand, elaborate pictures exist, many of which are in the museum at Naples, and also a very refined sort of mosaic decoration was used for walls and piers, the whole surface being covered with this material, and a very rich color-effect is thus produced. A fountain in a large niche exists in the Naples museum, where the whole concave surface of the niche and the semi-dome at its top are covered with mosaic of very small tesseræ. On each side of this stands a column, and the convex surfaces of these are as rich as the surface of the niche. There are in the same gallery bas-reliefs of figures the whole surface of which—background and reliefs alike—are covered with mosaic.

When the early Christian churches were in building, as in the sixth and seventh centuries, the arts of antiquity were in complete decay. Sculpture was not to be had; even the barbarous art of the fifth century had disappeared. Of the painting of the time we can judge by miniatures in manuscripts, and by the designs of the mosaics themselves. It is evident that all the higher skill and ability had gone, and that what was left was the natural instinct of decoration common to half-civilized people, together with a disposition to study the great works of the past which were then numerous in spite of war and ravage, and a certain tradition of great design which would influence their decoration and keep it from the triviality often seen in the work of barbarous people, even when artistic in disposition. Mosaic lent itself easily to the requirements of the time. The artists could not draw the figure, but they could compose groups of draped personages, the head and arms only showing, and the rest of each figure shrouded in ample robes, the patterns of the stuffs most effective in their contrasting colors. The Christian emblems, too—lambs, crosses, banners bearing the sacred monogram, and the like—were perfect material for mosaic. In this way the interiors of Santa Sophia at Constantinople and of the other churches of the empire, by hundreds, including those of Ravenna, which still remain to us in almost perfect condition, were decorated in the richest manner; but the material, instead of stone or marble, was generally glass. The art, once well established in the Eastern provinces and in Sicily, spread to Italy with the earliest building there of churches of any importance, and the great basilicas were adorned within, and even to a certain extent without, by means of this splendid and inexpensive material. St. Mark's church at Venice and the churches at Palermo and Monreale in Sicily are more completely decorated in this way than others, but many churches in Ravenna and in Rome, as well as in other towns, retain large mosaics of great beauty.

What is called *Florentine mosaic* is an inlay of very hard stones in a background usually of white or of black marble. It is so far a true mosaic that the different pieces of beautiful jasper, lapis-lazuli, and the like, are fitted close together, no background showing between. Some specimens of this art have some parts in relief; thus a cherry will be indicated by a piece of translucent and brilliant red stone raised in a half ball above the general surface. The term *pietra dura* (hard stone) is commonly used in Italy for such work. It is sometimes used on a very large scale; thus the whole sacristy of the Church of San Lorenzo in Florence is lined with *pietra dura* of the most brilliant sort, and although parts of this are in rather large slabs of the precious material, other parts are covered with a mosaic of small pieces.

What is called *Roman mosaic* is made of very thin glass rods of many colors, which are manufactured for the purpose. By these very elaborate pictures may be made; views of St. Peter's, etc., are common even in the U. S., but these are generally almost valueless as works of art.

RUSSELL STURGIS.

Mosaic Gold: See ORMOLU.

Mosasau'ria [Mod. Lat., named from *Mosasau'rus*, one of the genera; Lat. *Mo'sa*, the river Meuse + Gr. σαῦρος, lizard]: a group of extinct reptiles, remains of which were first discovered in 1780 in the upper chalk of St. Pietersberg, near Maestricht, in Holland, on the Meuse river. The first known species was called *Mosasaurus hofmanni*. A few other species have been found in the Cretaceous of England and Europe, but their remains are much more abundant in the deposits of that age in North America, and among these several genera have been recognized. They agree in having an elongated and serpent-like body. The jaws were powerful and well armed with sharp conical teeth, which were ankylosed by their bases with the jaws, and occurred also on the roof of the mouth. The two rami of the lower jaw were united at the extremity only by cartilage, as in the serpents, and a further provision for the wide distension of the mouth was afforded by a joint in the side of the lower jaw at the base of the splenial element. The other bones of the skull had much resemblance to those of existing lizards. (In the genus *Mosasaurus* the cranium is 5 feet in length.) The vertebræ were concave in front and convex behind. Those of the neck were few. The limbs were in the form of paddles with five digits, each having from four to six phalanges. The families now known are the *Mosasauridæ* and the *Edestosauridæ*. In the former the zygosphenal articulation of the vertebræ was wanting; in the latter it was well developed, as in modern snakes and iguanas. The best-known genera of the first family are the following: *Mosasaurus*, *Liodon*, *Baptosaurus*, *Holosaurus*, *Lestosaurus*, and *Tylosaurus*. More than fifty species of Mosasauria have been found in the Cretaceous strata of North America. About fifteen of these are from New Jersey, half a dozen from the Gulf deposits, and the remainder from Kansas and other parts of the West. *Mosasaurus princeps*, from New Jersey, probably was 75 feet in length, and *Tylosaurus dyspelor*, from Kansas, scarcely less gigantic.

O. C. MARSH.

Mosasau'ridæ: a family of reptiles. See MOSASAURIA.

Mosby, JOHN SINGLETON: See the Appendix.

Moscheles', IGNAZ: pianist and composer; b. at Prague, May 30, 1794. His father was a Jewish banker. He studied first with F. D. Weber, director of the conservatory, after-

ward with Albrechtsberger and Salieri; went to Paris in 1820, but in the following year repaired to London, where he remained twenty-five years. In 1846, after a period of professional travel in France and Germany, he established himself in Leipzig; was made director of the conservatory there, and exerted great influence on the musical education and taste of his time. Thalberg and Mendelssohn were his pupils, the only two who by general admission surpassed their master. Previous to them Moscheles ranked with the most eminent, even with Hummel and Kalkbrenner. Moscheles was a composer of sonatas, concertos, fantasias, variations, and studies for the piano. Some of these have a permanent value. His translation from the German of Schindler's *Life of Beethoven* is well known. D. in Leipzig, Mar. 10, 1870. See *Aus Moscheles Leben* (1872) and *Briefwechsel mit Mendelssohn-Bartholdy* (1888).

Moschus (Gr. Μόσχος) **of Syracuse**: Greek idyllic poet; flourished about 150 B.C. His *Lament for Bion* (Ἐπιτάφιος Βίωνος) has been utilized by Shelley in his *Adonais*. Noteworthy also are his *Rape of Europa* and his *Runaway Cupid* (Ἔρως δραπέτης). Often edited with Theocritus and Bion (*qq. v.*), and translated with the same by Andrew Lang (1889).

Mosco'so, or **Mosco'so de Alvarado**, Luis: soldier; b. at Badajoz, Spain, about 1505. In 1529 he went to Guatemala with his kinsman, Pedro de Alvarado, passed with him to Peru in 1534, and remained there for two years, serving under Pizarro. Returning to Spain, he joined the expedition of Hernando de Soto to Florida in 1538; on de Soto's death, May 21, 1542, succeeded him in command and descended the Mississippi in July, 1543, finally reaching Mexico with the remnants of the expedition. D. in Peru in 1560. H. H. S.

Mos'cow: government of Central Russia, watered by the rivers Moskva and Kliazma. Area, 12,859 sq. miles. Its surface is an almost level plain, consisting of a claycy or sandy soil, not very fertile. The government is the most flourishing manufacturing part of Russia. Whole villages are often engaged each in the manufacture of one single article—cloth, silk brocade, paper, pins, glass, mirrors, etc. —and the manufacture of many articles is carried to a high degree of elaboration. Limestone and marble are quarried and extensively used for building purposes, and the government is rich in coal. Pop. (1897) 2,433,356.

Moscow: the former capital of the Russian empire, a great manufacturing and commercial center, and now the second imperial residence; in lat. 55° 45′ N., lon. 37° 33′ E., 400 miles by railway S. E. of St. Petersburg (see map of Russia, ref. 7–E). It is situated in a hilly, fertile, well-cultivated, and beautiful district on the navigable river Moskva, and presents, when seen from the Sparrow Hills on its southern outskirts, a most picturesque appearance, spires and domes in old Byzantine style rising beside palaces and public buildings in the modern French and Italian. Its circumference is 23 miles, and it consists of five different parts: 1. Kremlin, the central part of the city, occupying a hill on the northern bank of the Moskva, is surrounded by heavy stone walls. It contains the palaces of the czar, the patriarch, and the holy synod, the arsenal, the treasury, and other public buildings, the Cathedral of the Assumption, in which the czars are crowned, built in the fourteenth century, and gorgeously decorated; the Cathedral of St. Michael, in which the czars before Peter the Great are buried; the tower of Ivan Veliki, 270 feet high, surmounted by a gilded dome 37 feet high, and containing thirty-two bells; the Kolokol, the largest bell in the world, weighing 448,000 lb., placed on a pedestal close by, etc. 2. Kitaigorod, or the "Chinese city," to the E. of the Kremlin, also surrounded by a wall with towers and gates, is the seat of the trade of the city. Here is the Petrovskoi cathedral, properly consisting of twenty-one chapels joined together. 3. Beloigorod, or the "white city," because it is surrounded by a wall of whitish stone, encircles the Kremlin and Kitaigorod on three sides. Here are the palaces of the governor and the nobility, the university, several immense monasteries, the foundling hospital, the theaters, the post-office, and other government houses, and the famous drill-house, 560 feet long and 158 feet wide. 4. Zemlianoigorod, or the "earthen city," because it was formerly surrounded by an earthen wall, which now has been transformed into promenades. 5. The Slobodi, or suburbs, eight in number; in these splendid mansions and magnificent monasteries, schools, hospitals, etc., surrounded with large and beautiful gardens, alternate with clusters of shanties, and with manufacturing establishments. Among the 400 places of worship which the city contains there are chapels for the Roman Catholics, Lutherans, and other Christian denominations, also synagogues and even mosques. The university, attended by 3,400 students, was founded in 1755, and enjoys a high reputation. Connected with it are a library of 250,000 volumes, a printing establishment, a zoölogical and mineralogical museum, a botanical garden, an observatory, an anatomical theater, and several scientific associations of high standing. Besides general schools of different grades the city also contains special educational institutions—ecclesiastical seminaries, military schools, an academy of art, commercial and industrial schools—and numerous benevolent institutions. It has water communication with the Baltic, the Black, the White, and the Caspian Seas, and it is connected with St. Petersburg, Nijnii-Novgorod, Taganrog, and Warsaw by rail. It carries on an immense trade in tea, grain, cotton, timber, furs, tallow, metals, and its own productions. The opening of the port of St. Petersburg had a bad effect on the commerce of Moscow, but since that time both the trade with Asia and the inland trade of the city have increased immensely. It also rivals St. Petersburg as the first manufacturing place in Russia, and its factories of cotton, wool, silk, tobacco, paper, chemicals, leather, pottery, watches, silver, and other metals are very extensive. Its book-trade exceeds that of any other city in Russia.

Moscow was founded in the twelfth century, and in the fourteenth it became the capital of the rising empire and the residence of the Grand Duke of Moscow. In 1712 Peter the Great transferred the capital to St. Petersburg, but Moscow, being a sacred city, continued to stand as the first city in the estimation of the Russian nation. It was the winter residence of the Russian nobility, and by its commerce and industry it grew rich. In 1812 it had 9,158 houses and 252,609 inhabitants. Napoleon, however, when he entered it, Sept. 15, 1812, found hardly 12,000 people in the city; the rest had fled. From Sept. 14 to 21 a conflagration raged, started by the inhabitants themselves, and the impossibility of wintering in a ruined city, together with lack of supplies and the liability to being continually attacked by Cossacks, compelled Napoleon to abandon the city. Only 2,626 houses were left standing after the conflagration. Nevertheless, the city was soon rebuilt. It had 166,515 inhabitants in 1816, 348,562 in 1838, 611,970 in 1871, and 988,610 in 1897.

Moscow: town; capital of Latah co., Ida. (for location of county, see map of Idaho, ref. 5–A); on the N. Pac. and the Union Pac. railways, near the Washington boundary-line, 94 miles S. by E. of Spokane, Wash. It is in a milling, mining, stock-raising, and agricultural region; is the seat of the State University, established by act of the territorial Legislature in 1889, contains a business college, 2 public-school buildings, 2 national banks with combined capital of $175,000, 2 State banks with capital of $125,000, and a daily and 3 weekly newspapers; and has a large lumber-trade and several manufactories. Pop. precinct (1890) 2,861; town (1900) 2,484. Editor of "Mirror."

Moseley, mōz'lĕy, Henry, D. D., F. R. S.: educator and scientist; b. in England about 1802; graduated at St. John's College, Cambridge, with high honors 1826; took orders in the Church of England 1828; was Professor of Natural Philosophy and Astronomy at King's College, London, 1831–45; was a distinguished champion of popular education, and one of the first inspectors of schools appointed by government; author of *Mechanical Principles of Engineering and Architecture* (1842), which is a text-book at West Point, *Lectures on Astronomy* (1847), and of several other works; became canon of Bristol 1853; chaplain to the Queen 1855. D. at Olveston, Jan. 20, 1872.

Moselle, mō'zel': river of France; rises in the Vosges at an elevation of 2,260 feet, and flows with a tortuous course of 330 miles through France, Belgium, Luxemburg, and Rhenish Prussia, where it joins the Rhine at Coblentz. Its broad valley is covered with vines, celebrated for the light wine they yield.

Mosen, mō'zen, Julius: poet and dramatist; b. at Marienev, Saxony, July 8, 1803; studied jurisprudence at Jena and Leipzig; practiced law at Dresden, and was in 1844 appointed official playwright at the court theater of Oldenburg. D. in Oldenburg, Oct. 10, 1867. Mosen's best-known poetical production is his *Ahasver* (1838), an epic poem of great philosophical conceptions, treating the popular legend of the Wandering Jew. The philosophical nature of his poetry can also be seen from his historic dramas, *Die*

Bräute von Florenz, *Der Sohn des Fürsten*, *Kaiser Otto III.*, *Heinrich der Finkler*, *Cola Rienzi*, *Herzog Bernhard von Weimar*, in which the characters are made the representatives of the poet's abstract thought in order to illustrate his conceptions concerning the philosophy of history. Mosen's *Gedichte* (1836) shows less of this philosophical turn. JULIUS GOEBEL.

Mosenthal, mō'zen-tăl, JOSEPH: organist, violinist, and conductor; b. at Hesse-Cassel, Germany, in 1834; removed to New York in 1853, and there remained until his death. He had studied music under his father, and the violin under Spohr. On arriving in New York he began playing and teaching, and in 1860 became organist of Calvary church, remaining there until 1887. During that time he composed much sacred music, mostly for the choir of that church. He conducted the Mendelssohn Glee Club continuously from 1867, and before that he conducted the Tentonia Society and the New York Vocal Society. D. in New York, Jan. 6, 1896.

Mosenthal, SALOMON HERMANN: dramatist; b. Jan. 14, 1821, of Jewish parentage, at Cassel, in the Prussian province of Hesse; studied at the technical school of Carlsruhe and later at the University of Marburg, and received in 1851 a position under the Austrian Government at Vienna. Of his many highly successful dramas, two—*Deborah* (1850) and *Sonnenwendhof* (1857)—have been translated into the English, Danish, Hungarian, and Italian languages. His dramas *Die deutschen Komödianten* (1863), *Der Schulz von Altenbüren* (1868), *Maryna* (1871), and his tragedies *Düweke* (1860) and *Pietra* (1865) have also proved successful on the stage. D. in Vienna, Feb. 18, 1877. Revised by J. GOEBEL.

Moser, mō'zer, GUSTAV, von: dramatist; b. at Spandau, Germany, May 11, 1825; received a military education in Berlin; served as an officer in the Prussian army, but retired in 1856. In the solitude of his country life he conceived the idea of writing for the theater, and was at once very successful with a number of smaller farces. He established his fame as one of the brightest and wittiest writers of German comedies by the piece *Das Stiftungsfest* (1872), which is still played on many German stages. This comedy was followed by many others, the best known of which are *Der Elefant* (1873); *Ultimo* (1873); *Der Bibliothekar* (The Private Secretary, 1878); *Der Veilchenfresser* (1876); *Krieg im Frieden* (1880). The last two pieces were taken from German military life, and Moser's example has since been followed by other dramatists. A number of Moser's comedies and farces have been translated into English and successfully played. JULIUS GOEBEL.

Möser, mö'zer, JUSTUS: historian; b. at Osnabrück, Germany, Dec. 14, 1720; studied jurisprudence at Jena and Göttingen, and also paid great attention to the study of the modern languages and their literatures; occupied several very important positions in the government of his native country. D. Jan. 8, 1794. Möser, who was an ardent German patriot, may be called the father of modern German historiography. While history had thus far consisted only of a dry nomenclature of dynasties and wars, Möser claimed that the true historian should direct his attention chiefly to the changing conditions of the people, their laws, customs, and habits. He himself gave an example of such historical writing in his celebrated *Osnabrückische Geschichte* (1768), in which he also urged a more careful study of German antiquity. His *Patriotische Phantasien* (1774), a collection of essays on various practical topics, exerted a great influence on his nation. See *Sämmtliche Werke* (Berlin, 1842–43); Kreissig, *Justus Möser* (1857). JULIUS GOEBEL.

Moses [= Lat. = Gr. Μωσῆς, from Heb. *Mōsheh*, either derived from or adapted in form to *māshāh*, draw out (sc. of the water. Cf. Exod. ii. 10)]: lawgiver of the ancient Jewish people. The history of Moses is principally found in the Bible, but there are several other sources. There is an Egyptian tradition (Manetho), a Jewish tradition (Midrash), Philo, and Josephus, and a Mussulman tradition in the Koran. The tradition, however, contains comparatively very little which is not simple elaboration and exaggeration of the account given in the Pentateuch, and it has generally a legendary character. The name of Moses is one of the greatest in history. He organized the Hebrew people; he formed the Hebrew character; and the influence which the Hebrew nation has exercised on the civilization of mankind, by being through many centuries the bearer of the monotheistic idea, can hardly be overestimated. According to Ex. ii. 10, Moses was adopted by the king's daughter, and according to Acts vii. 22 he was initiated in all the secret wisdom of the Egyptian priesthood; but the Bible tells nothing of his youth from his adoption by the princess to the day when he slew an Egyptian overseer for his barbarous treatment of a Jewish man. He had then to flee from Egypt, and lived for many years in Midian with Jethro the priest, whose daughter he married and whose flocks he tended. Having been called to free his brethren from the oppression in which they lived, he returned to Egypt, but at first he was received by his countrymen with suspicion and by the Egyptians with contempt. Nevertheless, he succeeded in his mission, leading the Jews across the Red Sea into the desert. The first part of the task was thus accomplished: the remainder, however, proved still more difficult. Following the statements made in the Bible, rather than the traditional interpretations of the Bible, we find that the Israelites left Egypt a circumcised people, fairly well organized, with a good degree of civilization and a body of civil and religious institutions, but lacking in the sterner virtues. In the wilderness Moses improved their organization, and by divine revelation gave them a new body of institutions, into which, however, their previous usages were largely incorporated. For more than thirty-seven years they were "shepherds in the wilderness" (Num. xiv. 33). They were miraculously cared for to the extent to which God saw this to be necessary, but not to the extent of relieving them from effort, and not so as to free them from the discipline of the hard life of the desert. They came together again the fortieth year after they left Egypt, an uncircumcised people (Josh. v. 2–9), their civilization largely lost, paying less regard than they should to the legislation which Moses had provided for them (Deut. xii. 8; Amos v. 25, etc.), yet trained in the virtues in which they had been lacking, and thus, on the whole, fitted for the career that lay before them. According to the biblical narrative (in the Pentateuch and the book of Acts), Moses was forty years old when he fled into Arabia, eighty when he led the march to Sinai, and 120 when he died on Mt. Nebo. See Warburton's *Divine Legation of Moses* (1737, 1741, 1788); Spencer, *De Legibus Hebræorum Ritualibus* (1685); Witsius, *Egyptiaca* (1683); Michaelis, *Mosaisches Recht* (1770–75); and Saalschütz, *Mosaisches Recht* (1846, 1848). For the more recent literature concerning the times, the legislation, and the writings of Moses, see HEXATEUCH.

Revised by W. J. BEECHER.

Mos'heim, JOHANN LORENZ, von: theologian; b. at Lubeck, Germany, Oct. 9, 1694; was theological professor at Helmstädt 1723–47; became in 1747 professor at Göttingen and chancellor of the university. D. in Göttingen, Sept. 9, 1755. An able preacher and historian, his works are of great permanent value. The chief are *Institutiones Historiæ Ecclesiasticæ* (1726–39) and *De rebus Christianorum ante Constantinum* (1753), the former translated into English by Maclaine (London, 1765–68), later by James Murdock (New York, 1832; best ed. by W. Stubbs, London, 1863, 2 vols.). The latter was also translated by James Murdock, *Commentaries* (2 vols., New York, 1832). His theological standpoint occupies the middle between the two extremes, pietism and deism.

Moskwa, Battle of the: See BORODINO.

Moslem: See MOHAMMED and MOHAMMEDANISM.

Mosler, HENRY: See the Appendix.

Mosque [from Fr. *mosquée*, from Span. *mezquita*, from Arab. *masjid*, deriv. of *sajada*, bow, adore]: a Mussulman sanctuary; generally a square or rectangular building, surmounted by a dome. The most essential feature is the mihrab, an indentation in the wall or a marble slab or other object, which indicates the direction of the KAABA (*q. v.*), toward which prayer must be addressed. The mosque generally contains a high, narrow pulpit with a sharp-pointed cone above. Lamps, arabesques, and passages from the Koran form the customary ornaments, no pictures whatsoever of human beings or animals being allowed. None may enter save with unshod feet. The two sexes do not worship together, and a few mosques are reserved to women. Outside at the southeast corner is generally the lance-like minaret or tower, surrounded by an open gallery whence the muezzin calls to prayer. The school of the village or quarter is usually attached to the mosque. Endless variety of architecture and decoration characterizes the larger edifices. These have from two to seven minarets, are preceded by open courts with galleries and colonnades, and have hospi-

tals, almshouses, soup-kitchens, libraries, colleges, and theological seminaries in connection. The first mosque was erected at Medina by Mohammed in 622. E. A. G.

Mosquera, mos-kā′răă, Ruy Garcia: explorer and colonist; b. in Spain in 1501; accompanied Sebastian Cabot in his voyage in the Spanish service to the Rio de la Plata 1526; discovered Paraguay, from which he brought specimens of silver; was left by Cabot in charge of the colony of Espiritu Santo; narrowly escaped massacre by the Indians; established himself at Cape Santa Maria on the coast of Brazil, and subsequently on the island of Santa Catalina, after defeating the Portuguese, and in 1535 joined Pedro de Mendoza in founding Buenos Ayres, where he died about 1555. The influential family of Mosquera in Colombia, which during the nineteenth century has furnished several presidents, generals, ministers, and bishops, is said to trace its descent from the navigator.

Mosquera, Tomás Cipriano: soldier and politician; b. at Popayan, New Granada (the present Colombia), Sept. 20, 1798. He joined the patriot army when a lad, fought in Colombia and Peru, and was private secretary and chief of staff with Bolivar. Subsequently he held diplomatic and cabinet positions, was senator, and attained the rank of general. He was president of New Granada 1845–49, and during this term a large part of the internal debt was paid, restrictions on commerce were removed, and immigration was encouraged. In 1859 he headed the federalist-democratic revolt, assumed the executive in July, 1861, and called a constituent assembly, which adopted a federal constitution, changed the name of the country to United States of Colombia, and made him dictator. Meanwhile the opposition party was victorious in the west, and formed an alliance with Ecuador; civil war continued until 1862, when the opposition president, Canal, came to terms with Mosquera. The latter resigned his dictatorship to a new convention, which limited the presidential term to two years. Under this constitution Mosquera was president 1863–64, and was elected for the term beginning 1866; but having forcibly adjourned congress and arrested many of its members, he was deposed and banished for two years (May, 1867). Subsequently he was governor of Cauca and a member of congress. Mosquera was an author of considerable repute, his works including a *Vida de Bolivar* and a treatise on the geography of New Granada. D. at Coconuco, Oct. 7, 1878. Herbert H. Smith.

Mosquitia, mōs-kĕĕ-tee′ăă, or the **Mosquito Coast**: an ill-defined region on the eastern or Caribbean coast of Central America, between Cape Gracias á Dios and the river San Juan. The so-called Mosquito Indians, from which it takes its name, are a race of mixed African and Indian blood, probably derived from the union of Cimarrones, or fugitive slaves, with native women. (See Indians of Central America.) They first appear in history in the latter part of the seventeenth century as complete savages, subject to hereditary chiefs or "kings," and able, according to reports, to bring 40,000 warriors into the field. About 1660 the English had a permanent settlement, and subsequently they established a protectorate over the coast. Spain repeatedly interfered and tried to occupy it, and later Nicaragua and Honduras both claimed the territory. By the Clayton-Bulwer treaty, signed at Washington Apr. 19, 1850, Great Britain resigned all claims to the Mosquito Coast, and in 1860 by treaties with Nicaragua, Honduras, and Guatemala, she recognized the sovereignty of Nicaragua over it. The latter country agreed to maintain a permanent reserve for the Indians, who should have the right of self-government, while acknowledging allegiance to the republic. The same treaty forbids Nicaragua to interfere with the commerce of the Indians, and this clause has led to fresh disputes, owing to the attempts of Nicaragua to maintain customs officers at Bluefields. The question of her right to do so was submitted to the adjudication of the Emperor of Austria, who, in 1880, decided that no such right existed.

The name Mosquitia is now generally restricted to the reserve which, in a limited sense, forms a part of Nicaragua. It is a strip on the coast between lats. 11° 30′ and 14° 10′ N., extending inland to lon. 84° 15′ W., with an area of about 7,000 sq. miles. The surface is generally low, largely covered with forest, and very fertile. The interior is little known, but it is crossed by many rivers, the largest of which is the Bluefields river, at whose mouth is the only town of importance, Bluefields, or Blewfields, on a bay or lagoon of the same name. The Mosquitos proper probably do not number more than 10,000, and they are hardly advanced from their former savage condition. They obey their own "king," whose "capital" is on Pearl Cay Lagoon N. of Bluefields. There is a considerable trade in cabinet woods and bananas, and this is largely in the hands of citizens of the U. S. See "Samuel A. Bard" (E. G. Squier), *Waikna: Adventures on the Mosquito Shore* (1856 and 1891).

H. H. Smith.

Mosquito [= Span., dimin. of *mosca*: Ital. *mosca*: Fr. *mouche*, fly < Lat. *mus′ca*]: a name given to many biting and blood-sucking dipterous insects, mostly of the family *Culicidæ*, and of the genera *Culex*, *Anopheles*, *Corethra*. The female insects alone bite, or rather thrust into the flesh their awl-like bristles, massed together into a tube, through which they draw the blood. The distress these insects occasion is very great, not only in hot countries, but in some cold ones, like Lapland and Labrador. The use of mosquito-netting, the kindling of dense smoky fires, and the application of tar, pennyroyal oil, or decoction of feverfew to the skin—all have some effect in protecting the person from their attacks. The female deposits her eggs on the surface of the water, and the larvæ constitute an important part of the food of fishes. See Gnat. Revised by F. A. Lucas.

Mosquito Coast and **Mosquito Reservation**: See Mosquitia.

Moss-agate: See Chalcedony.

Mossbunker: See Menhaden.

Mosses [plur. of *moss* < M. Eng. *mos*: O. H. Germ. *mos* > Mod. Germ. *moos*; cf. Lat. *mus′cus*, moss]: See Mossworts.

Mosso, Angelo: physiologist; b. in Turin, Italy, May 31, 1846; studied medicine in Turin, devoting himself especially to physiology under the direction of Moleschott, and continued his studies in Florence and Leipzig. In 1876 he became Professor of Pharmacology in Turin, and three years later succeeded Moleschott as Professor of Physiology. He has won distinction by his original methods of investigation of the physiology of man, and by his ingenious mechanical devices for recording physical change resulting from physical and mental activity. In 1882 he founded the *Archives italiennes de biologie*, in which many of his works have appeared. He has published also *Die Diagnostik des Pulses* (1879); *Ueber den Kreislauf des Blutes im menschlichen Gehirne* (1881); *Die Furcht* (1889); *Die Ermüdung* (1892); *Die physische Erziehung der Jugend* (1894).

Mossworts: the plants constituting the great branch of the vegetable kingdom otherwise called the Bryophytes (*Bryophyta*), including the plants familiarly known as the liverworts and mosses. They are related to the Fernworts (*q. v.*) on the one hand, and the higher Carpophytes, especially the Stoneworts (*q. v.*), on the other. They agree with the fernworts in the structure of their sexual organs and a marked alternation of generations. The first generation—i. e. the one developed from the spore—bears the sexual organs; after fertilization a structure is produced, the second generation or sporophyte, which bears spores. From these spores the sexual generation is again produced.

The mossworts, like the fernworts, are all chlorophyll-bearing plants, none being parasitic or saprophytic. They are plants of rather small size, rarely exceeding 10 or 20 cm. (4 to 8 inches) in height, and often measuring no more than a millimeter ($\frac{1}{25}$ inch). They usually inhabit moist places, and a few are aquatic. While the plant-body often exhibits a complete differentiation of leaf and stem, no true roots are ever developed, their place being filled by root-hairs consisting of long cells or rows of cells.

Their sexual organs are antherids and archegones. The former are club-shaped bodies, consisting of a boundary layer of cells inclosing a considerable number of thin-walled cells. At maturity the latter are extruded from the antherid, when the protoplasm of each cell arranges itself into a more or less coiled, motile filament, the antherozoid, which escapes by the rupture of the cell-wall (Fig. 3, *e*). The archegones are flask-shaped structures (Fig. 9, *b*), consisting of one or two layers of boundary cells inclosing, at maturity, a single cell—the germ-cell, egg-cell, or oösphere. The neck of the mature archegone is narrow, elongated, and open at the top. Fertilization takes place by the antherozoids swimming to the summit of the archegone, and working their way down the narrow channel in its neck to the egg-cell with which one fuses. Of course this must take place in water, which may be abundantly supplied by a rain or heavy dew.

As a result of fertilization the egg-cell soon undergoes successive divisions, giving rise to a spherical or more commonly an elongated body (the sporophyte), the upper portion of which is usually somewhat enlarged into a spore-case (Figs. 5, 7, 10, 11). The spores are developed from certain internal cells, occupying definite positions, each mother-cell dividing into four daughter-cells, which become the spores by the formation of thick cell walls. In germination the spore grows out into an elongated green tube, which soon becomes divided into cylindrical cells (constituting the "protonema"), and from this the sexual plant develops sooner or later (Fig. 6).

Mossworts are often reproduced non-sexually by means of brood-cells or masses of cells, which are spontaneously separated from the plant-body. These are analogous to the conidia of many lower plants, but unfortunately in most books they have been called buds (or gemmæ), which they certainly are not.

In one of the common liverworts (*Marchantia polymorpha*) small cups form on the upper surface of the thallus (Fig. 1, *a*), and in these hairs appear which gradually enlarge by subdivision, finally forming a many-celled brood mass (Fig. 1, *b*), each of which breaks away below and falls to the earth, where it soon grows into a new thallus. Similar brood-cells occur singly in the axils of the leaves of some mosses. In some higher liverworts single brood-cells are detached from the margins of the leaves.

FIG. 1.—*a*, a small plant of *Marchantia polymorpha* with four brood-cups (natural size); *b*, brood masses in several stages of growth magnified.

The tissues of mossworts are mostly parenchymatous; still they show the beginnings of a differentiation into several kinds (Fig. 8, *b*, *c*, *d*), and there is often a rudimentary fibro-vascular bundle in the center of the stem and the midrib of the leaf.

The mossworts are usually divided into two classes, the Liverworts (*Hepaticæ*) and the Mosses (*Musci*).

THE LIVERWORTS.

The plant-body is a thallus, or a filiform stem with two (or three) rows of leaves, and is always prostrate, with two distinct and well-marked surfaces, an upper or dorsal and a lower or ventral, the latter bearing the root-hairs (rhizoids) by which it is attached to the ground.

There are three orders of liverworts, including about 3,000 species, as follows:

Marchantiaceæ, the liverworts proper; thallose, dichotomously branched, terrestrial (rarely aquatic) plants; spore-case globose, without a columella, indehiscent, or dehiscent (into four or more lobes, or rarely by a separable lid). The common crystalwort of the U. S. (*Riccia natans*, Fig. 2) is one of the simplest representatives of the order. Its spore-case is indehiscent, has no elaters, and is immersed in the upper surface of the thallus. *Marchantia polymorpha* (Figs. 1, 3, *c d e*, and 4), which is very common in nearly all regions of the earth, is one of the highest types of the order. Its spore-case splits into several revolute lobes, has elaters, and is borne on a specialized branch of the thallus.

FIG. 2.—*Riccia natans* (natural size).

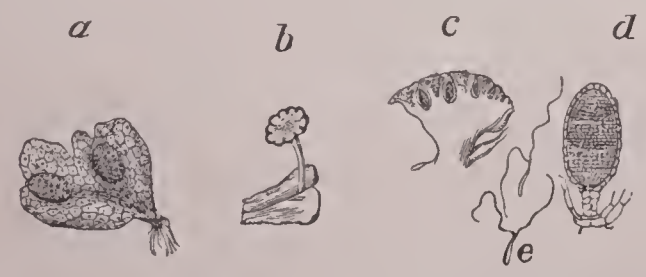


FIG. 3.—*a b*, antheridial branches; *c*, section of same; *d*, antherid; *e*, antherozoid (*d* and *e* highly magnified).

The many genera are separable into several families—e. g. (1) *Ricciæ*, represented in the U. S. by three genera, *Riccia*, *Thallocarpus*, and *Sphærocarpus*, and about twenty-five species; (2) *Targonieæ*, a small family represented in the U. S. by a single Californian species; (3) *Marchantieæ*, of which *Marchantia*, *Conocephalus* (Fig. 3, *a*), *Fimbriaria* (Fig. 4), and *Lunularia* are common genera in the U. S., the last named occurring on flowerpots in greenhouses to which it has been introduced from Europe.

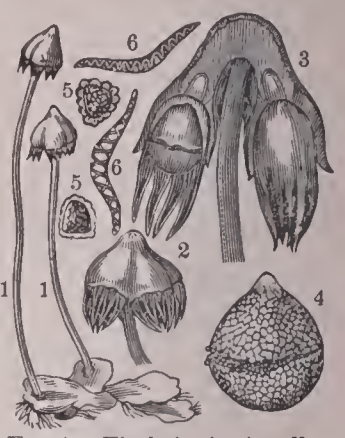


FIG. 4.—*Fimbriaria tenella*: 1, 2, 3, plants, with antheridial branches; 4, spore-case; 5, spores; 6, elaters.

Anthocerotaceæ, the horned liverworts; thallose, irregularly branched terrestrial plants, spore-case cylindrical, with a columella and elaters, and splitting at maturity into two longitudinal valves. The single family, *Anthoceroteæ*, is represented in the U. S. by a dozen or more species of *Anthoceros* (Fig. 5, *a*) and *Notothylas*.

Jungermanniaceæ, the scale-mosses; leafy-stemmed plants, with two-ranked leaves, spore-case stalked, globose, without columella, dehiscing into four lobes, and containing elaters. Scale-mosses grow on the bark of trees, on rocks, or on the ground. The species (2,000 or more) are usually distributed among about a dozen families. In the U. S. 171 species have been enumerated belonging to the genera *Aneura*, *Metzgeria*, *Frullania*, *Lejeunia*, *Madotheca*, *Radula* (Fig. 5, *b*), *Jungermannia*, etc.

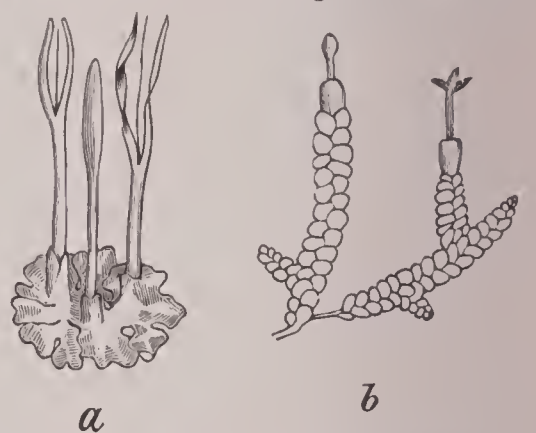


FIG. 5.—*a*, *Anthoceros lævis*; *b*, *Radula complanata*.

THE MOSSES.

The plant-body is always a leafy stem, which is usually erect, producing root-hairs below; the leaves, which are mostly sessile and several ranked, are usually composed of a single layer of cells, often traversed by a midrib.

In the mosses the protonema is usually much larger than in the liverworts. Here it is a mass of green branching threads (Fig. 6, *a*), from which eventually the leafy plant (sexual generation) is produced (Fig. 6, *b*).

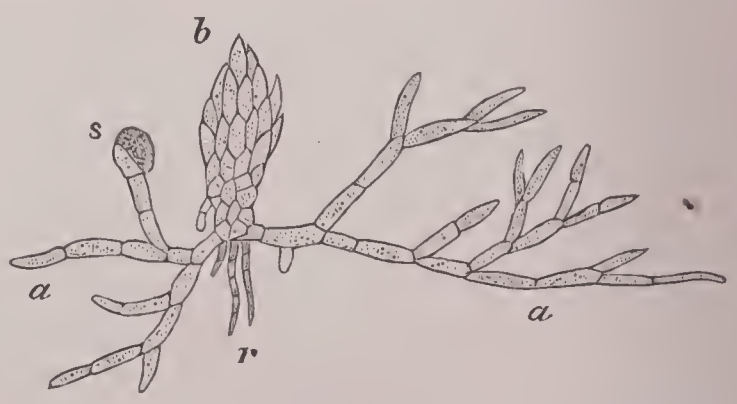


FIG. 6.—*a*, Protonema of a moss, growing from the spore *s*, and producing a leafy stem, *b*, and root-hairs, *r*.

About 4,500 species are known, arranged in four orders, as follows:

Andreæaceæ, the black mosses; small plants, usually of a dark color, with thickish, several-ranked leaves, composed of similar cells; sexual organs terminal; antherids several, oblong, stalked; archegones several, each developing into a thin, persistent calyptra, and producing a spore-case which is destitute of stomates, and dehisces longitudinally into four valves. Before maturity the spore-case is raised upon a short stalk developed at the summit of the leafy stem. The family, *Andreææ*, contains the only genus, *Andreæa* (Fig. 7, *a*), and sixteen species, three of which occur on wet rocks in North America.

Sphagnaceæ, the peat-mosses; large, soft, and usually pale-colored mosses, inhabiting bogs and swamps. Leaves five-ranked, and composed of dissimilar cells, (1) narrow chlorophyll-bearing cells, and (2) large, perforated cells lying between the former, and often containing water. Antherids globose, stalked, solitary at the sides of the leaves of special branches; archegones terminal on special branches, soon ruptured above by the growing spore-case, which has stomates on its surface, and dehisces horizontally by a lid, leaving a naked mouth (Fig. 7, *b*). Before maturity the spore-

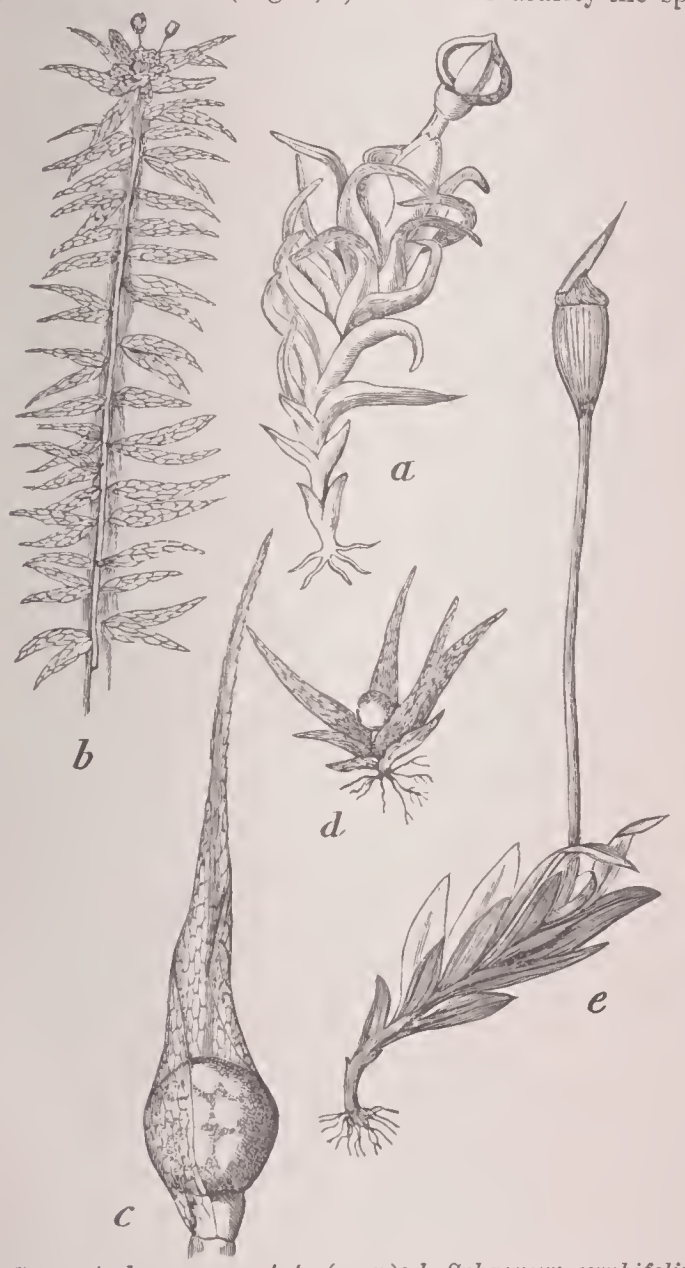


Fig. 7.—*a*, *Andreæa angustata* (mag.); *b*, *Sphagnum cymbifolium*; *c*, spore-case of *Archidium phascoides* (mag.); *d*, *Nanomitrium tenerum* (mag.); *e*, *Fissidens minutulus* (mag.).

case is raised upon a short stalk developed at the summit of the leafy stem.

There is but one family, *Sphagnaceæ*, and this contains but one genus, *Sphagnum*, of about sixty species, nearly half of which occur in North America. *S. cymbifolium* (Fig. 7, *b*) and several other species are used by florists for packing in the transportation of living plants, inasmuch as they retain moisture for a long time.

Archidiaceæ, minute plants, with branching and prostrate stems, and leaves composed of a single layer of similar cells, and a midrib of elongated thicker-walled cells; sexual organs terminal, antherids club-shaped, archegones several, each rupturing as the spore-case develops; spore-case globose, sessile, containing a few large spores and no columella, indehiscent. The single genus, *Archidium* (Fig. 7, *c*), represents the family *Archidieæ*. The species are few, five only occurring in the U. S.

Bryaceæ, the true mosses; usually of larger size with simple or branching stems, and leaves composed of a single layer of similar cells, and commonly with a midrib of elongated cells; sexual organs terminal or lateral, antherids club-shaped, archegones usually several, each developing into a persistent calyptra, and producing a stalked spore-case, which contains a columella, has stomates on its surface, and usually dehisces horizontally by a lid, the mouth being naked or provided with teeth (Fig. 7, *d e*).

In this order are found fully nine-tenths of the mosses (about 4,000 species). They vary greatly in complexity of structure and development of the plant-body, from the tiny *Ephemerum* to the large and stocky *Polytrichum*, or the

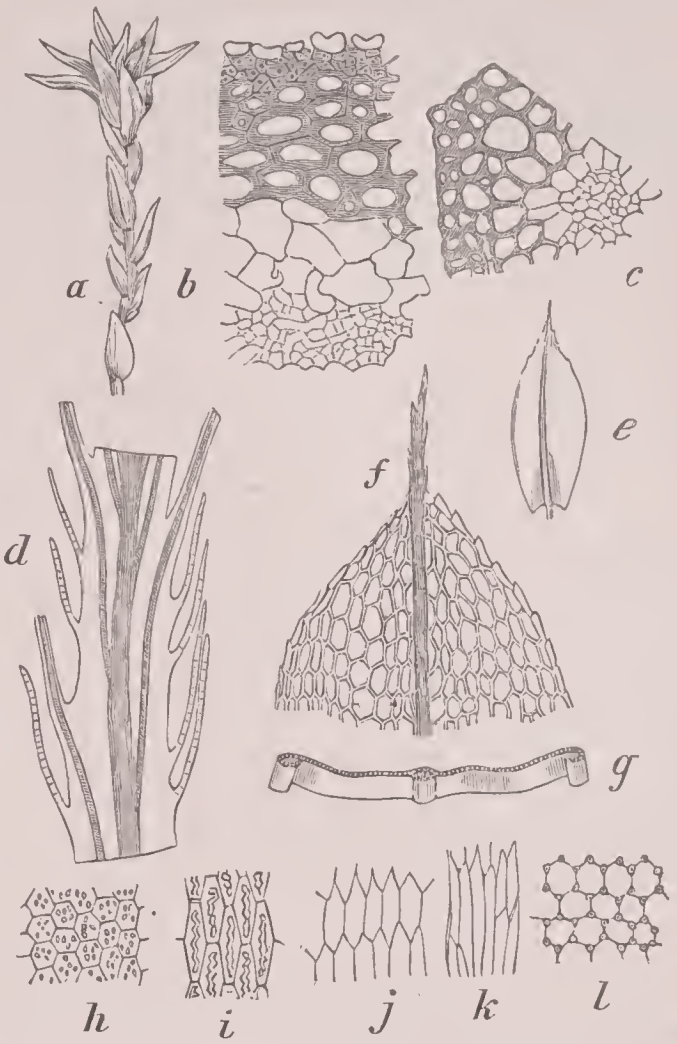


Fig. 8.—*a*, typical moss plant; *b c*, partial cross-sections of stems; *d*, longitudinal section of stem, showing the rudimentary fibro-vascular bundles; *e*, leaf; *f*, portion of leaf showing areolation; *g*, leaf section; *h* to *l*, forms of areolation (all except *a* magnified).

feathery-branched *Hypnum*. In some cases there are strings of elongated cells, which traverse not only the leaves (Fig. 8, *e f g*), but also extend downward into the stem (Fig. 8, *d*). These are rudimentary fibro-vascular bundles. The stems of some species, when cut in cross-section, show a good deal of differentiation of their tissues (Fig. 8, *b c*). The cells of the leaves vary much in the different genera, and these differences are commonly used in the generic and specific descriptions. A few of the characteristic shapes (areolations) are given in Fig. 8, *h* to *l*.

In many cases the sexual organs are collected at the summit of the stem, and surrounded by a whorl of leaves, somewhat resembling a flower (Fig. 9). In some cases the antherids (*a*) and the archegones (*b*) are in the same "flower" (hermaphrodite), while in others they are separated, but on the same plant (monœcious), or on different plants (diœcious).

Fig. 9.—A moss plant in "flower": *a*, antherids and hairs (paraphyses); *b*, archegones and paraphyses (magnified).

The spore-case is usually long stalked, and as it grows carries up the calyptra (Fig. 10, *a*). When young the spore-case is composed of uniform parenchymatous tissue; but an inner cylindrical portion separates partially from the rest (Fig. 10, *e*), and in this is the circular spore-bearing layer (darker in the figure), each cell of which produces four spores by subdivision. The remaining central tissue constitutes the columella.

The teeth which line the mouth of the opened spore-case are formed by the splitting of certain thick-walled cells. Each tooth is thus composed of the fragments of many

cells, whose horizontal walls constitute its transverse bars (Fig. 11, *b d*). In some mosses there is a single row of

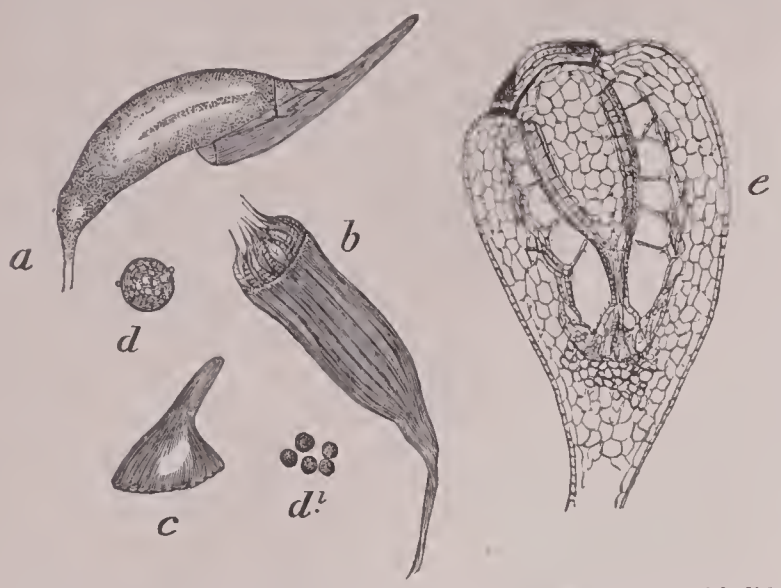


Fig. 10.—*a*, ripe spore-case with its calyptra ; *b*, the same with lid removed ; *c*, lid ; *d d*, spores ; *e*, young spore-case in longitudinal section (all magnified).

teeth (Fig. 11, *a b*), while in others there are two (*c d*). The usual number in each row is sixteen, but it may be four, eight, sixteen, thirty-two, or sixty-four.

There are many families of the true mosses, arranged under two sub-orders, as follows :

1. *Spore-case indehiscent*, Cleistocarpæ.—Here are grouped several families of small mosses, including the genera *Ephemerum*, *Nanomitrium* (Fig. 7, *d*), *Phascum*, etc., often associated with the plants of the preceding order on account of their simple structure.

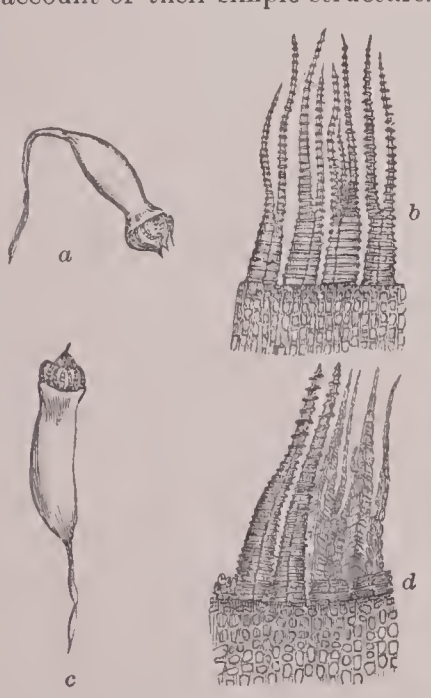


Fig. 11.—*a*, spore-case of *Fissidens* ; *b*, teeth of same ; *c*, spore-case of *Hypnum* ; *d*, teeth of same (all magnified).

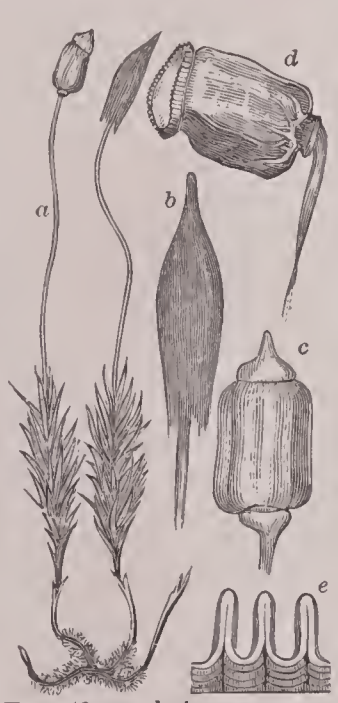


Fig. 12.—*a*, hair-cap moss (*Polytrichum*) ; *b*, spore-case covered with calyptra ; *c*, spore-case ; *d*, same with lid off ; *e*, teeth of spore-case (all except *a* magnified).

2. *Spore-case dehiscent by a lid*, Stegocarpæ.—This sub-order is again divided into two groups, according as the spore-case is terminal or lateral. The prominent genera in the first (*Acrocarpæ*) are *Grimmia*, *Bartramia*, *Fissidens* (Figs. 7, *e*, and 11, *a b*), *Ceratodon*, *Dicranum*, *Polytrichum* (Fig. 12), *Orthotrichum*, *Funaria*, *Bryum*, *Mnium*, and *Timmia*. In the second (*Pleurocarpæ*) the principal genera are *Leskea*, *Cylindrothecium*, *Climacium*, and *Hypnum* (Fig. 11, *c d*).

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Charles E. Bessey.

Mostaganem' : town ; in the province of Oran, Algeria ; carries on an important trade with the interior. Its harbor is shallow. It has manufactures of woolen fabrics, leather, pottery, and jewelry. Pop. (1891) 14,374.

Mostar' : capital of Herzegovina, Austro-Hungarian empire ; on the Narenta, which is here crossed by a celebrated Roman bridge consisting of one arch of 95 feet (hence its name, *Most Star*, Old Bridge). It is situated 35 miles from the mouth of the river and 40 miles S. W. of Serajevo (see map of Austria-Hungary, ref. 10–F). It manufactures knife and sword blades and fine silks, and the vicinity produces an excellent wine. Pop. about 12,600.

Most Favored Nation Clause : See the Appendix.

Mosul : chief town of the vilayet of Mosul, Asiatic Turkey ; on the right bank of the Tigris, opposite Nineveh (see map of Turkey, ref. 6–J). Formerly a prosperous manufacturing city, its fine cotton fabrics, called muslins, were exported to Europe. Now its manufactures have almost ceased, its bazaars are filled with European goods and even its transit trade has largely diminished, as Kurdish tribes render the neighborhood insecure. Though the soil in the region is fertile, hardly anything is produced save wheat, barley, and some cotton and rice. Near the city are oil and mineral springs. Pop. 57,000, four-fifths Mussulmans.

Moszkowski, Moritz : See the Appendix.

Motasalis, Motazalites, or **Kadarija** [*motasalis* or *motazalites* mean literally sectaries, being from an Arabic word meaning to separate ; *kadarija* means literally free-will men] : a Mussulman heretical sect ; founded shortly after the prophet's death by the Doctors Mohabbed-al-Djohani, Djilan, and Yunis. Abu-Hadifah-Wasil was their chief leader. They taught that God's essence and attributes were inseparable ; that the Koran was created and not eternal, faith inalienable, and that God's providence was only most general and left man absolutely free. Rationalistic and philosophical, they controlled for a time the seminaries of Bassorah and Bagdad, and were favored by many Abasside princes. Innumerable sects and divisions of sects have sprung from them. E. A. Grosvenor.

Moth [M. Eng. *mothe* < O. Eng. *moððe* : Germ. *motte*] : a nocturnal insect of the order *Lepidoptera*. Moths are distinguished from butterflies and sphinges (or hawk-moths) by the antennæ, which are mostly filiform or pectinate in moths, knobbed in butterflies, and enlarged in the middle in the sphinges. Moths are mostly, but not always, nocturnal ; sphinges mostly crepuscular (flying by twilight) ; and butterflies diurnal. Among the best-known moths are the silkworm moths (*Bombyx mori*) and the clothes-moths (*Tinea flavifrontella*, *T. tapetzella*, or carpet-moth, etc.). Their larvæ attack woolens, furs, feathers, etc., and more rarely cotton goods. Goods which are exposed to their ravages should be carefully shaken and inspected about the first of June. Powdered black pepper should be strewed under the edges of carpets. Spirits of turpentine, snuff, tobacco, camphor, cedar chips, corrosive sublimate, benzine, and carbolic acid are among the agents which are useful in checking their ravages. See Entomology and Lepidoptera ; also Gall Insects.

Moth, mōt, Matthias : statesman and lexicographer ; b. in Odense, Denmark, about 1642 ; was ennobled 1679 ; made chancellor in 1684 ; was removed 1699 on the death of his patron, Christian V. In 1680 he began the compilation of a Danish dictionary, in which, by reason of his position, he was able to obtain the co-operation of scholars from all parts of the kingdom ; only two specimen sheets were printed together with the plan in 1697. After his death the collection, consisting of sixty folio volumes, was sold to the king, and later was transferred to the Royal Library. In his orthography Moth anticipated many of the reforms instituted by Rask. He died in 1719. See C. Molbech, *Historisk Udsigt over de danske Ordbogs-Arbeider i det 17 og 18 Aarhundrede* (Copenhagen, 1827), and *A Bibliography of Danish and Swedish Dictionaries*, etc. (Baltimore, 1890), by the author of this article. D. K. Dodge.

Mother Carey's Chicken, or **Stormy Petrel**: a name applied to various little petrels belonging to the genera *Procellaria*, *Cymodroma*, *Oceanodroma*, etc., which to the untrained eye look much alike, but more properly restricted to *Procellaria pelagica*, a bird about 6 inches long and 14 in spread of wing. The color is brownish black above, a little browner below, and there is a conspicuous white patch on the rump. This petrel is common in parts of the North Atlantic, but is the rarest of the little petrels found along the eastern coast of the U. S. It can be readily distinguished among them by its square tail, short legs, and entirely black feet. It nests in crannies among rocks, and lays a single white egg with a few faint markings around the larger end. The bird has a rank, musty odor, and when captured, besides biting and scratching, defends itself by ejecting from its mouth an ill-smelling, oily fluid, the partly digested contents of its stomach. The superstitious dread in which this bird is said to be held has been greatly exaggerated. It is doubtful if it ever was regarded as the harbinger of a storm, because in some localities it is, at proper seasons, always common, and it is most noticeable during a gale because, being then prevented from readily obtaining its customary food, it hovers about ships in search of scraps of food. See also PETREL.

F. A. LUCAS.

Mother-of-pearl: a substance chiefly afforded by the shells of the pearl-oyster (*Meleagrina margaritifera*), which also yields the greater part of the pearls of commeree. The shells are obtained in the Gulf of California, at Panama, Cubagua, Ceylon, Madagascar, Swan river, Manilla, the Society islands, etc. Those from Manilla are the best; they are of the black-lipped variety. The Society islands furnish the silver-lipped sort, and Panama the "bullock shells." The genera *Haliotis*, *Turbo*, etc., also furnish some mother-of-pearl. It is principally used in knife-handles, shirt-buttons, for inlaying, etc.

Moths: See MOTH.

Motion [viâ O. Fr. from Lat. *mo'tio*, a moving, deriv. of *move're*, to move]: change of position or place of a point or of a body, the successive positions of the point or body forming its path or trajectory.

There can be no definite conception of the motion of a point or body without reference of its positions to some other point or body in relation to which the motion is estimated. On the earth's surface we are accustomed to refer nearly all ordinary phenomena of motion to some point which is fixed on the earth. The motion of a person walking is unconsciously referred to the points on the ground over which he passes; the motion of a projectile is referred to the point at which it receives the impulse which produces its motion; and the conception of the motion of the solar system is possible only by referring it to some point or direction in space toward which the system as a whole is supposed to move. The fundamental idea, therefore, of a simple movement is that it is relative—i. e. it must have reference to some point and some direction which may be supposed fixed. The study of the principles of motion unconnected with the forces which produce it constitutes a branch of the science of dynamics to which the name *kinematics* (from Gr. κίνημα, movement, from κινεῖν, move) has been given.

Velocity is a term which has reference to the *rate* of motion of a point or body. It is employed to denote a definite measure of the rate of motion according to some particular unit of measure. The three simple units of measure by which natural phenomena are investigated are the unit of force, the unit of time, and the unit of distance or space. The two latter are employed in the determination of velocity; and from these two the measure of velocity may be obtained—viz., the space measured in units of space, passed over by a body in a unit of time. If a second be taken as the unit of time, the velocity will be the space passed over by a point or body in one second. In this manner all velocities may be compared by their measures in the same units; assuming the same interval of time for the unit of time, the velocities of bodies in motion may be compared definitely by the spaces passed over in this unit of time.

If the path or trajectory of a point is known, and its velocity given, the elements of its motion are thus completely determined. The motion is said to be *uniform* when equal portions of the path are passed over in equal times. It is *varied* when unequal portions of the path are described in equal times. It is *uniformly varied* when the successive changes of velocity, increasing or diminishing, take place by equal increments or decrements in the same time. The laws of motion require, therefore, not only that the path shall be known, but that the velocity at each point of its path, or the law by which the velocity changes, shall be known. In uniform movement this law is expressed algebraically by the expression $s = v\,t$, in which s is the space moved through, v the constant velocity, and t the time, in seconds, during which motion has taken place from the initial point. In varied motion the velocity is continually changing, either uniformly or otherwise; and to determine the velocity of a point at any position of its path it is necessary to know the law of change. If the velocity increase or diminish at a uniform rate, the velocity at any instant t, measured from the instant at which the velocity was v_1, will be $v = v_1 + a\,t$, in which a is a constant denoting the rate of variation of the velocity called the acceleration, and the space described will be represented by

$$s = v_1 t + \frac{a\,t^2}{2}.$$

If the velocity is neither constant nor uniformly varying, its rate of variation and the relation between the space and time may still be found by the methods of the integral calculus.

A point is said to have a motion of *translation* with reference to another point when the line joining the two points is altered in length. It is said to have a motion of *rotation* in reference to another point when the line joining the two points changes its direction. A point moving in a circular path has a motion of rotation with reference to the center of motion, but no motion of translation in reference to this center; and a point the trajectory of which is a straight line has a simple motion of translation with reference to all points in that straight line. The measure of angular movement involves the unit of time and the angle through which the body turns in a unit of time. This angle is usually estimated by the length of the circular arc passed over by a point at the distance unity from the axis, and this length is called the *angular velocity*. It results from this mode of measuring angular movement that if a represent the angular velocity, then the actual velocity of a point in the body at the distance r from the axis, in the direction of the tangent to its path, will be equal to the angular velocity multiplied by the distance from the center of motion, or $v = a\,r$. For practical purposes, especially in the study of machines, it is often convenient to express the angular velocity in terms of the number of turns per second of the body about its axis. If N be the number of turns per second—by which it is implied that N may be a fraction or a whole number—then $a = 2\pi N$, and $v = 2\pi N\,r$ will be the actual velocity of a point at the distance r from the axis in the direction of the tangent, π being the ratio of the circumference to the diameter.

Starting thus with the general proposition that all motion is relative, the motion of one point with reference to another is usually composed of two elements—one a change of distance and another a change of angular position. If a change of distance along a given direction only takes place, the motion of either point referred to the other is a movement of translation; if a change of angle only takes place, the movement is one of simple rotation; and if both these changes occur simultaneously the movement is a motion of translation and rotation combined. A rigid body is said to have a motion of translation when all points of the body describe parallel lines, and a motion of rotation when any line of the body changes its direction.

Relative and Comparative Motions of Points.—Two points moving in the same straight line have a *relative* motion equal to the sum or difference of their motions in reference to a third point in the same line. If the points move in the same direction their relative motion will be the difference, and if in opposite directions the sum of their motions in reference to the third point. If the points move with the same velocity the distance between them will remain invariable when they move in the same direction, and will continually increase if they move in opposite directions. When two points rotate about a third, the three points lying in the same plane, if the two revolving points are rigidly connected their angular motions and velocities will be the same; their *comparative* motions will differ only in their tangential velocities, which depend on their distances from the center of rotation. Their *relative* motions will, however, be found to consist of a rotation about each other with the same angular velocity with which they revolve about the common central point. If two points connected together by an invariable line revolve about different centers, their relative and comparative motions may be found by the application

of a theorem which forms the basis of nearly the whole theory of combination in mechanism—viz.: If two points are so connected that their distance apart remains invariable, the components of their velocities along the straight line joining them must be equal.

Composition of Translations.—If a point move over one side of a parallelogram, and then over the next adjacent side, the effect will be the same as if it had moved along the diagonal—i. e. its relative motion with reference to the starting-point will be the same. The two motions along the sides are called the components, and the diagonal motion the resultant motion. It follows from this that any motion of translation in a plane may be resolved into two components in any two given directions in that plane by constructing a parallelogram of which the diagonal is the original motion, the sides having the given direction. More generally any motion of translation can be resolved into three components in three given non-coplanar directions by constructing a parallelopiped of which the diagonal is the original motion, the edges having the given directions. In the same manner the velocity of a point in a given direction may be resolved into three component velocities having given directions. If the components are at right angles to each other, the parallelopiped will be rectangular.

Resolution and Composition of Rotations.—The rotation of a rigid body about a given axis is equivalent to the resultant of two component rotations about two axes parallel to the given axis and in the same plane, the angular velocities of each of the three rotations being proportional to the distance between the other two axes. It follows from this that if two wheels revolving about their centers remain in contact with each other, the point of contact being in the line joining the centers, the angular velocities of the wheels will be inversely proportional to their radii. This proposition forms the basis of the construction of spur-gearing. This kind of gearing illustrates the composition and resolution of parallel rotations. If one wheel be fixed and the other roll around it, the motion of any point in the rolling wheel about the instantaneous axis or pitch-point may be regarded as compounded of the rotation about the axis of the rolling wheel and the rotation of the axis of the rolling wheel about the axis of the fixed wheel.

Rotations may be resolved and compounded in another manner. A rotation about a given axis may be regarded as equivalent to two rotations about two axes which intersect the given axis at the same point, the angular velocities about each of the three axes being proportional to the sine of the angle between the other two. This proposition is the basis of construction of bevel wheels. If one cone roll upon another having the same vertex, the surfaces of the two cones being constantly in contact along a line, any point in the rolling cone may be regarded as having a rotation about its own axis combined with a rotation of this axis about the axis of the fixed cone; or as having a simple rotation about the line of contact as an instantaneous axis. To find the diameters of two beveled wheels which shall revolve with given angular velocities about two intersecting axes, it is only necessary to draw two lines intersecting each other and making the required angle between the axes. If, then, from the point of intersection distances be laid off proportional to the angular velocities of the wheels respectively, the diagonal of a parallelogram constructed on these lines will represent the line of contact of two rolling cones. Such a construction may be called the parallelogram of rotations. This parallelogram determines the relative diameters of the bevel wheels.

Helical or screw-like motion may be regarded as either compounded of a rotation about an axis and a translation in the direction of that axis, or it may be considered as compounded of two rotations about two axes lying in different planes. The latter proposition is illustrated by the rolling of one hyperboloid upon another, their surfaces being in contact along the right-lined element which constitutes the instantaneous axis of the rolling hyperboloid. Such hyperboloids form the basis for the construction of skew-bevel wheels.

It follows from the principles of the composition of motions that the most complex motion of a rigid body may be regarded as equivalent at each instant to a rotation about an instantaneous axis, and a translation along that axis combined, each point of the body describing a helical path.

The combination of two motions of translation transverse to each other gives rise usually to curved trajectories. If one be a reciprocating motion of small amplitude, and the other a continuous motion, the curve takes an undulating or wave-like form. Harmonic motion is a reciprocating motion in a straight line, in which the velocity at every instant is equal to the component parallel to the straight line of another point which moves uniformly in a circle, the amplitude of the reciprocating motion being equal to the diameter of the circle. The motion of the piston of the steam-engine would be exactly harmonic if the connecting-rod were infinite in length. The motion is approximately harmonic in ordinary cases of piston-and-crank motion.

The motions of one curve rolling on another curve, or one body rolling on another body, present particular cases of the general proposition of the movement of rigid bodies, which are not only often observed, but which form the bases of useful applications. The case of a wheel rolling on another wheel has been referred to. In this case any point of the circumference of the rolling wheel rotates about the point of contact and describes a continuous curve called an epicycloid. A cylinder rolling on a plane furnishes an example in which a rotation is combined with a translation of the rotating body, the resultant motion of any point in the cylinder being a rotation about an instantaneous axis, which is the line of contact of the cylinder and plane. Any point of the cylinder describes a curve called a trochoid, and a point in the surface of the cylinder a curve called a cycloid. The crank-pin of a locomotive wheel describes a trochoid, and a point in the circumference of the wheel a cycloid, as the engine moves along the track. A point in a plane rolling on a cylinder, or a point in a string unwound from a wheel, describes an involute of the circle from which it is unwrapped.

The motion of the piston of a locomotive engine furnishes an interesting example of comparative and relative motions of translation. In the forward motion it acts as the moving surface which gives rotation through the crank to the wheel and in the backward motion as a point of resistance, the cylinder being pushed away from the piston; considered relatively to each other, the piston and cylinder have precisely the same motions as they would have if the locomotive were suspended from the earth. Considered with reference to the earth, the cylinder has a continuous uniform motion in a straight line, while the piston, at one point of each revolution, comes partially to a state of rest with reference to the earth. It would come to rest if the crank-pin were in the circumference of the driving-wheel. When a body is spoken of as being at rest, it is understood only as being at rest relatively to other points, there being no point of absolute rest in the universe.

It will have become apparent from this discussion of the principles of motion that the actual path of a material point in space may be the result of a complicated series of motions. Leaving out of consideration the infinitesimal motions of vibration which the molecules of bodies have, and which constitute the cause or phenomena of heat, a particle may have a resultant motion which is compounded of an almost unlimited number of separate motions. Take, for instance, a point in a projectile: it usually has a motion of rotation about an axis within the body of the projectile; it has a parabolic motion with reference to the earth, while it partakes of the motion of the earth around the sun. It is thus made evident that in discussing motion it must usually be restricted to certain relative conditions which constitute the particular points of any investigation.

Revised by R. A. Roberts.

Motion in Animals and Plants: the movements observed in living matter. They may be divided into two categories—invisible and visible. The former are such as occur in the vibrations of atoms, being manifested in heat, light, electricity, and chemical changes. Visible movements are of great variety, many being obvious to the naked eye, while others demand the aid of the microscope. Some, such as growth, are so slow as to be inappreciable except by prolonged observation, but most of them are readily discernible.

In low organisms motion is not only seen in the individual as a whole, but in separate parts. Thus the amœba while in the active state continues to undergo alterations in its outlines by throwing out foot-like prolongations here and there, and from time to time retracting them. The interior semi-liquid protoplasm can be seen to possess a circulatory movement, and if vacuoles are present they may be noticed to contract and dilate. The vorticella has a contractile stem, by means of which the organism is raised or lowered, also a contractile vacuole, besides movable cilia at its mouth.

The paramecium, spirostomum, and the embryo of porifera have cilia which they move with a rapid lashing motion. The volvox and certain rotifera possess cilia or ciliated tentacula which they employ as propulsive organs, while the flagellata propel themselves by their flagella. The volvox, which is in the form of a spherical combination of cells, and is one of the lowest organisms of plant life, is able to execute remarkable movements by means of its cilia—it sometimes rolls over and over like a ball, or around in a circle, or in various indefinite directions, or revolves as though it were on a pivot. The common starfish moves from place to place by means of ambulacral feet. The ophiura, one of the starfish, propels itself in a curious manner by raising itself upon its legs and throwing its body forward, progressing by a series of leaps. The astropectin, another of the starfish, has flexible, hollow legs which the animal draws forward and then fills with fluid, making them rigid, thus raising the body as though on stilts. This straightening of the legs draws the body forward, and as soon as the legs are perpendicular the fluid is suddenly withdrawn, the legs collapse, and the body falls. By a succession of such operations the organism moves from place to place. In centipedes and millipedes the motions of the legs are well defined. The movements of spiders and insects are also sufficiently well known as to need no special comment. In certain mollusks locomotion is accomplished by protoplasmic prolongations which serve as feet as well as for burrowing. Cephalopods swim by means of tentacula. Crustacea use their antennæ as a means of locomotion, and they are able to burrow by means of the conjoined actions of their antennæ and the movements of flexion and extension of their bodies.

In vertebrates motion is developed to a much greater degree. Illustrations are found in the various methods of locomotion, as in swimming, flying, trotting, running, walking, etc., and in the many movements exhibited by various parts of the organism. For instance, in man besides the peculiar combinations of movements which are observed in his methods of locomotion, are those involved in facial expression, gesture, speech, mastication, and deglutition, also movements of the eyeballs, heart, intestines, vessel-walls, blood and lymph, cilia lining the air-passages and Fallopian tubes, white corpuscles, etc. See GAITS and MECHANICS, ANIMAL.

In plants motion is observed in cells and in various organs. Thus in cells the soft protoplasm is sometimes seen to rotate within the cell-wall, as in the leaves of the *Vallisneria spiralis*, while the nucleus is continually undergoing a change of form as it moves from place to place. In the cells of other plants the protoplasm sends prolongations to various parts of the interior, which are after a time withdrawn only to be sent out in other directions. Vacuoles in plant-cells contract and dilate, thus causing a circulation of the cell contents. In the sap-tubes or vessels, ascending and descending currents of sap are observed.

The movements of certain organs are well observed in many species, and in some instances are truly remarkable. The leaves of several species of sorrel move up and down with alterations of light and temperature. The lateral leaflets of the sensitive-plant close in pairs when touched, and if the irritation is strong enough the petiole bends downward and all of its leaflets close. The leaves of the Venus fly-trap (*Dionea muscipula*) and of the so-called aquatic *Dioneæ* (*Aldrovanda vesiculosa*) are constituted of lateral halves which are so connected at the midrib as to permit of their opening and closing like a hinge. In the passive state the leaves are partially open, but should an insect alight within the blades, the sides come together and the victim is imprisoned. The telegraph-plant (*Desmodium gyrans*) rotates the lateral leaflets and jerks them up and down under favorable conditions as often as two or three times a second. The tentacles or filaments of the leaf of the common sundew (*Drosera rotundifolia*) double upon an insect that falls upon the disk or touches them: one after another of the tentacles bends over the prey, rendering escape impossible. Should the victim be caught by the tentacles at the margin of the leaf it will gradually be worked toward the center by the successive movements of the tentacles. So exquisitely sensitive are these filaments that a slighter stimulus will cause them to bend than can be appreciated by the most sensitive nerves of man. The petals of some flowers, as the portulaca, close in the evening and open in the morning; other flowers open in the evening and close in the morning. The leaves of certain plants are similarly affected by light. Thus very strong light causes the leaflets of the sensitive-plant to close, and it arrests the movements of the leaflets of the telegraph-plant; the prolonged absence of light destroys the irritability of the sensitive-plant. The stamens of the *Berberideæ*, *Cynareæ*, etc., are mobile, and when touched bend upon the stigma.

EDWARD T. REICHERT.

Motive: that which occasions or tends to bring about a voluntary movement, such as a consideration, inducement, end, etc. The word is used most generally by psychologists to denote *any influence whatever which tends to bring about voluntary action on the part of a normal person.* Motives fall into two great classes, according as they represent pictured objects of pursuit on one hand, or the subconscious, organic, habitual, or purely affective springs of action on the other, whose main influence is the coloring they give to consciousness as a whole. The former class of motives are *ends*, the latter *affects*. No sharp line can be drawn between them, for they pass constantly into one another. Yet in consciousness the line is both plain and important; for it is only "ends" which are available as distinct lines of direction for volition, in definite cases of choice.

Affects.—All states of feeling whatever tend to discharge themselves in action through the muscles. We feel the force, the motive worth, of a suggestion, a pain, an impulse. An idea simply as an idea—if such could be realized—might not react in movement; but the simple presence of an idea in consciousness itself gives feeling, and only in so far as it affects us does it move us to action.

We may accordingly apply the term *affects* to all involuntary stimuli to movement. When I am affected I am moved through my own inner state of sensibility. And such affects figure directly in the voluntary consciousness, standing in contrast with another great class of stimulations, which together with them constitute *motives*.

All the influences, therefore, which do their work upon us unconsciously are to be taken into account as real motives. The general law that sense-modifications tend to pass off in motor reactions bears right up into the voluntary sphere. *Suggestion* which produces involuntary movement tends to produce voluntary; so of *pleasure and pain*, *emotion*, *impulse*. The psychology which separates volition from reaction so sharply as to deny any influence upon the will to other stimuli than pictured ideas is false. The conditions back of an act of choice are never limited to the alternatives between which the choice is made. There is beneath it all a dumb, unexpressed mass of affects—organic, partially felt tendencies outward, which give coloring to the whole process. A decision made at night is reversed in the morning, when no new information has been received. A trifling physical accident will distort vision, arouse emotion, and reverse decision. This fact, that our most abstract acts of volition are strongly influenced by subconscious affective influences, is only beginning to have due recognition in psychology.

Ends.—The other class of motives may be called ends; which are actual considerations in consciousness which we weigh and measure, as in reaching a decision. Technically they are called *presentations*, since they are mental images which consciousness *presents* to itself as worth preserving. The attitude of the mind toward such ends is *desire*. (See WILL.) With these two kinds of motives distinguished, we may consider how these motives behave in reference to our voluntary action.

Law of Motives.—Volition always involves some measure of division in consciousness—some measure of confusion due to unadjusted claims. The various classes of claims which are to be adjusted in an act have been pointed out. They are the springs of action or *motives*, any affecting tendencies whatever that represent active conditions of consciousness. My whole personality is an expressive thing: its expressive side is as real and elementary as its receptive side. Consequently, at every moment the man is expressing himself somehow, and what he is expressing is the outcome of all the elements in him which seek expression.

Further, the whole of the present possibilities of the man are summed up in these tendencies outward; they represent his entire self at the moment that he acts, i. e. his make-up as the present conditions of his environment are suited to call it out. Given conditions which favor the expression of a number of his motives at once, and they all clamor for exclusive recognition. For example, a brakeman's hand is freezing to the iron; intense pain, a physical spring of action, prompts him to desert his brake; but he quickly calculates the chances of collision, or an open bridge: intellec-

tual motive urging him to remain faithfully at his post; and with this last there comes the picturing of wounded passengers, the cries of those in danger—a new emotional motive, which brings with it a warm flood of sympathy, leading to a quick and easy decision on the side of duty. The decision is the man's decision; it expresses the nature of this man and no other; and it is the outgoing of his nature in a line which the particular circumstances open to him. Accordingly, we may say, first, that *all volition results from a more or less complex aggregation of motives*; and, second, that *this aggregation of motives exhausts the possible alternatives of present action.* It is impossible that any one of these motives should act alone, for a man is never free from his body, on one side, or his higher ideals, on another side, or his emotional life, on a third. They are all present always in normal life.

The second position shows us that any doctrine according to which a man can transcend his motives, hold aloof from them, despise and reject them, simply asks us to chase a firefly. If you remove a man's motives you remove the man; for what is the man but body and mind? The whole content of volition disappears. To will at all a something must be willed, but this something is a pictured something, bearing some relation to myself. The reason I will it is because it moves me—is my motive. Let me picture never so strongly the fabulous—the utterly uninteresting and indifferent—and will in reference to it is impossible. I can never make new motives, nor will a thing that does not for some reason find a responsive echo in my breast.

Nature of Motives.—It is also plain that a motive is nothing in itself. It is only a name for a partial expression of the nature of an agent. Consequently, motives can in no sense be considered as forces which expend their energies upon the will, or which fight each other. These conceptions of the old psychology are nothing short of myths—myths which have "darkened counsel without wisdom" long enough. Apart from the motives, there is no will to fight against, and as to struggling with each other—that would mean either that each of the motives had a will of its own, or that there was no common life whose full realization is the best satisfaction of them all. Here is a developing principle—call it what we may—whose different life-furthering adaptations represent a hierarchy of worths. One worth is chosen. If it be the best the others are also furthered with it by their very denial; if it be lower than the best it suffers with the others through its gratification; both because, as elements of a common life, all are involved in the gratification of each. How, then, can they be conceived as separate entities contending in a theater which is cold stone to all of them? Rather they are all vital elements in the functional synthesis of a living consciousness.

Affects as Motives.—Among motives two great classes have been distinguished, affects and ends. The former are immediate influences upon the will, unpictured, unreckoned, unavoidable. The latter are reflective motives, pictured, estimated, subject to conscious selection or rejection. Now it is plain that these two classes of motives stand on very different planes in the mental life as regards their volitional worth. If all volition is in view of an end, then it is only by strengthening the influence of particular ends that affects enter. If I grow greatly excited, for example, over a particular choice, my excitement colors my choice only in so far as it presses home upon me one alternative of my choice. My physical health alters my opinions and reactions, not by supplying me a new end, but by brightening a consideration here, dulling another there, rendering the attention sluggish, and so limiting the range of my consideration, or stimulating it greatly, and so pitching the entire intellectual play at a higher key. What actual volition is concerned with, therefore, is ends and ends only.

Play of Motives.—How, then, does an end pass into a volition—how does it get the fiat which makes it an act? Careful questioning of consciousness leads us to see that the picturing of ends is in no respect different from the picturing of anything else. It is an ordinary act of Apperception (*q. v.*), by which new elements of conscious content are taken up in an integration with the old established complex of ideas. The new end gets in only as far as it is adjusted and harmonized with old ends; the old ends themselves, a single integrated group, take on a new complexion from the new element of experience thus absorbed. The attention moves throughout the series of elements, grasping, relating, retaining, selecting, and with the integration which it effects, swells and fills consciousness—that is volition. Just as soon as the elements of the end-complex cease to act as partial influences, causing the movements of attention by their own vividness, and the attention gets its hold upon its integrated content as a grand related *situation*, the fiat of choice goes forth.

For example, I have been accustomed, after careful thought, to pursue a given line of business policy. It is the outcome of all my thinking, feeling, and past action—an integration, a motor situation, which exhausts my motives and represents my present volitional attitude. A friend gives me new information; it gets an entrance by its own intrinsic hold upon my attention; it becomes an element in the situation; every other element gets a new adjustment; and when I make up my mind again, get control of the situation through relative stability in the apperceptive outcome—then I am at once in action—my fiat is given.

No one motive has brought about this result. I do not adopt one and utterly deny others. I adopt the situation in which all have entered and to which they have given each its own significance. It is true that the exigencies of conduct narrow me down to a very small number of expressions. I must either go to the opera or stay away. But neither alternative represents my true mind. I decide to go, *provided*; to stay away, *if*; and whichever I do it is with the clear consciousness that I am not realizing my ideal volitional situation in the premises. Instead of indulging one of my motives I am acting on a compromise, which really satisfies none.

The apperception of motives therefore differs from general apperception only in its explicit reference to action. This reference is present in all apperception; no state of consciousness lacks it; but when I have action in view the moving quality of the elements of my synthesis is more felt. Generally, my decision is simply consent—the passage of "the adopting act." I consent to a thing when I give it my sanction. This is volition; but not as full a volition as the volition of conduct. When I know that my own fate is involved, that it is I who must act, there is a fullness of emotional warmth and reality that gives new coloring to the motives involved, and perhaps radically alters the outcome.

Controlling Motive.—The controlling motive, consequently, is the motive which wins the choice; but it is very difficult to find anything that it controls. It does not exist at all after choice, for the outcome of choice is a new end in which all the motives have entered. So it does not control conduct, which is merely expression. For the same reason it does not control the volition itself. Every one of the motives is controlling in the same sense, i. e. of entering essentially in the result. The only advantage it has over other motives is that it becomes the final channel of expression in conduct, an advantage denied to them. In this sense it controls the other motives, but only in this sense. See Psychology, Volition, and Will.

J. Mark Baldwin.

Motley, John Lothrop, LL. D., D. C. L.: historian; b. at Dorchester, Mass., Apr. 15, 1814; graduated at Harvard in 1831; studied at Göttingen and Berlin; was a fellow student with Bismarck; was admitted to the bar in 1836; became in 1841 secretary of the legation at St. Petersburg; U. S. minister to Austria 1861–66; to England 1869–70. After long and exhaustive researches and manifold preparations he published in London in 1856 *The Rise of the Dutch Republic* (3 vols.), which immediately attracted great attention, and has been translated into German, French, Dutch, and Danish. *The History of the United Netherlands* followed (4 vols., 1861–68), and the *Life of John van Barneveld* in 1874, with equal success. His pictures of characters, events, and social states are complete and vivid, and breathe in general a spirit of justice and truth. D. near Dorchester, England, May 29, 1877. See a *Memoir*, by Oliver Wendell Holmes (1878), and *Correspondence*, edited by George William Curtis (2 vols., 1889).

Motoori, mo-tō'rĕĕ, Morinaga: Japanese scholar and author; b. at Matsuzaka in Ise, Japan, in 1730; the father of modern Japanese literature, whose constant aim was to rescue it from a too slavish adherence to Chinese traditions. He wrote on politics in the *Tamakushize*, on history in the *Manyoshu*, *Kokinshu*, and *Genji Monogatari*, on archæology and the history of religious traditions in the *Kojikiden*; and is pre-eminent among Japanese writers for the elegance and perspicuity of his style. He prepared the way more than any other man for the restoration in 1868 of the

emperor to his ancestral rights, and was later elevated to a place in the national panthcon. D. in 1801. J. M. Dixon.

Motor Carriages: See the Appendix.

Mott, Lucretia: See the Appendix.

Mott, Valentine, M. D., LL. D.: surgeon; b. at Glen Cove, L. I., Aug. 20, 1785; graduated M. D., Columbia College, New York, 1806; studied three years in London and Edinburgh; was Professor of Surgery in Columbia College 1809–26, in Rutgers Medical College 1826–30, in College of Physicians and Surgeons, New York, 1830–40, and in University Medical College, New York, 1840–60. He was a very successful surgical operator; was the inventor of valuable surgical implements; had wide fame as an *accoucheur*; was a brilliant and able lecturer; published a translation of Velpeau's *Operative Surgery*, with large additions; a volume of travels in the East (1842), a volume of published clinical lectures (1860), and many papers and addresses. He was the recipient of many foreign distinctions and a member of numerous learned societies. D. in New York, Apr. 26, 1865.

Motto [Ital. *motto*, saying, adage, from Fr. *mot*, word: Provenç. *motz*: Catal. *mot* < Lat. **muttum*, a sound, deriv. of *muttire*, to utter a sound]: a word, phrase, or sentence, used as a declaration of faith or allegiance, as a war-cry in the Middle Ages, as a part of the achievement of arms (see Heraldry), or merely as a kind of badge, sometimes inherited. Those mottoes which were originally war-cries are necessarily very brief; most war-cries indeed are not strictly mottoes, but were names, as of saints (*Saint George!* or *Notre Dame!*) or of the estates or castle of the leader (*Sancy!* or *Bury!*), or of some ancestor, or perhaps some lady. Mottoes of significance including several words or a sentence were naturally developed with the progress of heraldic bearings and heraldic display. While some mottoes originated as a remark or boast appropriate to special occasion (e. g. those emblazoned on the arms of Great Britain: *Honi soit qui mal y pense*—May he be shamed who thinks evil of it; and *Dieu et mon Droit*—God and my right—the utterance of Richard I. at the battle of Gisors), most mottoes have been chosen deliberately for their meaning and euphony; such obvious phrases as *Semper idem* (Always the same) and *Esse quam videri* (To be rather than to seem) have been taken by many persons.

The Italian and French nobles of the fifteenth and sixteenth centuries had the habit of adopting elaborate emblematic devices with sometimes more mottoes than one. Perhaps the briefest of them all was that of Pope Leo X., *Suave*—that is, sweet, or agreeable, or easy; or perhaps as an adverb, gently. The mottoes of nations in Europe are generally those of their reigning families, or of their chief honorary orders, but cities and towns all through the Middle Ages had mottoes of their own; and from this custom have come the mottoes of the States of the American Union. Virginia has *Sic Semper Tyrannis* (So [let it be] always to tyrants), in allusion to the dagger in the escutcheon; New York has *Excelsior*; and the Union itself the admirably chosen words *E Pluribus Unum*. Russell Sturgis.

Mouflon: an animal of the genus *Ovis*, found in Southern Europe, and closely related to the common sheep, with which it breeds, and to the big-horn. Its fleece is not woolly.

Moukden: See Mukden.

Mould: See Mucoraceæ and Water Moulds.

Moulding [deriv. of *mould*, *mold*, from O. Fr. *moler* > Fr. *mouler*: Span. *moldar*: Ital. *modulare* < Lat. *modula'ri*, measure, deriv. of *mo'dulus*, *modus*, measure]: the art of forming a cavity conformably to a plan, pattern, or model, in mould, sand, or other suitable material, in which to pour molten metal or other liquid capable of solidifying therein.

The art of moulding has come down to us from a very remote period; we find evidences of its practice by the most ancient nations, in articles found among the ruins of temples, palaces, fortresses, and cities. Whatever the source of the technology of the art, we in our day can show nothing superior, either in design or execution, to the work of men whose names and methods are lost. The materials used and the methods employed in the art at present can alone claim our attention.

Preliminary Preparations.—These involve a most careful study, by the artist or engineer responsible for the work, of the character, general plan, and the subordinate details of its design; the selection of proper materials for the pattern or model, and its construction with especial reference to accuracy and the number of copies to be made from it. If but few copies are required, the pattern is usually made of wood, plaster-of-Paris, or some other cheap, perishable material; if the pattern is to be used frequently, it should be made of metal. In moulding directly from natural objects, of course, no other pattern is required, and by the peculiar process employed the object copied can be used but once.

The Material of which the Mould is to be made.—This should allow the passage of air and such gases as are generated when the mould is filled with melted metal, but it must also be sufficiently compact to resist the pressure of the liquid metal and the high temperature at which it enters the mould, and it must separate from the casting with ease, leaving a clean, smooth surface.

Suitable frames, called "flasks," must be provided for holding the material of the mould, and ovens for drying certain kinds of moulds erected. Proper hand-tools must also be furnished the workmen or moulders, and cranes or other machinery for lifting and moving heavy moulds and castings.

Making the Patterns.—The patterns used in the art of moulding are in form exact representations of the articles to be cast in the moulds made from them, but in size they usually exceed the finished article by an amount represented by the "shrinkage" of the metal in passing from a liquid to a cold, solid condition. The amount of this allowance for shrinkage is determined from the well-known behavior of the various metals A common allowance for the metals more generally used is as follows:

Cast iron	$\frac{1}{8}$ inch per foot.
Gun metal (copper and tin)	$\frac{1}{6}$ " "
Copper	$\frac{1}{5}$ " "
Lead	$\frac{5}{16}$ " "
Zinc	$\frac{1}{4}$ " "
Tin	$\frac{1}{12}$ " "
Bismuth	$\frac{5}{32}$ " "

Patterns are usually made of wood, which must be thoroughly dry and free from imperfections. Pine is the kind more generally used, but cherry and mahogany are often employed for small objects. Wood patterns when finished are coated with shell-lac varnish, to prevent the absorption of moisture from the damp materials of the mould; but when a pattern is to be used often, it is preferable to make it of metal. Brass and cast iron are used for this purpose.

Patterns are frequently made in two or more parts to facilitate moulding, and for the casting of gear-wheels it is a growing practice to make a small segment of the rim for a pattern of that part; this is attached to a very exact apparatus for placing it, which enables the moulder to make it subserve the purpose of a complete pattern of the rim.

Models for statuary are commonly built up by the artist in clay, from which a plaster cast is made, and from this the mould.

Kinds of Moulding.—These are three in number, viz., green-sand, dry-sand, and loam-moulding. In the first there is employed a "moulding-sand" composed chiefly of silica with a small admixture of alumina, which is always used in a moist or "green" condition, in wooden boxes or flasks. In the second method the moulding-sand is used in iron flasks, and before the mould is considered finished it is thoroughly dried, hence the term "dry-sand moulding."

In loam-moulding the sand employed has more alumina associated with it, and usually has mixed with it a quantity of horse-dung to increase its adhesiveness and porosity; this moulding composition is called "loam," whence the term loam-moulding. The loam is always manipulated in a moist or even wet state, but is thoroughly dried before the metal is run into the mould made in it. In loam-moulding patterns are rarely employed save for certain ornamental parts and for projecting "ears" or "lugs"; the most of the work being done with sweeps, straight-edges, and other tools.

Flasks.—The flasks or boxes used for holding the sand of the mould are usually rectangular frames of wood or metal, without top or bottom, having in their interior a number of cross-bars or traverses, to assist in sustaining the sand. Flasks are commonly made in two parts, the upper of which is called "the cope" and the lower "the drag." The cope is prevented from lateral displacement by dowel pins on its lower side, which enter corresponding holes in the top of the drag.

Wood is generally used for flasks that are employed for green-sand moulding, and iron flasks are always used for dry-sand work. Sometimes iron flasks are also used for small

work that is moulded in green sand. "Snap-flasks" are a special variety only used for very small work; in these there are no traverses, and both the cope and drag are hinged at one corner, and have a latch at the opposite angle; this arrangement permits the detachment and removal of the flask from the mould after it is finished, and thus it can be used for any number of moulds.

Cores.—These are made of a somewhat coarse sand, whose cohesion is augmented by mixing it with stale beer, yeast, molasses and water, or similar adhesive matter. Cores are made in a great variety of shapes, and are used in moulding to make holes and hollows in the casting wherever required; for this purpose the cores are put into the mould in their proper places, and the metal flows around them.

Making a Mould.—The simplest way of making a mould is to hammer a pattern into the sand floor of the foundry until its top is level with the surface of the floor; the pattern is then removed and metal is run into the cavity left. This is called open sand-moulding, and is only used for the coarsest variety of work, such as pig iron and the various rough plates, "glands," etc., used in foundries.

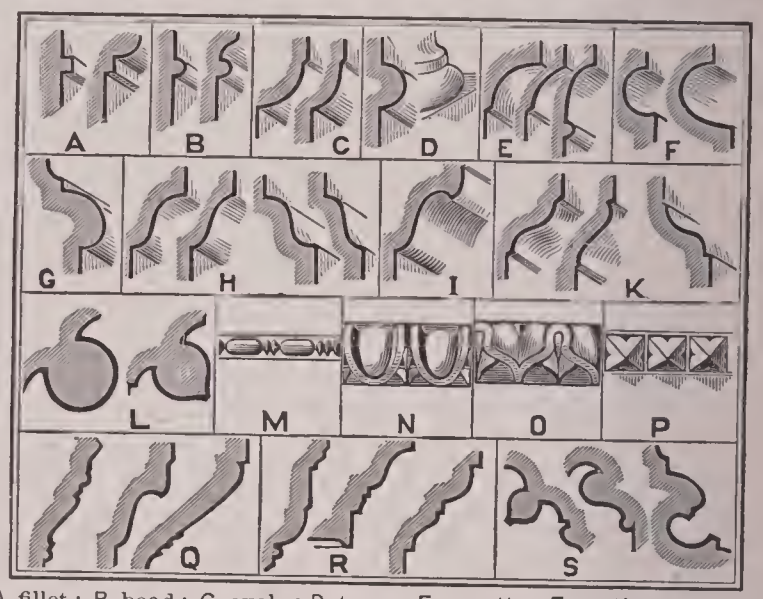
In ordinary green-sand moulding a board, called the follow-board, is first placed upon the floor; upon it with its top side down is placed the drag. Half of the pattern of the article to be cast is placed within the drag upon the follow-board; green sand is then sifted upon the pattern until it is thoroughly covered; the drag is then shoveled heaping full of unsifted sand, which is then thoroughly compressed by the use of a tool called a rammer; the surplus sand is then removed by a straight-edge or "strickle," so that none projects above the sides of the drag, which is then turned over; the surface of the sand that is then uppermost is smoothed with a trowel or "slicker," and dry "parting-sand" is dusted over it evenly, any of the sand which falls upon the upper surface of the pattern being blown off with hand-bellows. The other half of the pattern is now placed upon that in the sand, and the cope of the flask is placed upon the drag. A "gate-pin" (a tapering pin of wood, large end up) is placed in position on the sand in the drag, and sand is sifted into the cope until the pattern is entirely covered, when sand is shoveled in, rammed, and strickled off, as in the case of the drag. The gate-pin is now withdrawn and the upper end of the gate (also called "git") is enlarged and given a trumpet-mouth shape; then the cope is lifted and turned over to one side of the drag, carrying the upper half of the pattern with it. A "rapping-pin" is now inserted in that portion of the pattern which remains in the drag, and gently rapped with a hammer in every direction to loosen the pattern, which is gently lifted out by the rapping-pin. A runner is then cut from the mould to the gate, and if the casting is required to be very smooth a facing material is applied to the surface of the mould and carefully smoothed down. All imperfections are corrected in the lower half of the mould, and when the upper half has had its pattern removed, and been "faced" and "mended up," the cope is again lifted, turned, and placed carefully upon the drag, which is now locked to the cope by hooks, glands, or any other way that will prevent its "rising" when the metal is poured in the mould. Care must be taken before the patterns are removed to make a number of vent-holes with a vent-wire in order to liberate the air and gases that tend to accumulate in the upper part of the mould when the liquid metal is run in. The mould having been finished, it is in due time "poured," and as soon as the metal is sufficiently solidified to bear handling without injury the flask is opened and the sand and casting removed, the gates and runners are broken off, and the article cast is cleaned.

W. F. Durfee.

Mouldings: ornaments in architecture and decoration, consisting of narrow raisings or lowerings of the surface. The new surface, that is, the surface of the moulding, may be plane, or of a simple or elaborate curvature. A moulding has generally the same profile or section from one end to the other; it is supposed to be produced by moving the profile at right angles to its plane, either in a right line or along a curved path; mouldings in plaster and other plastic material are made in this way.

In many architectural styles mouldings constitute one of the most important elements in design, serving by their multiplied alternations of light, shade, and shadow in parallel lines to frame and accentuate the main divisions of a composition, and to impart animation and variety to its whole aspect. They occur most frequently grouped in string-courses separating the successive stages of the design; in the bases and capitals of columns, and in entablatures and cornices, to support and to crown its various features; in arch-mouldings, to break up the depth of heavy arches into pleasing successions of convex and hollow surfaces, whose concentric lights and shades repeat the form of the arch, and mediate like a penumbra between the bright wall and the deep shadow of the arch; in archivolts, to frame arch-openings with delicate concentric lines of shadow; and in frames, to decorate the outlines of decorative or constructive panels.

The essential consideration in designing mouldings is the profile; for although this is not seen, and although a pretty profile may not give an effective moulding, yet upon this depends the whole character of the moulding and of its effect in the composition. The profile is usually a curve, simple or compound; the nature of its curvature and the way in which various curves are combined in groups and alternated with angular and plane surfaces determining widely diverse effects by graduated transitions or abrupt contrasts of light and shade, and by the ranging succession of wide and narrow bands or lines of shadow. The type profiles of the commoner mouldings are shown and named in the annexed diagram.



A, fillet; B, bead; C, ovolo; D, torus; E, cavetto; F, scotia, or gorge; G, thumb-moulding; H, cyma recta; I, beak-moulding; K, cyma reversa, or ogee; L, boultel, plain and filleted; M N O P, decorated mouldings; Q, Greek profiles; R, Roman profiles; S, mediæval (Gothic) profiles.

In the art of profiling mouldings the ancient Greeks were absolute masters, and the combination of delicacy and strength in the subtle and elusive curves of Greek mouldings has never been equaled. This delicacy was not lost in the decorations with which they were often enriched; whether these were painted, as in the earlier and Doric buildings, or deeply carved, as in the later and Ionic mouldings. The decorative forms used seem to have originated in Egyptian lotus-borders, but were treated so as to reproduce in symmetrical repeated patterns the profile of the moulding itself, and thus developed into the egg-and-dart, water-leaf, or heart-leaf, and anthemion ornaments which the Romans still further elaborated and enriched, not without sacrificing the purity and delicacy of the original Greek profiles. (See Architecture.) The Gothic mouldings were far more complex than the Classic, with multiplied deep hollows, sharp, angular fellets, and salient rounds or boultels. They were almost invariably cut into the masonry, reducing its mass, instead of projecting from it like the Classic. The earlier or Romanesque mouldings were large and simple in profile, but often richly carved with zigzags, billets, or surface-patterns. These disappeared with the advent of the pointed arch; in the true Gothic or pointed styles only the hollows were decorated, and these with pyramid-flowers or dogteeth at first, later with ball-flowers, naturalistic or conventional foliage, and finally running vines realistically carved. The Renaissance revived the Roman profiles and ornaments, and modern architecture has mainly continued in its use. The importance of carefully studying the profiles of all mouldings is best understood perhaps by the French, whose care in this respect accounts largely for the air of refinement which seems to characterize in a greater degree the average modern French building as compared with the average modern English, German, or American building. See Architec-

TURE, ORDERS OF ARCHITECTURE, and RENAISSANCE ARCHITECTURE; also Perrot and Chipiez, *History of Art in Antiquity*; Viollet-le-Duc, *Dictionnaire Raisonné*, under *Profil*; Paley, *Gothic Mouldings*; Parker, *Glossary*; Rosengarten, *Handbook of Styles in Architecture*. A. D. F. HAMLIN.

Moulds: See MUCORACEÆ and WATER MOULDS.

Moulins, moo'lăn': capital of the department of Allier, France; on the Allier, here crossed by one of the finest bridges in France; 124 miles N. W. of Lyons (see map of France, ref. 5–F). It is a beautifully situated and handsomely built town, with a fine cathedral, large cavalry barracks, and important manufactures of cottons and cutlery. Pop. (1896) 22,215.

Moulins: wide-mouthed, funnel-shaped crevasses formed in melting GLACIERS (*q. v.*).

Moulting, or **Exuviation** [*moult* is from M. Eng. *mouten*, from Lat. *muta're*, change, whence Eng. *mew*, moult; *exuviation* is from Lat. *exu'viæ*, anything taken or stripped off, the shed skin of animals, deriv. of *exu'ere*, take out or off]: the periodical casting off of shell, skin, horns, feathers, or other parts of the integument, such as takes place once a year or oftener (in some animals once every few days) among serpents, batrachians, spiders, insect-larvæ, etc. Birds in many cases shed their feathers annually, and many quadrupeds also shed their coat of hair nearly all at once. Deer mostly renew their horns completely every year. In man exuviation is a continual process; and this is the case with many of the lower animals. See FEATHERS and ENTOMOLOGY.

Moulton, mōl'tŭn, ELLEN LOUISE CHANDLER: poet and story-writer; b. in Pomfret, Conn., Apr. 5, 1835; married in 1855 William A. Moulton, a publisher of Boston: has published many contributions to periodical literature: author of *This, That, and the Other* (1854); *Juno Clifford* (1855); *My Third Book* (1859); *Bedtime Stories* (1873, 1875, 1880); *Swallow Flights* (1878); *In the Garden of Dreams* (1890); *Some Women's Hearts* (1888); and other works.

Moulton, RICHARD GREEN: See the Appendix.

Moultrie, WILLIAM: soldier and patriot; b. in South Carolina in 1731; commanded a company against the Cherokees 1761; was in 1775 appointed colonel of the Second South Carolina Regiment, and in that year represented St. Helena parish in the provincial congress. In June, 1776, while engaged in constructing a rude defensive work of palmetto logs on Sullivan's island, Charleston harbor, he was attacked by a British fleet (June 28) under Sir Peter Parker; an engagement of nearly ten hours ensued, resulting in victory for the little fort, which has since borne the name of its gallant defender. In September he was made a brigadier-general, and in Feb., 1779, defeated the British near Beaufort. In May he successfully resisted Prevost's advance upon Charleston, which place he was able to hold until the arrival of Lincoln; but in 1780, upon the surrender of the place, he was made prisoner and held for nearly two years, refusing repeated offers of bribery to desert the cause of his country. After his exchange (Feb., 1782) he was made (Oct. 15) a major-general; was Governor of South Carolina 1785, and again 1794–96. Author of *Memoirs of the Revolution* (2 vols., 1802). D. at Charleston, S. C., Sept. 27, 1805.

Mound-builder: a species of bird. See MEGAPODIDÆ and NESTS OF BIRDS.

Mound-builders: in American archæology, the name applied to the constructors of an extensive series of ancient remains, of uncertain date, scattered over the upper Mississippi and Ohio river valleys. These remains vary greatly in size and character, and evidently were erected by different peoples widely apart in time, but approximating each other in the general level of their culture. The mounds or tumuli are of earth or earth mingled with stones, and are of two general classes, the one with a circular base and conical in shape, the other with a rectangular base and a superstructure in the form of a truncated and terraced pyramid. The former are generally found to contain human remains, and are therefore held to have been barrows or sepulchral monuments raised over the distinguished dead, or, in some instances, serving as the communal place of interment for a gens or clan. The truncated pyramids, with their flat surfaces, were evidently the sites for buildings, such as temples or council-houses, which being constructed of perishable material have disappeared. Many of the mounds are small in size, scarcely visible above the general level of the soil, while others reach extraordinary proportions. One at Grave Creek, W. Va., is 70 feet high and 900 feet in circumference; a rectangular, truncated mound at Marietta, O., is 188 feet long, 132 feet wide, but only 10 feet high; one at Cahokia, Ill., is 97 feet high, rising from a base in the form of a parallelogram, with sides measuring 700 and 500 feet respectively. They are most numerous in Southern Ohio and Southern Illinois. According to a careful estimate there are more than 10,000 in the former State alone. Many of them are connected with extensive artificial embankments and earthworks, inclosing large areas in lines representing accurately geometrical figures, usually the square and the circle. One of these, in Ross co., O., incloses 140 acres; while that known as Fort Ancient, on the Little Miami river, extends in the whole circuit of its embankments about 4 miles. Nearly 1,500 of such inclosures have been enumerated in the State of Ohio, and over 100 in Ross County, which seems to have been one of the centers of population of this ancient people.

Another class of mounds occasionally found in Ohio but much more abundant in Wisconsin are those known as animal or effigy mounds. These are of slight elevation, at most 3 or 4 feet, and represent in outline the figure of some animal in gigantic size, often several hundred feet in length. Usually the subject chosen is a bird or familiar mammal. Figures of men are rare; instances of extinct or unknown animal forms, such as those of monkeys, elephants, the mastodon, etc., have been alleged in various quarters, but closer examination has proved the resemblance to be delusive. Several remarkable examples of such mounds are found in Ohio, as the Great Serpent mound in Adams County and the so-called Alligator (probably an opossum) in Licking County. From these examples it is surmised that the builders of the Wisconsin mounds may have been connected with the constructors of the Ohio works. It is generally supposed that the object of these effigy mounds was to represent the "totemic animal" or mythical ancestor of the gens or tribe.

Many hundreds of the mounds have been carefully opened and their contents studied. They indicate a degree of civilization higher, indeed, than that of the native Indians, who occupied the locality when it was first visited by the whites, but not in advance of what was found in many portions of the area of the U. S., and generically strictly within the limits familiar to the red race. Although the mound-builders were familiar with the use of copper for ornaments and tools, they hammered it from the native ore, and knew nothing of smelting or casting. They were wholly within the "polished stone age," and their weapons and implements were mainly of chert, quartz, slate, and bone. They were somewhat skillful in carving pipes from the softer stones, and evidently were agricultural, cultivating tobacco, maize, and some other food-plants. Their pottery was superior to that of the nations N. or E. of them, but much below that of Mexico; the most artistic examples are certain small figurines representing animal and human forms, which have been found broken and thrown upon funeral pyres under the sepulchral mounds. It is evident that they had extensive commercial intercourse in various directions. Besides copper, which came from the shores of Lake Superior, the mounds have yielded abundance of mica, brought from the mountains of North Carolina, pearls from the Tennessee river, shells from the Gulf coast, and obsidian from the region now comprising Yellowstone Park.

The period when the mound-builders flourished has been differently estimated; but there is a growing tendency to reject the assumption of a very great antiquity. There is no good reason for assigning any of the remains in the Ohio valley an age antecedent to the Christian era; and the final destruction of their towns may well have been but a few generations before the discovery of the continent by Columbus. Faint traditions of this event were still retained by tribes who occupied the region at the advent of the whites. Indeed, some plausible attempts have been made to identify their descendants with certain existing tribes. It is now fully recognized that the culture of these ancient peoples was strictly "Indian" in character; and in a number of prominent traits it bore a striking likeness to that discovered by de Soto and the early French explorers on the lower Mississippi, and in the area of the Gulf States. Not only did the modern tribes resident there erect mounds of similar size and character to those in the Ohio valley, but many minor details of art and ornament are identical. There is therefore no occasion to go beyond the ancestors or relatives of these southern tribes to explain the mystery of the mound-builders.

Authorities.—*Reports of the Peabody Museum* (Cambridge); Cyrus Thomas, *Mound Exploration for the Bureau of Ethnology*; W. K. Moorehead, *Primitive Man in Ohio* (New York, 1892); J. P. Maclean, *The Mound-builders* (Cincinnati). D. G. Brinton.

Mound City: city; capital of Pulaski co., Ill. (for location of county, see map of Illinois, ref. 12–E); on the Ohio river, and the Cleve., Cin., Chi. and St. L. Railway; 7 miles N. of Cairo. The principal industries are lumbering, manufacturing, and ship-building. It contains one of the U. S. national cemeteries. Pop. precinct (1880) 2,222; (1890) 1,965; city (1900) 2,705.

Mound City: city; Holt co., Mo. (for location of county, see map of Missouri, ref. 2–C); on the Chi., Burl. and Quincy Railroad; 45 miles N. by W. of St. Joseph. It is in an agricultural and stock-raising region; has considerable canning interests; and contains 5 churches, 2 public-school buildings, 3 hotels, and 2 weekly newspapers. Pop. (1880) 678; (1890) 1,193; (1900) 1,681. Editor of "News."

Moundsville: city (formerly Grave Creek, renamed from large mound in vicinity); capital of Marshall co., W. Va. (for location of county, see map of West Virginia, ref. 4–G); on the Ohio river, and the Balt. and O. and the Ohio River railways; 12 miles S. of Wheeling. It is in a coal-mining and farming region; has water-works, electric lights, electric railway, cotton and woolen mills, glass, mineral wool, and shoe factories, brick-works, and several sawmills and coal-banks; and contains the State penitentiary, a State bank with capital of $35,000, and two weekly newspapers. The work of the mound-builders here consists of a conical structure, about 70 feet high and 900 feet in circumference at the base. A shaft sunk from the apex to the base in 1838 disclosed two sepulchral chambers, formed of logs and covered with stones, containing human skeletons. Pop. (1880) 1,774; (1890) 2,688; (1900) 5,362.
Editor of "Herald."

Mountain: a prominence of the earth's surface, having considerable magnitude and steep slopes. Plateaus are distinguished from mountains by their broader tops or gentler slopes. Hills are distinguished by their less magnitude; but there is no fixed limit, and classification is influenced by the general scale of the surrounding features. An eminence which in a district of great mountains would be called a hill might rank as a mountain if surrounded by broad lowlands.

A long mountain is called a range, ridge, or sierra, and is said to trend in the direction of its length. A group of ranges usually exhibit parallelism of trend, and if it is itself long is called a chain or cordillera.

Parts of Mountains.—A ridge diverging from the main ridge or mass of a mountain is called a spur. Acute lines of water-parting are called crests. Peaks are exceptionally high points of crests; saddles or cols, exceptionally low points. Cols traversed by routes of travel, or available for such routes are called passes. The title mount is often prefixed to the specific name of a peak or isolated mountain; and knob, following the specific name, is sometimes used in the same sense. Acute peaks are called pinnacles or needles. Hollows or depressions on the slopes of mountains are called valleys if their bottoms are broad, gorges if they have narrow bottoms between steep walls. In the Western U. S. gorge is replaced by cañon; in the Catskill district of New York by clove. In the Rocky Mountains large mountain valleys are called parks; in the Southern Appalachians small mountain valleys are known as coves. Steeply walled amphitheaters, often found near the crests of ranges, are called cirques.

Origin of Mountains.—The processes of mountain-making may be summarized under three heads: uplift, eruption, and sculpture. From time to time, now in one place and now in another, portions of the earth's crust are lifted high above the general level. If the rising tract is broad it becomes a plateau; if narrow it becomes a mountain. So, too, in various places and from time to time lavas issue from cracks in the earth, and spreading over the surface are congealed. Many such lava-flows issuing at one place build up a mountain. The whole surface of the land is subject to erosive action by rain, streams, frost, and other agencies, and the final tendency of this action is to wear away the continents and deposit the material in the ocean; but its immediate tendency is to carve hollows in the higher parts and on the steeper slopes of the land. The mountains made by uplift and eruption are thus sculptured into new shapes, often very different from the original: and plateaus are sometimes so profoundly furrowed that the parts remaining between the hollows are properly called mountains. It will be noted that uplift and eruption are initiative, while sculpture is a modifying process. Though they co-operate in the production of mountains, their co-operation is antagonistic, and the form of each mountain represents a transitory phase of the conflict between constructive and destructive forces. Uplift and eruption do their work slowly, and their product is subject to degradation from the very start.

Types of Uplift.—In some cases the rocks composing an uplifted mass are massive or are of complicated structure, and it may then be difficult to determine the character of the uplift; but when the original structure is simple, and especially when the original rocks are undisturbed sediments, the new structure given to the rocks exhibits the nature of the disturbance. In a number of well-studied mountain chains the rocks are arranged in a series of parallel folds or wrinkles. The folds, though long, are shorter

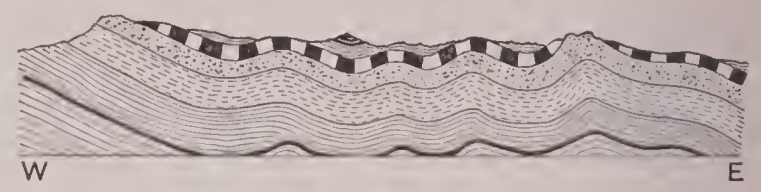


Fig. 1.—Section of Appalachian folds in Virginia (after Rogers).

than the chain, and lap past each other like wind-waves on a lake. Associated with them are faults of the type called thrust faults (Fig. 2). Both folds and faults show that in

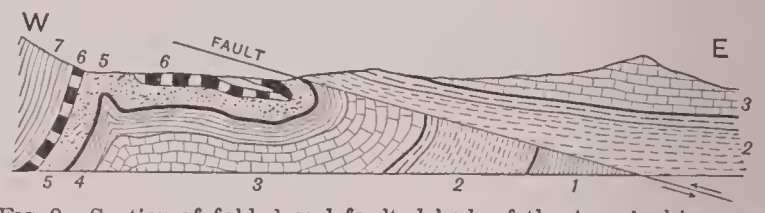


Fig. 2.—Section of folded and faulted beds of the Appalachian systems in Eastern Tennessee (after Campbell). Arrows show the directions of motion along the fault plane. Formation 2, originally underlying 3, and overlying 1, is by the dislocation made to rest on the broken ends of 1, 2, 3, and 4.

the process of wrinkling the rocks have been made to occupy much less space laterally, and it is hence inferred that the wrinkles were produced by forces acting horizontally, or in directions tangential to the earth's surface. To account for such forces various theories have been propounded, the one that has found most favor appealing to the shrinkage of the earth by cooling. The interior of the earth is intensely hot (see Earth and Refrigeration of the Earth), and there is a continual flow of heat by conduction to the surface, whence it is radiated to space; but the outer part, having acquired a low temperature long ago, does not become cooler. Consequently, there is a progressive shrinkage of the nucleus, but not of the crust, and the adjustment of the crust to the shrinking nucleus produces tangential stresses. The folded structure is characteristic of the Appalachian Mountains and the Coast Ranges of the U. S., and of the Jura Mountains of Europe; it is appropriately called the *Appalachian structure*.

In an important variety of fold-structure the folds are pressed closely together, are symmetrically arranged on opposite sides of an axis, and are overturned in such way that the strata dip toward the axis from both sides (Fig. 3).

Fig. 3.—Section illustrating the fan-structure of the Alps (after Geikie). The numbers indicate different formations in the order of their original superposition, No. 1 being the lowest.

This type, which is not well illustrated in the U. S., has been best studied in the Alps, and is called the *Alpine* or *fan-structure*.

In an independent type, known as the *Basin Range structure*, there seems to have been no horizontal compression, but only vertical movement. Sometimes the rocks are arched, but more frequently they are divided by vertical fractures into blocks of mountain size, and these are un-

equally lifted, or some go up and others down (Fig. 4). Frequently a number of great blocks are separately tilted, their lifted edges making mountains and their fallen edges valleys (Fig. 5). This structure, for which no satisfactory explana-

FIG. 4.—Ideal section, illustrating Great Basin structure (after Russell).

tion has been offered, characterizes many mountain ranges in Nevada, Utah, Arizona, and New Mexico.

Intermediate between the Basin Range structure and what has been called plateau structure is the *Uinta structure*, in which a crustal block somewhat broader than an ordinary mountain range is lifted bodily above adjacent tracts and is

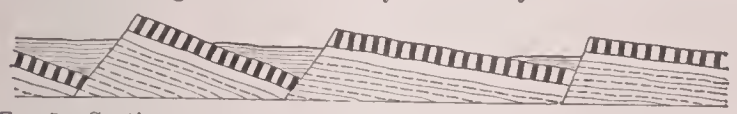


FIG. 5.—Section across mountains and valleys in Southeastern Oregon (after Russell).

itself gently arched. Of this type are the Uinta Mountains of Utah and the Black Hills of Dakota.

Types of Eruption.—Those eruptions which produce mountains may be classified as superficial and subterranean. *Superficial* eruptions build up mountains of conical form with craters at top, lavas of one type producing cones of gentle slope, as in the Sandwich islands, lavas of another type making steep cones like Vesuvius. Some volcanic cones are solitary, others are grouped together, and sometimes the grouping is linear. In the Western U. S. there are many volcanic mountains, among which Rainier, Hood, St. Helena, Adams, Shasta, and Taylor are distinguished by their great size. The Cascade Range is a broad upland constituted chiefly of confluent volcanoes. See VOLCANO.

Eruptions that may be called subterranean never reach the surface, but stop at lower levels, forming bubble-like cysts called laccolites. In making space for themselves they lift the superjacent rocks, and thus produce mountains at the surface. Structurally such mountains are domes with hard nuclei; and they are often grouped together after the manner of volcanoes. In the Western U. S. the Henry, Navajo, Abajo, La Sal, Elk, Spanish, and Huerfano Mountains are of this type.

Mountain-making by Sculpture.—When a continental area is exempt for a long time from uplift and eruption it becomes a plain. Its mountains are worn down to low hills, its valleys are made flat, and its extent is enlarged by the building of low deltas on its coasts. The whole surface is brought so nearly to the level of the sea that the streams are sluggish and nearly cease their work of degradation. The form of the surface is practically independent of the geologic structure, which may be simple or complex. If such a plain, or part of it, be uplifted, the resulting plateau is at once subjected to active but unequal erosion. All about its margin, and eventually through its whole extent, streams have steep descent and deepen their channels rapidly; the general surface between streams suffers relatively little wear; and the plateau is thus converted into a rugged tract of steep-sided mountains and valleys. If the rock is homogeneous, the positions and trends of the mountains are determined by the streams, and each mountain is usually a congeries of spurs. If the rock is varied in texture, the courses of streams are modified through the inequality of the resistances offered by the different rocks to erosion, and a topography results in which valleys follow the outcrops of rocks easily eroded, and the great masses of resistant rock survive as mountains. This is finely illustrated in the Appalachian chain. After the rock-sheets of that range had been crowded into folds there was a long period of stability during which the parts of folds lying above sea-level were almost completely removed, hills surviving only where resistant rocks were massed together. Then the folded belt was gradually lifted into a broad, flattish arch several thousand feet high, and the streams were stimulated to a great work of sculpture. From the arch-like plateau they have carved the existing mountains, the plan of the mountain-ridges being determined almost wholly by the arrangement of the more durable formations. This arrangement was itself determined primarily by the folds and faults of the earlier uplift, and secondarily by the level at which the folds were truncated. Many of the structural features of the chain are thus forcibly expressed in its topography, although the axes of mountain-ridges do not ordinarily coincide with the axes of folds.

FIG. 6.—Map of Appalachian ridges in Eastern Central Pennsylvania (after Lesley). The ridges coincide with the outcrops of hard beds which were involved with soft beds in great folds.

A number of the eruptive rocks are able to withstand erosive attack with peculiar success, and this quality enables sculpture to develop mountains when eruption is combined with regional uplift. A small volcano, itself only a hill, may by the hardness of its rock protect and preserve softer rocks beneath it while the surrounding plateau is profoundly degraded, and thus determine the existence of a mountain. Of this character are the Uinkaret and San Francisco Mountains of Arizona. In similar fashion thick, level layers of lava sometimes cause flat-topped mountains, such as the Raton of Colorado, the Thousand Lake of Utah, and Table Mountain of California.

Lavas that were originally congealed beneath the surface, or that were afterward buried deeply by sediments, often occasion mountains as a result of subsequent regional uplift and degradation. To this class belong the Henry and other laccolitic mountains already mentioned, the Watchung of New Jersey, and the various mountains of the Connecticut valley.

Origin of Mountain Details.—Excepting volcanoes in process of construction, mountains owe to sculpture their details of form. The storm-water that flows down the sides of a mountain follows everywhere the lines of steepest slope. These lines converge so that the water is gradually gathered into a small number of large streams which issue from the base. The streams are the carriers of the eroded rock, and are themselves agents of erosion, excavating the gorges in which they flow. The spurs between them are not minor units of uplift or eruption, but are residual parts of the general mass which survive because not on stream lines. The placing of stream lines is therefore a matter of importance. Sometimes a large stream crossing a rising mountain mass holds its course despite the uplift, degrading its channel as rapidly as the bottom rises; but small streams are deviated by the uplift and turned down the newly created slopes. Similarly, when the streams of a rising plateau discover a resistant rock mass, the largest persist and file the mass in two, but the smaller are eventually drawn off in other directions by streams traversing soft rock, and their places are taken by streams running from hard rock toward soft. Each stream tends to enlarge its valley at the head and sides, and along the divides there is a contest for territory. In this contest large streams have advantage over small, streams at low level over streams at high level, and streams on soft rock over streams on hard rock. There results a tendency toward the rapid segregation of mountain drainage into a few main streams whose lower courses are of high stability, while their upper courses respond freely to the local conditions of rock texture, which usually vary with the progressive degradation of the mass. The high grades of mountain torrents enable them to lower their channels

rapidly; the intervening spurs, being comparatively exempt from such action, lag behind until their slopes become so steep that blocks loosened by frost can be rolled down by gravity. It is for this reason that the valleys of mountain streams are gorges and the crests of mountain spurs are sharp.

Where glaciers gather about mountain summits and flow down their sides the laws of sculpture are different. There are still crests, troughs, and spurs, but they have other forms. The troughs, instead of resembling the letter V in cross profile, simulate U, and they head in cirques with nearly vertical sides. The cirques are gradually eaten backward, and where two meet on opposite sides of a crest the crest is first reduced to a narrow row of pinnacles (the *arrête* of the French), and finally converted into a low col. These forms are specially illustrated in the Sierra Nevada, which formerly nourished a great system of glaciers. Where a continental glacier flows over a mountain it wears away the sharper angles, substituting a system of curved contours, as illustrated in the mountains of New England. See GLACIERS.

The results of prolonged ice-sculpture are not known. The only glaciated regions now bare of ice, so that their topographic details can be studied, were occupied but briefly by ice, and had been previously sculptured by water, and the ice-formed features consequently appear as modifications of water-formed features. See PLEISTOCENE PERIOD.

Zones of Climate and Life.—The development of glaciers about the summits of some mountains is but one of a large group of characters linked to the dependence of climate on altitude. The upper layers of air are cooler than the lower, the general rate of change being 1° F. for each 300 feet. The precipitation of moisture on mountain-slopes increases upward, except at great altitudes, and the ratio of snow to rain increases upward. With changes in temperature and precipitation go changes in vegetation, so that mountains are begirt with approximately horizontal floral zones, each differing from the next in most of its species. Above all the plant zones the highest peaks are barren. Animals of all kinds are directly or indirectly dependent on plants for food, and faunal zones in general coincide with floral. In regions of great general moisture the barren zone is chiefly occupied with perennial snow, whence ice-streams, following valleys, invade the higher life zones; in arid regions the barren ground may have no perennial snow. The height of the various zones above sea-level is affected by many local conditions, but chiefly by latitude, all zones descending from the tropics toward the poles, and the barren zone finally reaching the sea.

Thus the scenery of mountains, though indebted primarily to the vital throes of the inner earth and the destructive energies of water and ice, owes much of its beauty to the gentler offices of sun and shower, which clothe it with a varied mantle of verdure. Certain elements of topographic form also must be credited to life, for where the air is both warm and moist the resulting rank vegetation generates reagents that decompose rocks, and at the same time impedes the work of running water, and these influences conspire to give smoother and rounder contours to spurs and crests.

Oceanic Mountains.—The name mountain is ordinarily applied only to prominences of the land, but a broader meaning is sometimes given. Many islands are but the peaks or crests of mountains that stand on the ocean floor, and other oceanic mountains are known only from soundings. Knowledge of the configuration of the ocean-bed is only fragmentary, and if complete would doubtless confirm our present impression of a general smoothness as compared with the land; but it can scarcely be doubted that elaborate survey would discover a great number of mountains resembling those of the land except as to details of sculpture. Half-submerged mountain chains are well illustrated by the Alaskan and West Indian archipelagoes.

REFERENCES.—For accounts of individual mountains the reader should consult articles under their several names; the great mountain systems of the earth are outlined in the articles on the several continents, those of the Western U. S. in the article ROCKY MOUNTAINS. The processes of mountain sculpture are treated under GEOLOGY and GLACIERS, those of eruption under VOLCANOES.

On the origin and classification of mountains, see Dutton, *Greater Problems of Physical Geology* (Phil. Soc. Wash. Bull., vol. xi., 1889); Fisher, *Physics of the Earth's Crust* (1889); Green's *Physical Geology* (1882); Heim, *Mechanismus der Gebirgsbildung* (1880); Le Conte, *Theory of the Origin of Mountain Ranges* (*Journal of Geology*, vol. i., 1893); Powell, *Geology of the Uinta Mountains* (1876); Reade, *Origin of Mountain Ranges* (1886); Suess, *Das Antlitz der Erde* (1888).

On the sculpture of mountains, see Davis, *Rivers and Valleys of Pennsylvania* (*Nat. Geographic Mag.*, vol. i., 1889); Geikie, *Scenery of Scotland* (2d ed., 1887); Gilbert, *Geology of the Henry Mountains* (1877); Hayes and Campbell, *Geomorphology of the Southern Appalachians* (*Nat. Geographic Mag.*, vol. vi., 1894). G. K. GILBERT.

Mountain, GEORGE J.: See the Appendix.

Mountain, JACOB: See the Appendix.

Mountain, The: See MONTAGNARDS.

Mountain-ash. or **Rowan-tree**: popular names of small trees, often seen in cultivation, belonging to the order *Rosaceæ*, sub-order *Pomaceæ*. They are *Pyrus aucuparia* of Europe, and *P. americana* and *P. sambucifolia* of North America. They have pinnate leaves, and in autumn clusters of small acid bright-red fruit. The European tree is most common in cultivation. The wood of all is hard and suitable for turnery. The peasantry of nearly all nations of Europe ascribe supernatural qualities to the wood of the rowan-tree, which is used for divining-rods and the like.

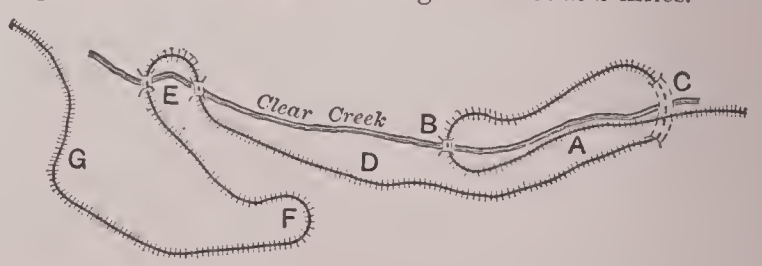
Mountain Limestone: a geologic formation of Carboniferous age, occurring in Great Britain. It is metalliferous, lead being the most important ore. Fluor-spar, a little petroleum, a few small coal-seams, quarries of building-stone, and some iron and copper ore are among its economic resources. The name has also been applied to Carboniferous limestones in the U. S., but is no longer so used. G. K. G.

Mountain-lion: a common name in the western parts of the U. S. for the PUMA (*q. v.*).

Mountain Meadow Massacre: See UTAH.

Mountain Railways: railways with steep gradients where cables or rack-rails are used to facilitate the ascent, or lines passing over mountains with unusual grades and curves, or narrow-gauge railways in mountainous countries. The first class, using cable and rack systems, will be found described in detail in INCLINED PLANE.

Mountain railways not using the special devices of the first class rarely have grades greater than 4 per cent. (211·2 feet rise per mile), and in order to make the ascent the horizontal distance is increased by forming spirals or zigzags, and often the line crosses itself at different elevations, while tunnels and viaducts are of frequent occurrence. The method of spirals and zigzags is illustrated (see figure) by a portion of the track of the Union Pacific Railway near Georgetown, Col. At A the track is on a grade of 3 per cent., but to pass directly to D would require a very heavy gradient of 10 per cent. or more, which a locomotive could not ascend, and accordingly the line was turned backward at B across the creek, and a spiral A B C D formed. At C the line crosses the creek again by a viaduct 90 feet above the water, and 75 feet above its own track. From D to G is seen an example of the zigzag method of gaining distance, requiring very sharp curves at E and F, and the grade being nearly 3 per cent. throughout. The total length of the line shown in the figure is about 2 miles.



The spiral shown above is of the class called a bridge spiral, in which the line swings around a valley and the upper end of the spiral is carried over the lower by a bridge or viaduct. Another class is the tunnel spiral, in which the line swings around a central hill and the lower end of the spiral crosses under the upper by a tunnel. The St. Gothard Railway has tunnel spirals on both the Swiss and Italian sides of the Alps.

Switchbacks have been used in a few cases instead of zigzags; in this case the line, after making an ascent, is turned back tangentially to itself without a curve, so that the train stops, and is run backward until the next switchback is reached. These are generally arranged in pairs, with the distance between the switchbacks as short as possible.

An additional locomotive or a pusher is frequently used on grades greater than 2 per cent. (105·6 feet per mile) for heavy trains, although a light train of one or two cars can easily be drawn by a single locomotive on much heavier grades. In some cases temporary grades of 10 per cent. have been operated, as on the Baltimore and Ohio Railroad in 1852.

Heavy grades for long distances are, as a rule, avoided, but an instance of such is the railway from Vera Cruz to the city of Mexico, which has an unbroken 2 per cent. grade for a distance of 72·6 miles. The Southern Pacific Railway has an average 2 per cent. grade (maximum, 2·2) for a distance of 25·4 miles. The Denver and Rio Grande Railroad has an average grade of 3 per cent. (maximum, 4·0) for a distance of 25 miles.

Mountain railways are charaeterized also by a large amount of curvature and many sharp curves. The number of degrees of curvature per mile generally increases with the number and height of the mountain ranges. The average curvature for a prairie State like Illinois is about 9° per mile, and for Pennsylvania about 80° per mile, while for some roads in Colorado it is more than 300° per mile.

The sharpness of a curve is inversely as its radius or directly as the degree of the curve, the latter being the angle subtended at the center by a chord of the circle 100 feet in length. Ordinary railway lines avoid curves greater than 5° (1,146 feet radius), but in making mountain ascents much sharper ones are necessary. The curve on the Lehigh Valley Railroad, Mauch Chunk, Pa., is nearly 14° (410 feet radius). The curves at E and F in the above sketch are 28° and 30° degrees respectively (207 and 193 feet radii). Such sharp curves make riding very uncomfortable to passengers unless the velocity is slow, while the increased resistance causes a greater fuel consumption and rapid wear of the rails.

Mountain railways are subject to accidents from both land and snow slides, and the prevention of these is an important part of the work of construction and maintenance. Retaining walls are built to secure the stability of slopes, and snow-sheds are erected to prevent snow from drifting or sliding into cuts. The avalanche-sheds of the mountain division of the Northern Pacific Railway are formed of solid rock-filled crib-work upon the upper slope and strongly braced frame-work on the lower, and their cost varies from $40 to $70 per linear foot. To protect these sheds from fire a water-supply is provided, and pipe-lines are laid to tanks erected at suitable intervals. Over $3,000,000 have been spent on this railway for the single item of protection from snow.

Narrow-gauge railways are frequently built in mountain regions, particularly for local traffic. These have the advantage that sharper curves and heavier grades may be used than with the standard gauge, thus lessening the cost of construction, while the cost of rolling stock is also smaller. The gauges most frequently used for this class of railways are 3 feet and 3½ feet, although short lines with a gauge as low as 2 feet have been built. The advantages of a narrow-gauge railway disappear when connection is made with those of the standard gauge, as freight has then to be transferred from one car to another, and thus delay and additional expense are incurred. For this reason narrow-gauge railways are often, after a few years, changed to the standard gauge of 4 ft. 8½ in. Many are found in Colorado, and among those may be mentioned the Calumet Mine branch of the Denver and Rio Grande Railroad, which surmounts a vertical height of 2,700 feet in 7 miles, having 8 per cent. grades for a large part of the distance. See Wellington's *Economic Theory of Railway Location* (New York, 1887); also on allied subjects, the articles Gauge of Railways, Inclined Plane, Railways, and Tunnels.

Mansfield Merriman.

Mount Airy: town; Surrey co., N. C. (for location of county, see map of North Carolina, ref. 2–E); on the Ararat river, and the Cape Fear and Yadkin Val. Railway; 151 miles N. W. of Raleigh. It contains granite quarries, mineral springs, flour and planing mills, cotton and tobacco factories, shoe-factory, and a weekly newspaper. Pop. (1880) 519; (1890) 1,768; (1900) 2,680.

Mount Ayr: town; capital of Ringgold co., Ia. (for location of county, see map of Iowa, ref. 7–F); on the Chi., Burl. and Quincy Railroad; 90 miles S. of Des Moines. It is in an agricultural and stock-raising region, the blue-grass belt of Southern Iowa; contains 5 churches, public school with 8 departments, 2 banks, and 3 weekly newspapers, and has fencing, pump, and cigar factories. Pop. (1880) 1,275; (1890) 1,265; (1900) 1,729.

Editor of "Journal."

Mount Calvary: See Calvary, Mount.

Mount Carmel, Palestine: See Carmel, Mount.

Mount Carmel: city; capital of Wabash co., Ill. (for location of county, see map of Illinois, ref. 9–G); on the Wabash River, and the Cleve., Cin., Chi. and St. L., and the Louis., Evans. and St. L. railways; 24 miles S. W. of Vincennes, Ind., 132 miles N. E. of Cairo. It derives good water-power from the river, and has a number of saw and flour mills and other manufactories, and two weekly newspapers. Pop. (1880) 2,047; (1890) 3,376; (1900) 4,311.

Mount Carmel: borough; Northumberland co., Pa. (for location of county, see map of Pennsylvania, ref. 4–G); on the Lehigh Val., the N. Cent., and the Phila. and Read. railways; 28 miles E. by S. of Sunbury, the county-seat. It has a number of anthracite coal mines, a national bank with capital of $50,000, and a daily and three weekly newspapers. Pop. (1880) 2,378; (1890) 8,254; (1900) 13,179.

Mount Carroll: city (founded in 1843); capital of Carroll co., Ill. (for location of county, see map of Illinois, ref. 2–D); on the Chi., Mil. and St. P. Railway; 128 miles W. of Chicago. It has 5 churches, 3 public schools, female seminary, 2 libraries (Seminary and Public School), and a weekly and 2 semi-weekly newspapers. The principal industries are farming, mining, and stock-raising. Pop. (1890) 1,836; (1900) 1,965.

Editor of "Mirror."

Mount Clemens: city; capital of Macomb co., Mich. (for location of county, see map of Michigan, ref. 7–K); on the Clinton river at the head of navigation, and on the Gr. Trunk Railway; 22 miles N. E. of Detroit. It is noted for its mineral and magnetic waters, said to have remarkable curative properties, which make the city a resort for hundreds of invalids annually. It contains an iron furnace, union school, public library, lumber manufactories, several hotels and boarding-houses, and two weekly newspapers. Pop. (1880) 3,057; (1890) 4,748; (1900) 6,576.

Mount Desert Island: a mountainous island of the Atlantic in Hancock co., Me., 14 miles long and 7 wide. Soame's Sound divides it nearly in two. Bar Harbor, Northeast and Southwest Harbors, Asticou, Soamesville, Seal Harbor, Seal Cove, and East Eden are among the villages. It abounds in beautiful lakes. The highest point is Green Mountain, 1,535 feet high. The island is a favorite place of summer resort. The French settled Mt. Desert in 1608, but in 1616 were driven out by the British, who settled it in 1761. Pop. (1890) 8,195; (1900) 7,907.

Mount Erebus: See Erebus, Mount.

Mount Forest: a village of Wellington co., Ontario; junction of the Grand Trunk and Canadian Pacific railways; 84 and 87 miles respectively W. N. W. of Toronto; on the south branch of the Saugeen river, a tributary of Lake Huron (see map of Ontario, ref. 4–C). It has good water-power, an iron-foundry, and other industries. Pop. (1891) 2,214.

M. W. H.

Mount Gilead: village (established as a stage station in 1845); capital of Morrow co., O. (for location of county, see map of Ohio, ref. 4–F); on the Olentangy river, and the Ohio Cent. and the Cleve., Cin., Chi. and St. L. railways; 45 miles N. of Columbus. It is in a rich farming region; manufactures machinery, carriages, and cider-presses; and has 5 churches, large public-school building, and 2 weekly newspapers. Pop. (1880) 1,216; (1890) 1,329; (1900) 1,528.

Editor of "Morrow County Sentinel."

Mount Holyoke College: an educational institution for women: situated at South Hadley, Hampshire co., Mass.; 4 miles from Holyoke, near the Connecticut river. It is the outgrowth of Mt. Holyoke Seminary, founded by Mary Lyon in 1836, and opened Nov. 8, 1837. In 1888 its charter was enlarged, and its name was changed to Mt. Holyoke Seminary and College. On Jan. 31, 1893, a full college curriculum was adopted, the charter was amended, the name was changed to Mt. Holyoke College, and the institution was given power to grant any degrees conferred by any college in the State. The campus contains a lake, park, tennis-courts, and botanic garden. Three courses of study lead respectively to the degrees B. A., B. S., B. L. The library contains 19,000 volumes. The main college building (destroyed by fire in 1896, and immediately replaced), 6 dormitories and library, gymnasium, observatory, physical and chemical

laboratory building, and Lyman Williston Hall comprise the college buildings. There are (1900) fifty professors and instructors, and 550 students. HENRIETTA E. HOOKER.

Mount Joy: borough; Lancaster co., Pa.; on the Penn. Railroad; 12 miles W. of Lancaster, the county-seat, 24 miles E. of Harrisburg (see map of Pennsylvania, ref. 6–H). It has a roller flour-mill, iron-foundry, woolen-mill, furniture and carriage factories, and agricultural-implement works; a seminary, soldiers' orphans' home, and two weekly newspapers. Pop. (1880) 2,058; (1890) 1,848; (1900) 2,018.

Mount Meru: See MERU.

Mount Morris: village; Livingston co., N. Y.; on the Dansville and Mt. Morris, the Del., Lack. and W., the N. Y., Lake E. and W., and the W. N. Y. and Pa. railways; 30 miles S. of Rochester, 60 miles E. of Buffalo (see map of New York, ref. 5–D). It has 5 churches, union school and academy, iron-furnace, sawmill, machine-shops, salt-works, 3 flour-mills, 2 cigar-factories, 2 broom-factories, and a monthly and 2 weekly periodicals. The Shaker property, purchased by the State for the establishment of the Craig colony for epileptics, is 4 miles S. of the village, and the site of the proposed Genesee river water-storage dam is a mile W. Pop. (1880) 1,899; (1890) 2,286; (1900) 2,410.
EDITOR OF "UNION."

Mount Olivet: See OLIVES, MOUNT OF.

Mount Pleasant: city; capital of Henry co., Ia. (for location of county, see map of Iowa, ref. 7–J); on the Chi., Burl. and Quincy Railroad; 28 miles W. N. W. of Burlington, 47 miles E. of Ottumwa. It contains 17 churches, 5 public-school buildings, 2 national banks with combined capital of $200,000, a savings-bank with capital of $24,000, and a daily, monthly, and 4 weekly newspapers. It is the seat of the Iowa Wesleyan University (chartered in 1855), German College (Methodist Episcopal, chartered in 1873), and the Iowa Hospital for the Insane. There are water-works, gas and electric light plants, flour-mills, carriage and wagon factories, and farming-implement works. Pop. (1880) 4,410; (1890) 3,997; (1900) 4,109. EDITOR OF "NEWS."

Mount Pleasant: city; capital of Isabella co., Mich. (for location of county, see map of Michigan, ref. 6–I); on the Chippewa river, and the Flint and Pere Marq. and the Toledo, Ann Arb. and N. Mich. railways; 46 miles W. of Bay City. It is in an agricultural region, and has a high school, the Central Michigan Normal School, an Indian Industrial School, 7 churches, 2 State banks with combined capital of $100,000, a national bank with capital of $50,000, a private bank, and three weekly newspapers. There are electric lights, flour, grist, and saw mills, sash, door, and basket factories, foundries, and a considerable lumber-trade. Pop. (1880) 1,115; (1890) 2,701; (1900) 3,662.
EDITOR OF "DEMOCRAT."

Mount Pleasant: borough; Westmoreland co., Pa. (for location of county, see map of Pennsylvania, ref. 5–B); on the Balt. and O. and the Penn. railways; 12 miles N. of Connellsville, 32 miles S. E. of Pittsburg. It is in a coal-mining, coke-making, and limestone-quarrying region; is the seat of the Western Pennsylvania Classical and Scientific Institute (Baptist, chartered in 1871); and has three national banks with combined capital of $200,000, a private bank, and a weekly newspaper. Pop. (1880) 1,197; (1890) 3,652; (1900) 4,745.

Mount Pleasant: town; capital of Berkeley co., S. C. (for location of county, see map of South Carolina, ref. 6–F); on Charleston Harbor, opposite Charleston. It is in an agricultural region, and has a weekly newspaper. Pop. (1880) 783; (1890) 1,138; (1900) 2,252.

Mount Pulaski: village; Logan co., Ill. (for location of county, see map of Illinois, ref. 6–E); on the Ill. Cent. and the Peoria, Decatur and Evans. railways; 21 miles N. W. of Decatur, 24 miles N. E. of Springfield. It is in a coal-mining and stock-raising region, ships large quantities of grain, and has several flour-mills and elevators, and a weekly newspaper. Pop. (1880) 1,125; (1890) 1,357; (1900) 1,643.

Mount-Stephen, GEORGE STEPHEN, Baron: capitalist; b. in Dufftown, Banffshire, Scotland, Feb. 5, 1829; removed to Canada in 1850, and, engaging in business as a merchant in Montreal, amassed great wealth. He became president of the Bank of Montreal in 1876, president of the Manitoba and Minneapolis Railway in 1878, and president of the Canadian Pacific Railway in 1881, an office which he held for seven years until his resignation. In 1887 he and his cousin, Sir Donald Smith, gave $1,250,000 to found the Victoria Hospital at Montreal, which was completed in 1893. In 1886 he was created a baronet for his services in connection with the Canadian Pacific Railway, and in 1891 was raised to the peerage under the title of Baron Mount-Stephen. Some time afterward he took his seat in the House of Lords. NEIL MACDONALD.

Mount Sterling: town; capital of Brown co., Ill. (for location of county, see map of Illinois, ref. 6–B); on the Wabash Railroad; midway between Quincy and Jacksonville. It is in a rich farming country; has extensive deposits of coal and brick-clay; contains 6 churches, large public school, 2 Roman Catholic schools, electric lights, water-works, and 3 weekly newspapers; and manufactures wagons, brick and tile, and earthenware. Pop. (1880) 1,445; (1890) 1,665; (1900) 1,960.
EDITOR OF "DEMOCRAT-MESSAGE."

Mount Sterling: city (founded in 1793); capital of Montgomery co., Ky. (for location of county, see map of Kentucky, ref. 3–I); on the Ches. and O. and the Ky. and S. Atlantic railways; 120 miles E. of Louisville. It contains 7 churches for white people and 2 for colored, a public, a military, and 7 private schools for white children and 2 for colored, a public library, and 2 semi-weekly and 2 weekly newspapers. The city is known through the State as "the Gate City to the Mountains," and has large trade interests. Pop. (1880) 2,087; (1890) 3,629; (1900) 3,561.
EDITOR OF "JOURNAL."

Mount Terror: See EREBUS, MOUNT.

Mount Vernon: city; capital of Jefferson co., Ill. (for location of county, see map of Illinois, ref. 9–E); on the Louis. and Nash., the Jack. S. E., the Louis., Evans. and St. L., and the Wabash, Chest. and West. railways; 76 miles E. of St. Louis, Mo. It contains 8 churches and 2 daily and 3 weekly newspapers, and is principally engaged in farming and manufacturing. Pop. (1880) 2,324; (1890) 3,233; (1900) 5,216. EDITOR OF "NEWS."

Mount Vernon: city; capital of Posey co., Ind. (for location of county, see map of Indiana, ref. 11–B); on the Ohio river, and the Louis. and Nash. and the Evans. and Terre Haute railways; 18 miles W. of Evansville. It has flour, saw, and planing mills, large commerce by rail and river, a national bank with capital of $100,000, a private bank, County and Mechanics' Library (founded in 1850), and a daily, a monthly, and three weekly newspapers. Pop. (1880) 3,730; (1890) 4,705; (1900) 5,132.

Mount Vernon: town; Linn co., Ia. (for location of county, see map of Iowa, ref. 4–J); on the Chi. and N. W. Railway; 16 miles E. of Cedar Rapids. It is in an agricultural region; is the seat of Cornell College (Methodist Episcopal); and has 2 libraries (Cornell College and Adelphian Society) containing over 12,000 volumes, and 3 weekly newspapers. Pop. (1880) 977; (1890) 1,259; (1900) 1,629.

Mount Vernon: city; incorporated as a village in 1853 and as a city in 1892; Westchester co., N. Y. (for location of county, see map of New York, ref. 8–J); on the Bronx river, and the N. Y., N. H. and H. and the N. Y. C. and H. R. railways; 13 miles N. of New York. It includes the former village of Mt. Vernon, the suburb of Chester Hill, and a part of the town of Eastchester, and has an area of about 1 sq. mile. Some parts of it are about 200 feet above tide water, and command an extensive view of Long Island Sound. There are 12 churches, 5 public and 4 private schools, Y. M. C. A. building, an opera-house, 4 libraries (Union School and School Districts 2, 4, 5) containing nearly 10,000 volumes, 2 State banks with combined capital of $75,000, a savings-bank, and a daily, 6 weekly, and 2 monthly periodicals. Pop. (1880) 1,857; (1890) 10,830; (1900) 20,346.
EDITOR OF "ARGUS."

Mount Vernon: city; capital of Knox co., O. (for location of county, see map of Ohio, ref. 4–F); on the Kokosing river, and the Balt. and O. and the Cleve., Akron and Col. railways; 45 miles N. E. of Columbus. It contains 9 churches, 8 school buildings, and a semi-weekly and 2 weekly newspapers; and has locomotive and machine works, flour-mills, and bent-wood, carriage and wagon, and furniture factories. Mt. Vernon Academy (Seventh-day Adventist) is a mile N. E. of the city, and Kenyon College (Protestant Episcopal) is 5 miles E. Pop. (1880) 5,249; (1890) 6,027; (1900) 6,663. EDITOR OF "REPUBLICAN."

Mount Vernon: magisterial district; Fairfax co., Va. (for location of county, see map of Virginia, ref. 4–H); on the Potomac river, and the Wash., Alex. and Mt. V. Electric Railway; 15 miles below Washington, D. C. It contains the home and tomb of George Washington, purchased with 200 acres of land in 1858 by the Ladies' Mt. Vernon Association for $200,000, and since preserved with great care by the association, which is a national organization with State representatives. The mansion contains many relics of the Washington family, and the spot is visited annually by thousands. Pop. of district (1890) 2,673; (1900) 3,033.

Mount Vernon Ladies' Association: See the Appendix.

Mourning: the official or conventional expression of grief. It has varied much at different times and in different countries. The Hebrews tore the garments, cut the hair and beard, strewed ashes on the head, went bareheaded and barefooted, and lay down on the ground weeping and smiting the breast; the period of mourning was seven days, but for Moses and Aaron they mourned thirty days. The Greeks cut off the hair, put on a coarse, black garment, retired into seclusion, and wailed. When a great general died the whole army cut off their hair and the manes of their horses. The period of mourning was in Athens thirty days, but in Sparta only ten. With the Romans the mourning was mostly done by the women; the men wore black clothes, but only for a few days. Public mournings often occurred in the days of the republic on the occasion of some public calamity or on the death of some great man; during the empire, on the death of an emperor. Then all business stopped; the temples, the forum, the schools, and the baths were closed. The mourning color was black under the republic, but during the empire white became the mourning color for women. The mourning rites among barbarians and half savages are often horrible, frequently involving serious mutilations. Among civilized nations the mourning customs have become very similar in modern times, and consist mostly in retirement within the house and avoidance of what is bright and noisy. In Europe and America the mourning color is black; in Turkey, violet; in China, white; in Egypt, yellow.

Mousa-ben-Noseir: Arab general. He was appointed by the Caliph Walid I. his lieutenant in Northern Africa, where by his justice he won the devoted affection of the recently converted Berbers or Moors. The proposals of Count Julian, who offered to betray Spain to the Mussulmans, determined him to undertake the conquest of that country. First he dispatched Tarik the Moor with a small army. Tarik was joined by Count Julian, and overthrew the Goths at the decisive battle of Xeres (911), their king, Roderic, being drowned in the Guadalquivir. Mousa crossed the strait and rapidly completed the subjugation of Spain. Then he reorganized the country, and by wise and kindly laws gave it peace and prosperity. He was preparing for the conquest of Gaul, but his virtues and successes aroused the suspicion of the jealous caliph, and he was summoned in disgrace to Damascus for trial. Making a triumphal entrance into that city with immense spoils and thousands of captives, he was still more suspected, and was condemned by the new caliph, Suleïman I., to payment of an enormous fine and was publicly flogged (715). His two sons were massacred. Then in contempt he was allowed to withdraw to Mecca, where he soon after died of grief and old age (716). E. A. G.

Mouse, plur. **Mice** [M. Eng. *mous* < O. Eng. *mūs* (plur. *mȳs*): O. H. Germ. *mūs* > Germ. *maus*. Cf. Sanskr. *mūṣ-*: Gr. *μῦς*: Lat. *mūs*, mouse]: the common name of the house mouse (*Mus musculus*), popularly applied to many species of small rodents, chiefly of the family *Muridæ*, although a few belong to related families. Such are the jumping mice (*Zapus*) of the family *Zapodidæ* (see DEER-MOUSE), the pocket mice (*Perognathus*), belonging to the *Dipodidæ*, and the dormice (*Myoxus*), forming the family *Myoxidæ*. The field mice, or voles, belong to the genus *Arvicola*, which includes many species and has representatives in both the Old and New Worlds. The white-footed or deer mice belong to the genus *Hesperomys*, which is exclusively American.

The house mouse is a native of the Old World, but, like the rat, has been unintentionally introduced by man throughout nearly the whole world, and thrives in his habitations from the arctic to the torrid zone, its amazing fecundity enabling it to hold out against numerous enemies, including its larger relative, the rat. Under favorable conditions the house mouse becomes semi-wild, and does much damage to stored grain.

The various small mice, particularly those of the genus *Arvicola*, inflict great damage by destroying growing or standing crops, and there have been such plagues of voles in Thessaly and Scotland that inoculation with the virus of a contagious disease was resorted to in order to destroy them, but with only partial success. F. A. L.

Moussy, JEAN ANTOINE VICTOR MARTIN, de: See MARTIN DE MOUSSY.

Mouth, Diseases of the: The mouth is subjected to so many irritations that it seems remarkable to find any mouths in a healthy condition. On account of the arrangement of the coating, however, it requires either a great irritation, or, on the other hand, diminished resistance, or both, before disease develops in the mouth. From the aspect of causation, it is convenient to make the division of the diseases according to the kind of change found in the mouth. We therefore have the inflammations, which induce by far the greatest number of diseases found in the mouth, and such other changes as will have to be described. Irritations may be of various kinds, either mechanical, chemical, thermal, or in the form of lower forms of life. Again, the point of view must not be lost sight of that the mouth has the property of secretion; i. e. certain substances are eliminated from the system by its glands, and these substances may give rise to sufficient irritation to cause inflammation. An inflammation of the mouth is called *stomatitis*, and of this there are the following varieties: *Catarrhalis*, *ulcerosa*, *hyphomycetica*, *aphthosa*, *crouposa*, *diphtheritica*, *syphilitica*, and *gangrenosa*.

Stomatitis catarrhalis is found as the results of uncleanliness; of irritation, too hot food, too acrid; acids, alkalies; in the presence of some of the exanthemata, i. e. measles, scarlet fever; with fevers in general. It is claimed, and it seems justly, that nearly all the forms of *stomatitis* are either preceded or accompanied by this form. Its symptoms are those of nearly all other forms—more or less pain, general constitutional reaction; but it is marked by redness, more or less swelling of the mouth, and, in some bad cases, hæmorrhage.

Stomatitis ulcerosa is found in scorbutic children, in lead and mercury poisoning, and frequently in those in which it seems impossible to determine the cause. It is characterized by the formation of an ulcerative band at the gums where they come in contact with the teeth. It never develops in toothless children. The ulcerative process, called a necrobiosis, a molecular death, is characteristic for the disease. With this we have a great amount of salivation and always very fetid saliva. The diseased process is no respecter of tissues, in that it loosens the teeth, and frequently attacks the bones of the jaws. Sometimes it runs into the form called *stomatitis gangrenosa*, and then becomes fatal; even without this termination stomatitis ulcerosa is always to be looked upon as a serious disease.

Stomatitis hyphomycetica, better known as thrush, is produced by one of the hyphomycetes which, for convenience, has been called the *saccharomyces albicans*. It is a disease which occurs most frequently in infants, and in adults who have been reduced by previous illness—consumption, typhoid fever, etc. It is characterized by the appearance of membranous spots, white or grayish white, deposited within the membrane of the mouth, but always in its outer layer. These membranes are made up of the fungus and parts of the mucous membrane, especially epithelial cells; they are detached with some difficulty, and sometimes there is left a bleeding spot where they are detached. The disease has frequently been mistaken for diphtheria of the mouth, but careful examination makes this error impossible. As a rule, the disease is amenable to treatment, and is only to be looked upon as a grave omen when implanted upon a general process already grave.

Stomatitis aphthosa is characterized by the appearance of small blisters in the mouth (aphthæ). Their eruption is preceded by more or less constitutional disturbances, and practically they represent that form of skin trouble known as herpes, except that they appear upon the mucous membrane. There is but one positively determined cause, that of the manifestation of the foot-and-mouth disease of cattle in man. As this is of very rare occurrence in the U. S., and as aphthæ are common, it is natural to suppose that there are many other poisons which may produce this disease. As a matter of fact, we do see it frequently in pneumonic and other fevers, and very commonly in disturbances of the gastro-intestinal tract, so that it seems as if this disease might be produced by a number of poisons acting either

directly upon the mucous membrane or indirectly through the nervous system, as is the case in herpes. In and of itself *stomatitis aphthosa* is not a dangerous affection, but may become so as the result of secondary infection of the abrasions which are left when the blister breaks. Of *stomatitis crouposa*, *diphtheritica*, and *syphilitica* little need be said in this place. They are all local manifestations of a disease graver than is expressed by the term stomatitis. See Croup, Diphtheria, and Syphilis.

Stomatitis gangrenosa is by far the most serious form of inflammation of the mouth, in that it usually ends fatally. It is found only in subjects very much debilitated by previous illness, and manifests itself by a gangrenous spot upon the cheek, which grows so as to perforate the cheek, and finally may include the whole of the face, the neck, attacking the bones and leaving a cavity, black and fetid, giving to the patient a most horrible appearance. The odor from this process is so penetrating that it may pervade the whole house. Fortunately, this disease is not frequently met with in private practice, but is most commonly seen in hospitals. It seems the great chance of saving these patients lies in early interference—the gangrenous tissue must be removed, best by the actual cautery (white heat), then by chemicals. In latter years more cures have been reported by means of this active interference than ever before.

In regard to the general treatment of *stomatitis* it may be said that surgical cleanliness is the principle that underlies successful treatment. We have many remedies which are especially valuable as applications to the mouth—chlorate of potassium, permanganate of potassium, nitrate of silver, salicylic acid, etc.; but their application alone will be of little avail unless done intelligently. On the whole, these forms of disease are very amenable to treatment, but they ought not to be overlooked on account of their apparent harmlessness, as, as in the case of *stomatitis ulcerosa*, they may be followed by grave and dangerous consequences if not properly treated.

For other diseases connected with the mouth, see Tongue, Mumps, etc. F. Forchheimer.

Movable Feasts: See Easter.

Movers, Franz Karl: theologian; b. in Koesfeld, Westphalia, July 17, 1806; studied theology and the Oriental languages at Münster 1825–29; was pastor of Berkum 1833–39, and then Professor of Theology in the Roman Catholic faculty at the University of Breslau, where he died, Sept. 28, 1856. His principal work is *Die Phönizier* (4 vols., 1840–56).

Mowat, Sir Oliver, LL. D., G. C. M. G.; statesman; b. in Kingston, Ontario, Canada, July 22, 1820; was called to the bar in 1841, and appointed a queen's counsel in 1856. He was a commissioner for consolidating the public general statutes for Canada and Upper Canada, respectively, in 1856; a member of the Quebec union conference 1864; president of the Evangelical Alliance of Ontario 1867–89, and has been president of the Canadian Institute, Toronto. He represented South Ontario in Canada Assembly 1857–64; North Oxford in Ontario Parliament since 1872; was Provincial Secretary in Brown-Dorion government in Aug., 1858; Postmaster-General in Sandfield Macdonald-Dorion government 1863–64, and the latter year was appointed Vice-Chancellor of Upper Canada, an office he resigned Oct. 25, 1872, on being called upon to form a new administration for Ontario. He was Premier and Attorney-General of Ontario from Oct., 1872, to July, 1896, when he became Minister of Justice of the Dominion in Sir Wilfrid Laurier's cabinet. He was appointed Lieutenant-Governor of Ontario Nov. 18, 1897. He was knighted in 1892.

Mowatt, Anna Cora: author; b. in Bordeaux, France, in 1819; daughter of Samuel Gouverneur Ogden, a New York merchant; married to James Mowatt, a lawyer, when she was only sixteen years old; published in 1836 her first work, a poetical romance entitled *Pelayo, or the Cavern of Covadonga*, using the pen-name "Isabel," and in 1837 a satirical answer to some adverse criticisms, under the title *Reviewers Reviewed*. During a sojourn in Europe because of ill health, she wrote *Gulzara, the Persian Slave*, a play, published in 1840. She began in Boston, Oct. 28, 1841, a series of dramatic readings, continued in Providence and New York, but discontinued them and returned to literary work, writing magazine stories, which she signed "Helen Berkley." She also wrote *Fashion*, a comedy, produced with success at the Park theater, New York, in March, 1845, and in June, 1845, she appeared at that theater as Pauline, in *The Lady of Lyons*, afterward acting in several other cities in the U. S. and in England. In 1847 she wrote another play, *Armand, or the Peer and the Peasant*. Her last appearance on the stage was at Niblo's Garden, New York, June 3, 1854. Her husband had died in 1851, and in 1854 she was married to William F. Ritchie, of Richmond, Va. Her chief writings, besides those mentioned above, are *The Fortune-Hunter* (1842); *Evelyn, or a Heart Unmasked* (1845); *The Autobiography of an Actress* (1854); *Mimic Life, or Before and Behind the Curtain* (1855); *Twin Roses* (1857); *Fairy Fingers* (1865); *The Mute Singer* (1866); *The Clergyman's Wife, and other Sketches* (1867). D. near London, England, July 28, 1870.

Mowbray, Henry Siddons: figure-painter; b. in Alexandria, Egypt, of English parents, in 1858; was taken to the U. S. when a child and lived in North Adams, Mass. Received an appointment to the U. S. Military Academy, but spent only one year there and went to Paris in 1878, where he became a pupil of Bonnat; studied and painted in Paris until 1885, when he settled in New York; became a member of the Society of American Artists 1886; National Academician 1892; was awarded the Clark prize at the National Academy, New York, 1888. He is a strong and graceful draughtsman and a brilliant colorist; well known as an illustrator. Studio in New York. W. A. C.

Mowing-machines: See Reaping-machines.

Moxa [from Japanese *mokusa*]: name applied to a form of the actual cautery whose use was derived from the Japanese and Chinese through the Portuguese. The down from the leaves of *Artemisia moxa*, the pith of the sunflower, cotton or lint soaked in solution of saltpeter and then dried, a pledget of spider's web, or a lump of madou is rolled into a little cone and placed upon the part which it is desired to cauterize. It is then set on fire and held in place by a hairpin or an instrument called a porte-moxa. The neighboring parts are surrounded by wet lint. There is no advantage over the hot iron in this method, and it is more painful. It is rarely employed. Revised by William Pepper.

Moyabam'ba, or **Moyobam'ba**: a town of Peru; capital of the department of Loreto; on the river Mayo or Moyabamba, a branch of the Huallaga; 423 miles N. of Lima and 2,840 feet above the sea. It is little more than a large village, the houses being scattered over a wide area and generally thatched with palm-leaves. Most of the inhabitants are Indians, and the only industry of importance is the manufacture of jipijapa or Panama hats. Moyabamba has some trade with Brazil by way of the Huallaga and Amazon; the chief obstacle to greatly increased commerce is the lack of good roads over the Andes. Pop. (1889) estimated, 9,500. H. H. S.

Mo'ya y Contra'ras, Pedro, de: prelate and administrator; b. in the diocese of Cordova, Spain, about 1520. He graduated as doctor of canon law at Salamanca, was Inquisitor in Murcia, and in 1571 was sent to Mexico to establish the Inquisition there. In Dec., 1574, he was consecrated Archbishop of Mexico, and after the death of the Count of Coruña he was acting viceroy Sept. 25, 1584, to Oct. 17, 1585. In 1591 he resigned the archbishopric and went to Spain, where in Jan., 1591, he became president of the Council of the Indies. D. in Madrid, Dec., 1591. H. H. S.

Moylan, Gen. Stephen: b. in Ireland in 1734; settled in Philadelphia, Pa., some years before the Revolution; presented himself to Gen. Washington at Cambridge, Mass., as a volunteer, and, being a gentleman of good education and address, was appointed aide-de-camp Mar. 5, 1776, commissary-general June 5; commanded the Fourth Light Dragoons in 1777; participated in Greene's Southern campaign in 1781; was appointed brevet brigadier-general Nov. 3, 1783; became a farmer at Goshen; was register and recorder of Chester County 1792–93; for several years commissioner of law for the district of Pennsylvania, and vice-president of the Society of the Cincinnati in 1800, and developed a great and beneficial activity in public life. D. in Philadelphia, Apr. 11, 1811.

Moyse, Hyacinthe: soldier; b. in Hericourt, Santo Domingo, in 1769; a Negro slave, nephew of Toussaint Louverture (*q. v.*). He was among the first of those who rebelled in 1790, and displayed great courage, soon becoming a leader. On Mar. 28, 1792, he compelled the commander at La Croix du Bouquet, Breton de la Villaudrie, to retreat to Port au Prince, and incited a general revolt in the western and southern counties. He was preparing to march against Port au Prince when the governor, Blanchelande,

induced many of the insurgent chiefs to disband their followers by promising them enfranchisement. Moyse joined the forces of Jean François, was placed in command of the Negroes of the county of Du Doudon, and remained active in the rebellion for several years. In 1793 he learned to read and write. He joined Toussaint Louverture in 1794, and fought for the French cause against the English, whom he finally drove from the island in 1798. He commanded the right wing of Toussaint's army in the invasion of the Spanish part of Santo Domingo, and defeated the Spanish on the banks of the river Nissa, entering Santo Domingo with Toussaint Jan. 2, 1801. Toussaint sent him as general inspector of agriculture to the northern part of Hayti, and before long Moyse again joined Jean François in rebellion against Toussaint, who ordered his arrest and condemned him to death without a trial. He and twenty-three of his followers were executed in Port au Prince, Dec. 25, 1801.

Mozambique, mō-zăm-beek' : a Portuguese province on the east coast of Africa, extending from Cape Delgado to the mouth of the Zambesi river, the coast regions farther S., formerly a part of Mozambique, now constituting the province of Lorenço Marques. These two provinces were constituted (1891) the state of East Africa, each province having its own capital, and the governor of the state residing in each alternately. The British possessions form the western frontier. The chief towns are Mozambique and Quilimane. Each settlement on the coast has its own local government. The coast land is low, with a rich, humid soil and a hot, moist climate, which make it extremely fertile. Large harvests of rice, maize, millet, and all varieties of tropical fruits are gathered. Hippopotami, elephants, lions, crocodiles, and flamingoes abound. On the islands and shoals with which the coast is fringed turtles are caught in great numbers, and pearl-fishing is very remunerative; tortoise-shell is a staple article of export. Revised by C. C. Adams.

Mozambique: capital of the Portuguese province of Mozambique; in lat. 15° 2′ S.; on a small coral island near the mouth of a bay 6 miles long and 5 miles wide (see map of Africa, ref. 7–G). It is defended by three forts, has a good harbor, and some trade in rice, gum, gold-dust, ebony, tortoise-shell, and timber. The streets are very narrow, and the houses are all whitewashed. Pop. about 8,000, of whom about 7,000 are slaves, and the rest Arabs, Indian merchants, and Portuguese.

Mozambique Channel: the strait between the east coast of Africa and the island of Madagascar. It is about 1,000 miles in length, with a breadth of between 500 and 600 miles at its entrances, and of nearly 300 miles in the middle. The Comoro islands are at its northern outlet.

Mozarab'ic Liturgy [*mozarab'ic*, deriv. of *mozarab*, from Span. *mozarabe*, from Arab. *mosta'rib*, deriv. of *te'arrab*, become an Arab, deriv. of *arab*, Arab]: the liturgy of the Christian subjects of the Saracens in Spain, called *Mozarabes*, Arabs by adoption. Ephesine in its type, if not in its origin, and not called Mozarabic till after the Mohammedan conquest in the eighth century, it is, in its groundwork at least, coeval with the introduction of Christianity into Spain. At Braga, in 538, it was set aside for the Roman liturgy, but restored at Toledo in 589; and at the Fourth Council of Toledo in 633, after some improvements by Leander of Seville (d. 595) and Isidore of Seville (d. 636), the use of it was extended to all Spain. Further improvements were introduced by Ildefonso of Toledo (d. 667), but in the eleventh century (in Aragon 1071, and in Castile 1074) it gave place, by royal authority, to the Roman liturgy. Through the influence and example of Cardinal Ximenes (1436–1517) the use of it was revived in Toledo (after 1502), in Salamanca (1517), and in Valladolid (1567). By the concordat of 1842 provision was made for its continuance at Toledo, but nowhere else. It has been pronounced "the richest, the fullest, the most varied of all known liturgies." It bears great resemblance to the Gallican liturgy, and is noted for its use of Scripture. It has been edited by Leslie (1755), Lorenzana (1774), and Arevalus (1804). See Migne's *Latin Patrology* (vols. lxxxv., lxxxvi., 1850) and John Mason Neale's *Eastern Church, General Introduction* (1850), and *Liturgiology and Church History* (2d ed. 1867).

Revised by S. M. Jackson.

Mozart, Germ. pron. mō'tsaărt, Leopold: the father of Wolfgang Amadeus Mozart; b. Nov. 14, 1719; was himself a voluminous composer, and was kapellmeister to the Archbishop of Salzburg. He deserves remembrance for two reasons: First, for having excellently conducted the early education of the son who was to become one of the greatest composers of all time. Second, for his own great *Violin School* (Augsburg, 1756), which may be termed the first theoretical and practical method for that instrument ever published. It passed through numerous editions in various languages, and was for a long time the only work of its kind. D. at Salzburg, May 28, 1787. Dudley Buck.

Mozart, Wolfgang Amadeus, sometimes called Jean Chrysostome Theophile Sigismund: pianist and composer; b. at the city of Salzburg, Germany, Jan. 27, 1756. At four years of age he played the violin with astonishing ease and expression, and composed minuets and simple pieces. When the boy was six years of age his father, Leopold Mozart, visited Munich and Vienna with his son and daughter, Marianne, whose performances excited great admiration. In 1763 Leopold made a second tour with the children, visiting the most important cities of Europe, and although only eight years of age Wolfgang composed most of the symphonies which were played at the concerts. The family visited England in 1764 and remained until late in 1766, when Wolfgang returned home to study composition under his father for a few months. The works of Handel, which he brought from London, and those of Bach became his classical models. He studied also some of the best Italian masters, getting from them his marvelous skill in making each of his vocal parts melodious and graceful even in the most constrained harmonic situations. In 1767 Leopold and the children went to Vienna, and remained there more than a year, hoping to improve their fortunes, but they reaped only loss and disappointment, owing chiefly to the jealousy of the Italian court musicians, and gladly left Austria for Italy. While in Rome Wolfgang wrote from memory, after hearing it but once, the Easter music performed in the Sistine chapel. At Milan an opera by young Mozart, *Mitridate*, was brought on the stage and repeated twenty times. The whole tour was a success, and on his return he was appointed court organist to the Archbishop of Salzburg. From 1777 to 1779 he resided in Paris. In 1780 he was called to Munich by Prince Charles Theodore of Bavaria to write the opera *Idomeneo*. In this entirely new creation Mozart laid the corner-stone of dramatic composition—a service which the most eminent of his successors fully acknowledge. Its originality and beauty became at once the delight of his audience, and earned him even more than his usual praises. The Archbishop of Salzburg at once had Mozart return with his honors from Munich, and in 1781 move with him to Vienna as a member of his household, but treated him as a menial. After a fruitless remonstrance Mozart resigned, and gave lessons for a living in Vienna, which thereafter was his home. In 1782 he married Constance Weber, a pianist, whose care and love were his greatest help and happiness. Joseph II., fond of Italian music and of his Italian masters, the enemies of Mozart, was slow in granting him any privileges. Finally, *Die Entführung aus dem Serail* was ordered, and paid for with fifty ducats. The originality of this work at first hid its beauties from the people of Vienna, but the opera made a deep impression on the musicians there and on all classes in other parts of Europe. The emperor gave Mozart the office of composer to the court and a salary of 800 florins, but with astonishing indifference made his office a sinecure. To sustain his family Mozart was obliged to give lessons, write waltzes and contredanses for balls, and give concerts in neighboring cities. It was not till his twenty-eighth year (1784) that these ephemeral labors were followed by uninterrupted industry in composition. The opportunity which wealth and royalty refused to give came unsought in the libretto of *Il Nozze di Figaro*, written for Mozart by the poor poet Da Ponte in 1786. This opera, finished in six weeks, had great success throughout Europe. Many offers came to him then from various courts, but Mozart was fond of Vienna, and even of his indifferent emperor. The people of Prague asked for an opera, and *Don Giovanni* was written for them in 1787. In 1788 Mozart began to feel depressed by his disease of the lungs and the nerves. A mysterious messenger (commissioned by Count Walsegg) came to him and engaged him to write a *Requiem*, refusing any information as to its destination. This mystery, some presentiment, and his melancholy fancies gave him the opinion that he was writing his own funeral service. In the single year of 1791 Mozart wrote *Die Zauberflöte*, *La Clemenza di Tito*, and the *Requiem*. He died Dec. 1 the same year, and was buried in St. Mark's churchyard, but the situation of his grave is unknown.

Mozart is considered the greatest composer of the world from the combined versatility and power of his genius. In every kind of composition he produced works of greatest excellence. He was the best pianist of his time in Germany. His execution was precise, elegant, fervid, and delicate in expression. He wrote 626 published works, and 294 compositions either unfinished or unpublished. *Don Giovanni*, *Il Nozze di Figaro*, *Die Zauberflöte*, the *Requiem*, the symphony in G minor, the quartets Nos. 10 and 18, are but a few of his great productions. See the *Life* by Jahn (1856–59; 2d ed. 1867; Eng. trans. 1882); that in English by Holmes (1845; 2d ed. 1878); and that by Fiseher (1888). His *Correspondence* was edited by Nohl (2d ed. 1877).

Revised by DUDLEY BUCK.

Moz'ley, JAMES BOWLING, D. D.: theologian; b. at Gainsborough, Lincolnshire, England, Sept. 15, 1813; graduated at Oriel College, Oxford, 1834; beeame a fellow of Magdalen 1840, vicar of Shoreham 1856, canon of Woreester 1869, Regius Professor of Divinity, Oxford, 1871; author of a work on *Predestination* (1855); works on *Baptismal Regeneration* (1856–62); *Eight Bampton Lectures on Miracles* (1865); *Ruling Ideas in Early Ages* (1877); *Essays* (1878); and other theological works. D. at Shoreham, Jan. 4, 1878.

Mucilage [= Fr., from Lat. *mucilago*, a mouldy, musty juice, deriv. of *mu'cus*, mueus, slime, and *muce're*, be mouldy or musty]: a name applied in the arts to solutions of vegetable gums (see GUM) in water, or to other soluble preparations possessing adhesive qualities. The best mueilage is prepared by dissolving gum arabic in water in closed copper boilers surrounded by steam-jaekets, the temperature of the water being raised to and kept at the boiling-point by superheated steam until the solution is effeeted, the proeess being hastened and facilitated by brass agitators run by maehinery. The hot solution is drawn off, filtered under pressure through cloth, to remove the dirt and other foreign matter contained in the gum; oil of eloves or some other suitable antiseptic is added to prevent fermentation and the growth of mould, whieh impair the adhesive properties of mueilage, and the solution is allowed to stand for some time until such impurities as were not removed on the cloth filter have settled out, when it is bottled.

One of the most eommon substitutes for gum arabic is DEXTRIN (*q. v.*). The objectionable brown color of its solution can be removed by filtering through animal eharcoal, but its adhesive properties, as indicated by its viseosity, are only equal to those of a third-rate gum arabic. It is used to form the adhesive surfaee of postage-stamps, labels, and envelopes. Fish-glue (see GLUE) is also much used on labels, and dilute solutions of this material are widely sold as mueilage, and are, exeept for the eharacteristic and disagreeable odor and taste, a satisfactory substitute for the gum-arabic mucilage. Other gums are also largely imported for the uses to which gum arabic was almost exclusively used. Of these the principal ones are the other African gums from Senegal and the Cape, and the Ghatti gums from India.

Dextrin is somewhat hygroscopic, more so than gum arabie or gum Ghatti, whieh explains the tendency of postage-stamps to stiek together in damp weather. H. B. HODGES.

Mucora'ceæ [Mod. Lat., from Lat. *mucor*, mould, mustiness, deriv. of *muce're*, be musty]: a family of fungi, popularly known as Moulds or Blaek Moulds, in which the oöspores are solitary and produeed by a proeess of conjugation, and whose eonidia are produeed in sacs eontaining one to many spores. The species of this order are very widely distributed, and among them are many fungi known as common moulds. They frequent articles of food, excrement of animals, and, in short, are found on nearly all decaying animal and vegetable matter. One species, *Phycomyces nitens*, grows on oily substances, an unusual habitat of fungi. As a rule, the members of this order are quite small, although *P. nitens* has been known to attain the height of a foot. The myeelium, which is often found in large masses in some of the commoner moulds of this group, frequently presents a shiny appearance, whenee the common German word for plants of this order, *Schimmel*, glitter, is derived.

Inasmuch as the species of this family conform tolerably closely to the type, we may select *Mucor mucedo*, a common mould growing on dung and other substances, as an illustration of the whole order. *M. mucedo* has occupied the attention of many botanists, but the most eomplete account of its development was given by Dr. Osear Brefeld in a work entitled *Botanische Untersuchungen über Schimmelpilze*, part i., published in 1872. In this publication there appeared for the first time an account of the oöspores, as well as the conidial spores of the plant in question. If fresh horse-dung be plaeed in a moist plaee, it will soon be covered by a coating of white glistening fibers, whieh are the hyphæ or mycelial threads of *M. mucedo*. They soon eover the surface of the dung with a cotton-wool-like mass, more or less dense according to the moisture and amount of nitrogenous matter in the dung, from whieh mass projeets eertain threads, whose tips, at first white, afterward blaek, are the eonidia or asexual fruit, eonsisting of saes containing a large number of spores. The threads, whieh grow upward to bear the spore-sacs, exhibit in *M. mucedo* a marked tendeney to turn toward the light. In *Rhizopus nigricans*, the eommon bread-mould, a nearly related species, the stalks of the spore-cases, on the eontrary, seem to be indifferent to the aetion of light. A mieroscopie examination of the hyphæ or threads composing the mycelium shows that, as in most fungi, they branch in all directions, and are occasionally divided by eross-partitions. The contents are colorless or slightly tinged with brown or gray, and the cell-wall, although, aecording to de Bary, it sometimes shows the blue color given by cellulose on the application of iodine and sulphurie acid, often fails to give that color. If submerged, the hyphæ live, at least for a eertain length of time, but undergo certain changes; the eross-partitions become more numerous, and the cell-walls sometimes bulge a little. It has been sometimes supposed that yeast-cells were nothing but the altered myeelium of submerged plants of *M. mucedo*. This view is not generally aecepted, and it must be admitted that we have no proof that yeast-cells either come from *Mucor* or are ehanged into it. When, however, the mycelium of *M. mucedo* is kept quite moist, it undergoes a modifieation, and we have the produetion of what are known as chlamydospores (Fig. 1). These are formed in the following way: The eross-partitions inerease in number, and some of the eells thus formed swell until they become nearly spherical. The protoplasmic contents of the eells then roll themselves up into round masses resembling spores, whieh afterward are capable of germinating. The filaments, or hyphæ, which rise above the common mass of myeelium to bear the conidia, are generally from an eighth to half an inch high, but under exceptionally favorable circumstanees may be as high as 6 inches. The ends of the hyphæ swell into a globular-shaped sae shown in Fig. 2. The contents of the sac are at first eontinuous with those of the rest of the filament, but are afterward eut off by a partition, which is not flat, like the cross-partitions found in the ordinary myceli-

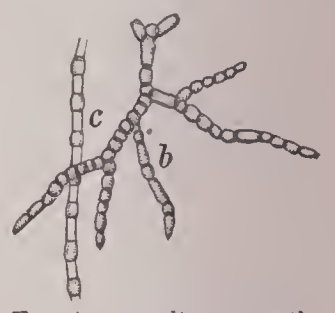


FIG. 1.—*c*, culture-growth; *b*, chlamydospores. (Magnified.)

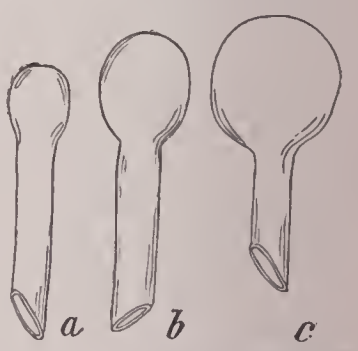


FIG. 2.—Successive stages of spore-sacs. (Magnified.)

um, but arehed, as shown in section in Fig. 3. The expanded tip of the mycelium, which projects into the spore-sac, is known as the *columella*. In *M. mucedo* (Figs. 2, 3) it is very prominent. In most of the Mucoraceæ it is smaller, and in a few cases is entirely wanting. In the sporangium or spore-sac the spores are formed by free-cell formation. In *M. mucedo* they are very numerous and of an oval shape, 0·0066–0·0099 mm. long and 0·0033–0·0040 mm. broad. Their color is grayish brown, and when seen in mass they often appear black. The external wall of the sporangium is composed of two layers, the outer of which is beset with short hairs. Within the sporangium is an expansible elastic substance, whose presence can be demonstrated before the spores are ripe by bursting open the outer wall, when the elastic substanee projeets as a globular mass, in which the young spores are imbedded. When ripe the spores are discharged with some violenee by means of the sudden swelling of the elastic substance; the whole outer wall breaks away and disappears, except a small portion which remains, forming a rim about the base. This is some-


FIG. 3.

times so small that it can be seen only on close examination, and at first sight it appears as though the columella which remains were the young state of a sporangium. In *Rhizopus*

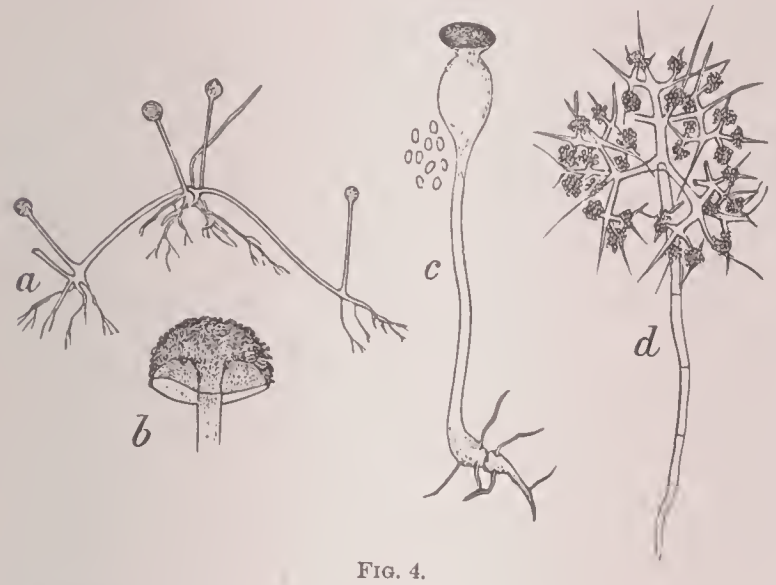


FIG. 4.

nigricans (bread-mould) it happens that not only is the outer wall of the sporangium destroyed, but the very large columella splits and collapses, falling back over the fruit-stalk like an umbrella or small toadstool, as in Fig. 4 *b*. The spores are often projected to a considerable distance, as may be shown by placing a piece of white paper 2 or 3 inches from a mass of *Mucor*, when it will soon be covered with black spots, which are the discharged spores. The spores placed on a moist surface swell to two, three, or even a greater number of times their original dimensions, but do not clearly show a division of their wall into two layers. Their germination takes place by the growth of one or more tubes, which soon assume all the appearance of the mycelium of *M. mucedo*, and in a short time, usually only a few hours, reproduce the conidia of the species.

When *M. mucedo* is cultivated on a decoction of horse-dung it bears only conidia. When growing spontaneously on horse-dung it frequently produces oöspores as well. On breaking the dung open they are seen by the naked eye,

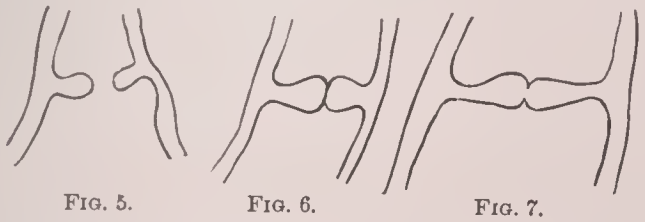


FIG. 5. FIG. 6. FIG. 7.

looking like small round black bodies just below the surface of the dung. Their size varies from 0·0099–0·2145 mm., according to Brefeld's measurements. Examined with a rather lower power of the microscope they are found to have two coats, the outer of which is black, opaque, and brittle, and roughened with irregular protuberances. On breaking open the outer coat, it is seen to be lined with a more delicate membrane, which fits into the inequalities of the outer layer. The inner coat is continuous; the outer is perforated by two circular openings diametrically opposite. This is where the suspensors were attached, as we shall see presently. The oöspores are produced in the following manner: Two hyphæ which are lying near each other send out lateral shoots, as shown in Fig. 5, which increase in size, gradually approaching each other until they meet, as in Fig. 6. The two parts in contact are next cut off by partitions from the hyphæ from which they respectively arose, as in Fig. 7. Finally, the cell-wall at the point of contact is absorbed, and the protoplasmic contents of the two cells unite into a globular mass, which afterward becomes enveloped in a coating of cellulose and grows into a spore (Fig. 8), such as has already been described. In Fig. 8, *a a* are called the suspensors. The oöspore remains attached for some time to the mycelium, but is finally set free; generally, however, a small part of the suspensors remains attached. The oöspore

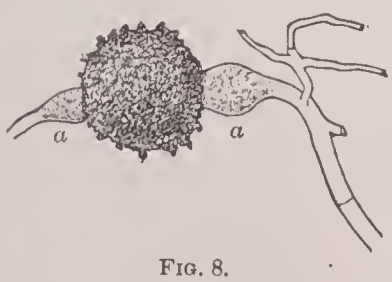


FIG. 8.

germinates in the following manner: The thick outer coat opens, and from the contents of the spore there grows out a germinal tube, which soon assumes all the marks of the ordinary Mucor mycelium. This mycelium, arising directly from the oöspore, produces conidia, and sometimes almost immediately, as is illustrated in Fig. 9. No case has as yet been observed in which the mycelium from the oöspore of *M. mucedo* has produced another oöspore directly, without first having borne conidia. The oöspores of the Mucoraceæ are called by de Bary *zygospores*, from their being produced by conjugation.

FIG. 9.

The method of production of the oöspores just described in *M. mucedo* prevails throughout the family. The process, it will readily be seen, is similar to what is known as conjugation in certain Algæ, as the Desmidiaceæ and Zygnemaceæ. The process consists in the direct union of the contents of two different cells, which resemble one another so closely that we can not with propriety call one male and the other female. In the Desmidiaceæ it is the contents of two unicellular bodies which unite; in the Zygnemaceæ the contents of two cells which are in different filaments. In one genus of the latter family, *Sirogonium*, we find a single filament, which bends upon itself, and the conjugation takes place between two cells of the same filament. In the Mucoraceæ we have a conjugation between parts of different threads, but these threads may have both arisen from the germination of the same spore, so that the conjugation in this order is not necessarily between two different individuals, which must always be the case with Desmids. In those species of *Mucor* where there is a large amount of mycelium we do not know whether the mass has arisen from one or many spores; and when conjugation takes place in such cases it may have been between threads arising from different spores. Cultures of single spores have, however, been made, from which it is known that threads of the same individual may conjugate. This is shown particularly clearly in *Sporodinia grandis*, common mould on toadstools, where the mycelium from a single spore is easily traced. It has been remarked that the two conjugating cells closely resemble one another. In *Chætocladium*, however, one of the cells is uniformly larger and of a slightly different shape from the other, but even in this case there is no distinction of antheridium and oögonium. The oöspores of the different species and genera of Mucoraceæ vary in shape, size, and markings, but a detailed account would be out of place. The most striking form is *Phycomyces nitens*, whose oöspores are surrounded by a ring of branching processes.

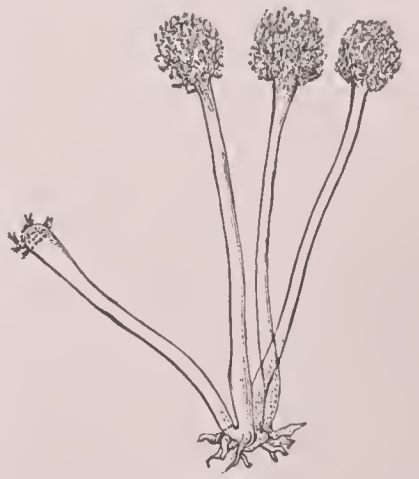


FIG. 10.

The older writers had no knowledge of the mode of production of the oöspores of this group, and the only form of fruit which they regarded in their classification of this order was the asexual or conidial form; and they considered the conidial sporangia to resemble the asci of the Perisporiaceæ. Modern research has shown that this is not the case; for, while the former are produced without the intervention of any sexual action, the latter are the result of a peculiar process of fertilization. By continental writers the *Mucoraceæ* are considered one of the lowest families of Fungi, and are placed just below the *Peronosporaceæ*.

The principal genera of the family are *Mucor* (Figs. 2, 3, 8, 9), *Phycomyces*, *Circinella*, *Spinellus*, *Sporodinia*, *Rhizopus* (Fig. 4, *a b*), *Helicostylum*, *Thamnidium*, *Chætostylum*, *Chætocladium* (Fig. 4, *d*), *Mortierella*, *Piptocephalis*, *Syncephalis* (Fig. 10), and *Pilobolus* (Fig. 4, *c*). W. G. FARLOW.

Mucous Membrane [*mucous* is from Lat. *mu'cus*, mucus]: the lining membrane of the alimentary, respiratory, and genito-urinary tracts. Anatomically, it consists of the mucous membrane proper and the sub-mucous tissues. The first is composed of the secretory tubules, follicles, and glands, situated upon a basement or limitary membrane;

the second consists of connective or "arcolar" tissue with some elastic fibers, and contains the capillary blood-vessels and nerve-filaments by which the secretory surface is nourished and vitalized. The functions of mucous surfaces differ very greatly with the situation. In the nose, for example, the function is merely the heating and warming of the air of respiration; in the œsophagus and lower urinary tract the mucous surface acts merely as a protective surface, offering no obstacle to the ready passage of the substances normal to the parts in question. In the stomach, intestines, and in certain other situations the mucous membrane secretes complex substances of the greatest importance in physiological processes, and by its corrugated structure, numerous reduplications, and villous processes it affords an extensive surface for the great functional processes of nutritive absorption and the elimination of effete excretory products. It is the common property of all mucous membranes to secrete a viscid liquid called mucus, which acts as a lubricant and protective. It consists of a viscid fluid part, containing mucin and cellular constituents derived from the mucous surface. Its free surface is lined with epithelial cells of various shapes, according to the function of the part, whether merely protective or whether secretive. These epithelia are constantly exfoliated, and as constantly reproduced by young cells formed by proliferation in the cellular structures beneath. The secreted matter called mucus contains a limited number of mucous corpuscles, which are cast-off epithelia or escaped products of rapid cell-formation, but the homogeneous fluid portion is the peculiar secretion of the mucous follicles. It is clear, colorless, has nearly a semi-solid consistency, and consists of water, mucin, and salts, especially chloride of sodium. When rich in corpuscles and mucin, mucus is viscid and tenacious. It is thin and watery when salines are chiefly present, and often a rapid serous flow is scarcely more than transuded blood-serum. The mucous membrane is also the seat of glands of special function, as those producing the saliva, the gastric and intestinal digestive juices. Inflammation of mucous surfaces is called *catarrh*, and is nearly always attended with increased secretion of mucus. Catarrh of mucous surfaces has many causes. When the skin is chilled, or its circulation is sluggish by reason of uncleanliness or neglect of exercise, blood is determined to the internal parts. Rapid circulation of the blood and the elevated temperature of the body produce catarrhs in most acute inflammatory or febrile disorders. When large organs, as the lungs or liver, are diseased, the obstruction they offer to the circulation favors congestion of the extensive mucous surfaces of the stomach and intestines, and catarrhs result. They are greatly congested when the heart is incapable of maintaining proper circulation. Direct irritation more often causes catarrhs, as dust in the bronchi, or errors in diet producing the catarrhs of gastric and intestinal indigestion. Revised by WILLIAM PEPPER.

Mucuna: See COWHAGE.

Mucus: See MUCOUS MEMBRANE.

Mudfish: a book-name for the African *Protopterus annecteus* (see DIPNOI) and for the bowfin, or dog-fish (*Amia calva*) of the Great Lakes of the U. S.

Mudge, ENOCH: preacher; b. in Lynn, Mass., June 21, 1776; joined the New England conference in 1793. He traveled and preached through most of Massachusetts, Rhode Island, Connecticut, and Maine. He was prominent in founding Methodism in Maine, which was then a province and a wilderness, and endured severe and romantic trials. He was twice elected to the Legislature of Massachusetts. The latter years of his life were spent in New Bedford, Mass., as chaplain to its mariners' chapel. He published a volume of excellent *Sermons for Mariners* and many poetical pieces of some merit. D. at Lynn, Mass., Apr. 2, 1850.

Mud-hen: See GALLINÆ.

Mud-puppy, or **Water-dog** (*Necturus maculatus*): a batrachian of the order *Amphipneusta*, found in the fresh waters of the eastern parts of the U. S., especially abundant in the Great Lake system. It has the head and mouth large; the upper jaw and palate thickly set with small sharp teeth; a short neck, with three branchial tufts on each side; tail compressed laterally, and fringed with a delicate membrane; four limbs, each having four toes without nails; small eyes, without lids; thick and fleshy lips; a large tongue, immovable except at the tip and edges; small nostrils; and a smooth skin. It has rudimentary lungs, and is able to support life out of water for several hours. Its color is brown, and it is marked by numerous blackish spots of various sizes. It reaches a length of about a foot. The name *Menobranchus* is a synonym of *Necturus*. The name mud-puppy is sometimes applied to a similar salamander, the HELLBENDER (*q. v.*). This batrachian is found chiefly in the head-waters of the Ohio and Tennessee rivers, not in the Great Lakes, and is larger and duller in color than the true mud-puppy; but the most striking difference is in the absence of gills in the hellbender, a round opening or spiracle occupying their place. Both animals are absolutely harmless.

Revised by D. S. JORDAN.

Muez'zin [Arab., also *muazzin*, deriv. of *'azzana*, inform (cf. *'azan*, the call to prayer), deriv. of *'azana*, hear]: the Mussulman official who chants the ezann or call to prayer five times every twenty-four hours from the minaret or some prominent part of a mosque. While chanting he stands erect, a finger in each ear, his face turned toward Mecca. He is expected to possess great strength and melodiousness of voice; if blind, so much the better, as he will not see into neighboring houses and gardens. Mohammed was unwilling to use bells or trumpets in calling the faithful to worship, as these were employed by the Christians and Jews, so he chose the human voice. The ezann is in the following words: "God most high! [four times]. I attest there is no God but God; I attest that Mohammed is the prophet of God; come to prayer; come to the temple of salvation [twice]. There is no God but God." To the morning ezann the words "prayer is better than sleep" are added after "temple of salvation." E. A. GROSVENOR.

Müffling, FRIEDRICH FERDINAND KARL WEISS, Freiherr von: general; b. in Halle, Westphalia, June 12, 1775; entered the Fusiliers while a mere lad, and was with them in the campaign against France 1792–94. In 1806 he entered the service of the Duke of Weimar, and after the battle of Jena joined Blücher and was appointed to conclude the capitulation of Rattkau. Two years later, as member of the so-called secret council, he entered the service of the Duke of Weimar, but in 1813 he re-entered the Prussian army and was assigned to Blücher's staff. He was repeatedly promoted, and after the first Peace of Paris was made chief of the general staff of the army stationed at the Rhine. In 1815 he was assigned to the British army under Wellington, and after the second surrender of Paris was made governor of the city. Five years later he became chief of the general staff of the Prussian army, and in 1832 was appointed general of the Seventh Army-corps. He retired in 1847 with the title of general field-marshal. D. in Erfurt, Jan. 16, 1851.

Muf'ti [= Arab. *muftī*, expounder], or **Sheikh-ul-Islam** [Arab., lord of the faith (liter., of the submission, which takes in Islam the place of faith in Christianity)]: the highest Ottoman ecclesiastical functionary, representative of the sultan in religious affairs, as is the grand vizier in temporal matters. His chief duty is to expound Mussulman religion and law. Though appointed and removable like any officer of state, he while in power exercises a peculiar and anomalous influence upon the throne. No Ottoman sultan was ever deposed until after the mufti had issued a *fetva* (official opinion) against him; such a fetva once issued, it would be very difficult if not impossible for the sovereign to retain his place. The title mufti is often applied to jurisconsults attached to general or local Ottoman government councils. E. A. GROSVENOR.

Müg'ge, THEODOR: author; b. in Berlin, Nov. 8, 1806; became a soldier, determined to go to South America and fight under Bolivar, but the war was over when he reached London: returned to Berlin; studied natural sciences, history, and philosophy for some time; devoted himself finally to literature. D. in Berlin, Feb. 18, 1861. Of his political writings, *France and the Bourbons* (1830), *England and the Reform* (1831), and *The Censure in Prussia* (1845), attracted much attention. The best of his traveling sketches are *Die Schweitz* (1847; Eng. trans. by Mrs. Percy Sinnet, London, 1848) and *Nordisches Bilderbuch* (1856); of his romances, *Toussaint* (1840) and *Afraja* (1854; Eng. trans. by E. J. Morris, Philadelphia, 1854). His works were published at Berlin in 33 vols. (1862–67). Revised by J. GOEBEL.

Mühl'bach, LOUISE (pseudonym of **Klara Mundt**): novelist; b. at Neubrandenburg, Germany, Jan. 2, 1814; married Theodor Mundt 1839; died Sept. 26, 1873. She was the author of numerous novels, mostly historical, which, on account of their sensational contents, were for a long time

devoured by the patrons of the German circulating libraries. The fecundity of her imagination is illustrated by the fact that in one year she was able to furnish a dozen volumes to these libraries. As a consequence, her stories lack entirely artistic finish, though some of them show considerable descriptive talent. JULIUS GOEBEL.

Mühlberg, mül'bārch: town; in the province of Saxony; on the Elbe; 36 miles S. E. of Wittenberg (see map of German Empire, ref. 4–G). It is famous on account of the battle fought here on Apr. 24, 1547, in which the army of the allied Protestant princes under Johann Friedrich was totally defeated by the imperial army, and which changed entirely the course of the Reformation. Pop. (1890) 3,443.

Muhlenberg, FREDERICK AUGUSTUS: first Speaker of the House of Representatives of the U. S.; son of Henry Melchior Muhlenberg; b. at Trappe, Montgomery co., Pa., June 2, 1750; was a grandson of the distinguished Indian agent, Conrad Weiser; was educated in the University of Halle, Germany; was ordained in 1770, and began his pastorate in Lebanon co., Pa.; was pastor of Christ's church (German Lutheran), New York, from 1773 until the British occupancy of the city in 1776 determined his removal, and he became his father's assistant in Montgomery co., Pa. In 1777 he became pastor at New Hanover, Oley, and Goschenhoppen, all in the same county, serving also for a time at Reading, Pa. He became a member of the Continental Congress in 1779, and in 1780 a member of the General Assembly of Pennsylvania, of which he was Speaker 1781–82; was delegate to the Pennsylvania convention to ratify the Federal Constitution in 1787, and was chosen its president; was a member of the 1st, 2d, 3d, and 4th Congresses, and Speaker of the 1st and 3d; receiver-general of Pennsylvania 1800. D. at Lancaster, Pa., June 4, 1801. After retiring from the ministry Mr. Muhlenberg was an active lay member of the Lutheran Church, and bore a very important part in the revision of the constitution of the Ministerium of Pennsylvania in 1792. H. E. JACOBS.

Muhlenberg, HEINRICH MELCHIOR, D. D.: the organizer of the Lutheran Church in America; b. at Eimbeck, Hanover, Sept. 6, 1711; studied at Göttingen, where, as a student, he founded an orphan-house, still in existence; was teacher in the orphan-house at Halle 1738–39; pastor in Grosshennersdorf, Saxony, 1739–42. The Lutheran congregations in Philadelphia, New Hanover, and Trappe having applied to the Lutheran pastors in London and the professors in Halle for a pastor, Muhlenberg responded to the call in 1742, and, on his arrival in Philadelphia, Nov. 25, began a career of unwearied activity extending throughout all the German settlements on the Atlantic coast from Nova Scotia to Georgia. He not only gathered the scattered people into congregations and saw that they were provided with pastors, but gave the congregations the organized form they have maintained; founded in 1748 the first synod (the Ministerium of Pennsylvania) and provided it with a constitution, and prepared the first liturgy and in a large measure the first hymn-book. The congregations of the General Synod and United Synod of the South, most of the congregations of the General Council and of the Joint Synod of Ohio, with many of those in the Synodical Conference, are the direct outgrowth of his labors. Dr. Muhlenberg laid the foundations of the Lutheran Church of America upon a confessional basis embracing all the symbolical books, to which he unwaveringly held, although cultivating friendly and even cordial relations with the representatives of the Episcopal, Presbyterian, and German Reformed Churches. He advocated the early introduction of the English language into the German churches, and set the example by preaching, while pastor in New York, every Sunday in three languages —German, Dutch, and English. The form of church government which he sought to introduce provided for the systematic oversight of pastors and congregations through an adaptation of the Lutheran episcopal system to the synodical organization. The liturgical service which he prepared in 1748 is essentially the same as the Common Service, now agreed upon by all English-speaking Lutheran bodies in the U. S. D. at Trappe, Pa., Oct. 7, 1787. See Mann, *Life and Times of Henry Melchior Muhlenberg* (Philadelphia, 1887). H. E. JACOBS.

Muhlenberg, JOHN PETER GABRIEL: clergyman, soldier, and legislator; b. at Trappe, Pa., Oct. 1, 1746; a son of Dr. Heinrich M. Muhlenberg; was educated in Halle, but ran away from college and enlisted in the dragoons; became in 1772 minister of a Lutheran church at Woodstock, Va.; was much in public life, and soon after the outbreak of the Revolution threw off his gown in the pulpit, displaying a military uniform, read his commission as colonel, and ordered the drums to beat for recruits; served with great distinction at Charleston, Brandywine, Germantown, Monmouth, Stony Point, and Yorktown; became a brigadier-general in 1777, and afterward a major-general; was vice-president of Pennsylvania 1785; member of Congress 1789–91, 1793–95, and 1799–1801; U. S. Senator 1801–02; became in 1802 U. S. supervisor of revenue for Pennsylvania, and in 1803 collector of the port of Philadelphia. D. near Philadelphia, Oct. 1, 1807. See the *Life* by Henry A. Muhlenberg (Philadelphia, 1849).

Muhlenberg, WILLIAM AUGUSTUS, S. T. D.: clergyman and hymn-writer; great-grandson of Heinrich Melchior Muhlenberg; b. in Philadelphia, Sept. 16, 1796; graduated at the University of Pennsylvania in 1814, and entered the Episcopal ministry in 1817. From 1817 to 1821 he was assistant rector of Christ church in Philadelphia under Bishop White. From 1821 to 1828 he was rector of St. James's church in Lancaster, Pa. From 1828 to 1846 he was at the head of a school, afterward called St. Paul's College, founded by him at Flushing, L. I. From 1846 to 1858 he was rector of the Church of the Holy Communion, erected by his sister, corner of Sixth Avenue and Twentieth Street, New York. In 1852 he organized the first Protestant sisterhood in the U. S.; he also promoted the establishment of a Christian settlement, called St. Johnland, on Long Island. In 1858 he became the first superintendent and pastor of St. Luke's Hospital, which owes its existence to him. He published *Church Poetry* (1823); *Music of the Church* (1852); *People's Psalter* (1858); *Evangelical Catholic Papers* (2 vols., 1875–77); and other works. He distinguished himself both as a philanthropist and a promoter of Christian union, but will be longest remembered as the author of the hymns *I would not Live Alway* (1823; revised in 1865); *Like Noah's Weary Dove* (1826); and *Saviour, who thy Flock art Feeding* (1826). D. in New York, Apr. 8, 1877.

Muhlenberg College: an institution at Allentown, Pa., founded in 1867, and named in honor of Heinrich Melchior Muhlenberg, the patriarch of the Lutheran Church in America. Its curriculum of studies embraces all the branches given in the best colleges for the degree of A. B., German being a required study throughout the four years' course. About 50 per cent. of its graduates prepare for the Lutheran ministry. The institution is endowed ($155,000), and has a valuable property in the best part of the city. The number of the faculty is 12, exclusive of lecturers; students, 157; alumni, 481; books in library, 10,000. It possesses the usual apparatus and cabinets, together with a laboratory for scientific work. It has had three presidents; Rev. T. L. Seip, D. D., the present president, was inaugurated in 1886. T. L. SEIP.

Mühlhausen: town of Prussia; province of Saxony; on the Unstrut; 25 miles by rail N. N. W. of Gotha (see map of German Empire, ref. 5–E). It has large manufactures of woolen and cotton goods, furniture, hosiery, leather, sewing-machines, etc. It is surrounded by walls, and originally was a free city of the empire. In the Peasants' war of 1525 it was the headquarters of Thomas Münzer, and also the scene of his execution. Pop. (1890) 27,538.

Muir, myur, JOHN, D. C. L.: Orientalist; b. in Glasgow, Scotland, Feb. 5, 1810; was educated at Glasgow University and at the East India College at Haileybury; proceeded to Bengal as a writer in the civil service 1828; filled several important posts in the revenue and judicial departments; made a profound study of Indian languages, history, and antiquities; wrote some religious tracts, in Sanskrit verse, and, after retiring from the service in 1853, devoted his time and his fortune to the promotion of Oriental studies, especially such as have a religious bearing. In 1862 he endowed with £5,000 a chair of Sanskrit and Comparative Philology in the University of Edinburgh. Besides various contributions to the *Transactions* of the Asiatic societies and other learned associations, Dr. Muir published five volumes of *Original Sanskrit Texts on the Origin and History of the People of India, their Religion and Institutions* (1858–70; 2d ed. 1868–73)—a work of the utmost value to the students of Indian antiquities, mythology, and literature, particularly of the Vedic age. Noticeable among his other works are *A Sketch of the Argument for Christianity against Hinduism* (Calcutta, 1839); *Examinations of Religions* (Calcutta, 1852–54); *Remarks on the Conduct of Missionary Operations in Northern India* (Cape Town,

1853). He was also the author of *Metrical Translations from the Sanskrit*, many essays in *The Journal of the Royal Asiatic Society*, and an anonymous work on *Inspiration*. D. in Edinburgh, Mar. 7, 1882.—Dr. Muir's brother, Sir William Muir, b. in 1819, rose to high rank in India, and on his return to England sat in the Council of India 1876–85, and was then chosen principal of the University of Edinburgh. He is author of a valuable *Life of Mahomet* (4 vols., 1858–61); *Extracts from the Corân* (1880); and other works.

Muir, John: See Appendix.

Muir, Mackenzie M.: See the Appendix.

Muk'den, or **Mouk'den**: city; capital of Manchuria, and chief city of the province of Shingking. *Mukden* is the Manchu name, and means prosperity. The city, whose walls have a circuit of 3 miles, and are pierced by nine gates, stands in a comparatively treeless plain, watered by the Hwŭn, a west-flowing affluent of the Liao river; about 430 miles N. E. of Peking and 80 N. of Ying-tse (Niuchwang), its port; lat. 41° 50′ 30″ N., lon. 123° 37′ E. (see map of China, ref. 2–L). It is modeled after Peking, and contains several palaces and official buildings erected about the year 1625, when Nurhachu made it his capital. The suburbs, where most of the business is transacted, are inclosed by another wall, 11 miles in circuit. About 3 miles to the E. is the tomb of Nurhachu. The tombs of most of the Manchu rulers, however, are at Yung-ling and Foo-ling, in the vicinity of the small palisaded city of Hingking, the original home of the Manchus. Pop. of Mukden about 180,000.

R. Lilley.

Mulberry [M. Eng. *moolbery*, *murberie*, whose first part is from Lat. *mo'rum*, mulberry. Cf. Germ. *maulbeere*; also from Lat., and like the Eng. with dissimilation of *l* to *r* before the following *r*]: a name of trees and fruits of the genus *Morus*, now generally referred to the *Urticaceæ* or Elm family. The genus comprises a few species of Asiatic and North American trees, mostly of small size and short trunk. The leaves are mostly large and ovate, alternate upon the stem, and are variously toothed and lobed, although not compound. A remarkable feature of mulberry foliage is its variability, leaves upon the same tree often differing widely in shape. The flowers are borne in axillary catkin-like short spikes, and they are small and greenish and unisexual. The sexes are borne upon different plants in some cases and upon different catkins on the same plant (monœcious) in others. The fruit itself is a very small, ovate achenium, which is ordinarily called a seed, while the fleshy and edible portion is the succulent enlarged calyx. The mass of thickened flowers comprising the spike is the so-called fruit of the mulberry.

The mulberry is chiefly known through its use as a food-plant for the silkworm. For this purpose it has been grown from the earliest times, particularly in China. Probably there is no single plant which enjoys such a voluminous literature as this white or silk-yielding mulberry, and there are few plants, perhaps, more variable or more confusing to systematic botanists. In the U. S., however, the mulberry is chiefly known as a fruit-bearing tree, and even in this capacity it is nowhere largely grown. The fruit resembles a blackberry in form and size, although more slender, and the flavor is sweet and in some varieties slightly vinous. It has never found its way into the market as a salable commodity, and there are no commercial preparations of it. It is worthy and capable of more extended use, however. The fruit varies from a half to 2 or even nearly 3 inches in length, and in color from amber white to violet, purple, and black. Although the two commonest species of mulberry are known as the white and the black, the color of the fruit does not afford characteristic differences between them. Mulberries begin to ripen early in summer, and some species or varieties mature their fruits successively through two or three months, a circumstance which adapts them to dessert use, but greatly lessens their adaptability for marketing. The fruits fall as they ripen, and the trees are therefore usually grown in sod, that the fruit may not be soiled. In Europe cresses or other quick-growing small plants are sometimes sown under the trees in order to catch the dropping fruits. Birds, poultry, and swine are very fond of mulberries, and in the southern parts of the U. S. certain varieties are planted for the express purpose of affording food to fattening hogs, for which the fruit is said to be well adapted. There are several kinds of mulberries grown for their ornamental foliage or curious habit. The Russian mulberry, a form of the white mulberry, is also planted for hedges, and mulberry timber is considered to be good for uses which require a light, strong, and durable wood.

At various times during the eighteenth century attempts were made to rear the silkworm in North America (see Silk), and the mulberry was grown to feed it. About 1830 a new species, called *Morus multicaulis*, was introduced into the U. S. from France, a fever of speculation set in, and millions of trees were planted. As a result, the market was overstocked, climate and disease affected the trees, nurserymen lost their fortunes, and in 1839 the bubble burst. *Morus multicaulis* is no longer grown, unless for stocks upon which to graft other kinds. The fruit-bearing mulberries of the U. S. have been referred to *Morus nigra*, but they really belong to *M. alba* and to the native *M. rubra*, while the true black mulberry is grown only in the Southern States and on the Pacific slope. The fruit-bearing mulberries of the U. S. therefore are essentially different in type from those of other countries. Apparently the first-named variety of mulberry originating upon American soil was the Johnson, springing from the native red mulberry, *M. rubra*. The Hicks and Stubbs mulberries also belong to this species, and these two varieties are much prized in the South, especially for swine. The best mulberry for the North is probably the New American, a variety of *Morus alba*, although it is commonly, but erroneously, sold under the name of Downing. The Russian mulberry is the *Morus tatarica* of Linnæus,

Mulberry.

but botanists now agree in referring it to *M. alba*, of which it is a hardy descendant. Two or three fruit-bearing varieties have sprung from this Russian stock, but they have not gained prominence. The *Nervosa* mulberry, grown in gardens for its curious narrow and jagged ribbed leaves, is a monstrous form of *M. alba*. The chief groups of mulberries now grown in North America may be divided as follows: 1. The white mulberry group. The white mulberry is supposed to be a native of China. It is nearly or quite as hardy as the plum-tree when well established. 2. The *Multicaulis* group. *Morus latifolia*, Poiret. (*M. multicaulis*, Perrottet. *M. alba* var. *multicaulis* of Loudon.) 3. The Japanese group. *Morus japonica*, Audibert. (*M. alba* var. *stylosa*, Bureau.) The fruit is short-oblong and red. 4. The black mulberry group. *Morus nigra*, Linn. The black mulberry is a native of Asia, probably of Persia and adjacent regions. It is not hardy, except in protected places, in New England and New York. 5. The red or native mulberry group. *Morus rubra*, Linn. The native mulberry is generally distributed from Western New England to Nebraska and southward to the Gulf. It is more abundant and attains a larger size in the South.

L. H. Bailey.

Mulcaster, Richard: schoolmaster; b. about 1530; educated at Eton, Cambridge, and Oxford; became in 1561 first head master of Merchant Taylors' School, in which position he remained until 1586. Some years later he was head master of St. Paul's School, where he labored for twelve years. In 1598 he was appointed by the queen rector of Stanford Rivers, in Essex, but began to live there

only in 1608. He died in 1611. In Merchant Taylors' School Edmund Spenser was one of his pupils, and among the others were nine who in later years aided in making a translation of the Bible (King James Version). His reputation has recently been increased through the attention attracted to his two works, *Positions for the Training up of Children, either for Skill in their Booke or Health in their Bodie* (1581), and *Elementarie*, or first steps in education (1582). The former has been reprinted with excellent notes by R. H. Quick. In the *Positions* Mulcaster outlines an excellent course of training for body and mind that is in accord at many, if not most, points with the best thought of our day. The *Elementarie* is in the main a vigorous plea for the use and study of English. He especially defends the use of English by the learned, and writes his own book in the vernacular to show his faith. He also had advanced views on the education of women. See reprint of *Positions*, edited by R. H. Quick; Williams, *History of Modern Education*; Quick, *Educational Reformers*. C. H. Thurber.

Mulder, Gerardus Johannes: chemist; b. at Utrecht, Holland, Dec. 27, 1802; studied medicine; practiced in 1825 at Amsterdam; lectured in 1827 at Rotterdam on botany and chemistry, and became in 1840 Professor of Chemistry at the University of Utrecht. His *Chemistry of Vegetable and Animal Physiology* (translated into German by Kolbe in 1844, and into English by J. T. W. Johnston in 1849) occasioned a hot controversy with Liebig concerning the existence of Protein (*q. v.*) as an independent compound. His *Chemistry of Wine* was translated into English by H. Bence Jones (1857). He also wrote the *Chemistry of Beer*, *De Voeding in Nederland*, *De Voeding van den Neger in Suriname*, *Chemical Researches*, etc., all translated into German, some into French. D. at Utrecht, Apr., 1880.

Revised by Ira Remsen.

Mule [viâ O. Fr. from Lat. *mu'lus*, mule (*mu'ta*, she-mule), whence O. Eng. *mūl*, mule]: a name in its widest sense synonymous with hybrid, but more commonly denoting the offspring of the male domestic ass and the mare; the corresponding offspring of the male horse and female ass is the jennet or Hinny (*q. v.*). The mule is more difficult to breed than the horse and matures more slowly, but its working life is longer and it is less liable to disease. The male is sterile, and although the female sometimes can be impregnated by the horse or ass, she rarely brings forth offspring alive. The mule is a hardy, strong, sure-footed, serviceable animal, peculiarly adapted to hard work in hot weather, and to use on steep and rough roads. Mules were much employed by the ancient Romans, and are now used in nearly all parts of the world, especially in North and South America, Spain, Southern France, Italy, and the East. In Spain, Spanish America, and parts of Africa and the East mules are highly prized as saddle animals. For military transport purposes they are decidedly superior to horses and much more used. In the U. S., Washington was instrumental in introducing the use of mules on Southern plantations, and at present they occur most extensively in the South. The total number in the U. S. in 1894 was 2,352,231, valued at $146,232,811. Very nearly half of these were possessed by the States of Missouri, Texas, Tennessee, Georgia, Mississippi, and Kentucky, named in order of numbers.

Mule-deer: See Deer.

Mulford, Elisha, LL. D.: philosophical writer; b. at Montrose, in Susquehanna co., Pa., Nov. 19, 1833; graduated at Yale College in 1855; his education in law, theology, and philosophy was continued at the Union Theological School, at Andover, and at Halle and Heidelberg, Germany. He held various charges, but after 1881 made his home in Cambridge, Mass. In 1870 he published *The Nation*, a profound treatise on the philosophy of the state; in 1880 *The Republic of God*, a similar work on the philosophy of religion. He lectured on the philosophy of law at Columbia Law School, and on theology and philosophy at Cambridge Theological (Episcopal) School. D. at Cambridge, Mass., Dec. 9, 1885.

Mulgrave, Constantine John Phipps, Baron: explorer and politician; b. in England, May 30, 1734; entered the navy at an early age; became post-captain 1765: commanded an exploring expedition in search of a northwest passage 1773; reached lat. 80° 48′ N., whence an impenetrable field of ice stretched northward; published *A Journal of a Voyage toward the North Pole* (1774); succeeded to the title 1775; was commissioner of the admiralty under Lord North's administration, and an ardent politician; was raised to the English peerage in 1784, and died Oct. 10, 1792.

Mulhall, Michael G.: statistician; b. in Dublin, Ireland, in 1836; was educated at the Irish College, Rome; removed to South America and founded the Buenos Ayres *Standard* 1861; contributed to *The Contemporary Review*. Is the author of *Handbook of the River Plata* (5th ed. 1885; trans. in Spanish); *The Progress of the World* (1880); *Dictionary of Statistics* (1891).

Mülhausen, mül-how'zen (in Fr. *Mulhouse*): town and railway center of Germany; province of Alsace-Lorraine; on the Ill, which divides it into the old and the new city; 61 miles S. S. W. of Strassburg (see map of German Empire, ref. 7–D). The old town is rather indifferently built, the new town is very elegant; there is, besides, a workingmen's quarter of 1,000 well-built houses. Mülhausen has manufactures of cotton (525,000 spindles), woolens, linens, muslins, watered silks, chemicals, printing and dye works, etc., and is one of the most flourishing manufacturing towns of Germany. The town and its territory originally belonged to the Swiss confederation, but in 1798 it was incorporated with France, and by the Treaty of Frankfort, 1871, it was ceded to Germany. Since that time it has increased very rapidly, principally by immigration from Germany. Pop. (1895) 82,986.

Mülheim-am-Rhein, mül'hīm-aam-rīn': town of Prussia, Rhine province; on the right bank of the Rhine; 3 miles above Cologne; has large manufactures of velvet, silk, and thread (see map of German Empire, ref. 4–C). Its prosperity dates back to the beginning of the seventeenth century, and was due to the settlement there of a number of Protestant emigrants from Cologne. Pop. (1890) 30,996.

Mulheim-an-der-Ruhr, -dār-roor': town of Prussia, Rhine province; on the Ruhr; 16 miles N. of Düsseldorf; has extensive manufactures of iron and leather, and a trade in coal and iron from the mines in the vicinity (see map of German Empire, ref. 4–C). The Ruhr becomes navigable here, and a large number of vessels for the navigation of that river and the Rhine are built. The trade of the town is principally with Holland. Pop. (1890) 27,903.

Mull: one of the Inner Hebrides; off the west coast of Scotland. It is 30 miles long and 25 miles broad, high, rugged, but fertile, though not fit for agriculture on account of climate; cattle and sheep are reared. Pop. about 7,000.

Mullein, mŭl'lin [M. Eng. *moleyn* < O. Eng. *molegn*]: the common name of a plant of the family *Scrophulariaceæ* or figworts (*Verbascum thapsus*), belonging to a widely distributed genus which includes more than eighty varieties. The common mullein of the U. S. is biennial, attaining a height of from 4 to 6 feet, with oblong-acute leaves 8 or 10 inches long, covered with a soft wool-like pubescence. It is found in Europe and Asia, whence it was introduced into North America, where it is a troublesome weed.

Muller, mü'lār', Charles Louis: historical and portrait painter; b. in Paris, Dec. 22, 1815; d. there Jan. 10, 1892. He was a pupil of Baron Gros and of Léon Cogniet; was awarded medals at the Salons of 1838 and 1846; first-class medal, Paris Exposition, 1855; became an officer of the Legion of Honor 1859; member of the Institute 1864. He is best known by his celebrated *Rott-calt of the Last Victims of the Reign of Terror*, formerly in the Luxembourg Gallery, Paris. His *Chartotte Corday in Prison* (1875) is in the Corcoran Gallery, Washington. W. A. C.

Müller, mü'ler, Eduard Friedrich Hermann Lucian: Latinist; b. at Merseburg, Germany, Mar. 17, 1836; studied in Berlin, and in 1867 became privat docent in Bonn; since 1870 has been Professor of Roman Literature at the Philological Historical Institute of St. Petersburg. His works display great learning and high critical talent, but are vitiated by virulent invective against eminent scholars who do not hold his views. With the exception of a very unsatisfactory *History of Ctassical Philology in the Netherlands* (1869), his work has been confined chiefly to Old Latin poetry. His masterpiece is the *De re metrica præter Plautum et Terentium* (1861), the most exhaustive and best treatment of the subject we possess. Besides this, Müller has edited *Lucitius* (1872); a literary monograph on this poet's *Life and Works* (1876); *Phædrus* (1877); *Catuttus, Tibullus, and Propertius*; a German commentary to Horace's *Satires and Epistles* (2 vols., 1892–93); *Nonius* (2 vols., 1892); monographs on *Ennius* and *Horace*, etc.

Alfred Gudeman.

Müller, Baron Ferdinand, von, M. D., F. R. S.: botanist; b. at Rostock, Germany, June 30, 1825; was educated at Kiel; investigated the botany of Schleswig and Holstein; emigrated to Australia 1847; made extensive botanical explorations in South Australia at his own expense 1848–52; was then made government botanist for the colony of Victoria; explored many mountain ranges previously unknown 1852–55; was naturalist to Gregory's exploring expedition 1855–56; was director of the botanical garden at Melbourne 1857–73; published *Fragmenta Phytographiæ Australiæ* (10 vols., London, 1862–77); *Plants of Victoria* (2 vols., Melbourne, 1860–65), *Flora Australiensis* (7 vols.), and other works. He was ennobled by the King of Würtemberg in 1870. D. at Melbourne, Oct. 9, 1896.

Müller, Frederick Max, Ph. D., knight of the *Ordre pour le mérite*: philologist; b. at Dessau, Germany, Dec. 6, 1823; studied at Leipzig, Berlin, and Paris; since 1854 has been Professor of Comparative Philology in the University of Oxford, England; is foreign member of the French Institute. He has a high reputation as a popular interpreter of the most recondite subjects of learning. Among his most important works may be mentioned *Rig-Veda Saṃhitā* (6 vols., 1849–73; 2d ed. 4 vols., 1889–92); *Rig-Veda Saṃhitā, Translated and Explained* (vol. i., 1869); 2d ed. *Sacred Books of the East* (1892); *Rig-Veda Prātiśākhya, das älteste Lehrbuch der vedischen Phonetik* (1869); *Hitopadeśa, in das Deutsche übersetst* (1844); *Hitopadeśa, Text with Interlinear Transliteration, Gramm. Analysis, and English Translation* (1866); *Meghadūta, dem Kālidāsa nachgedichtet* (1847); *Upanishads, Translated from the Sanskr., Sacred Books of the East* (vols. i. and xv., 1879, 1884); *Dhammapada, Translated from Pāli, Sacred Books of the East* (vol. x., 1881); *Buddhist Texts from Japan* (1881–85); *History of Ancient Sanskrit Literature* (2d ed. 1859); *Sanskrit Grammar for Beginners* (2d ed. 1870); *India, What can it Teach Us?* (1883; new ed. 1892); *Kant's Critique of Pure Reason, Translated* (1881); *Introduction to the Science of Religion* (1870; last ed. 1882); *On the Origin and Growth of Religion*, Hibbert Lectures (1878; new ed. 1882); *Chips from a German Workshop* (4 vols., 1867–75); *Selected Essays on Language, Mythology, and Religion* (2 vols., 1881); *Biographical Essays* (1884); *Lectures on the Science of Language* (1861–63; rewritten 1891); *The Science of Thought* (1887); *Biographies of Words and Home of the Aryas* (1888); *Gifford Lectures*, i. *Natural Religion* (1890), ii. *Physical Religion* (1891); *Anthropological Religion* (1892). D. Oct. 28, 1900. Benj. Ide Wheeler.

Müller, Friedrich (*Maler Müller*): poet; b. at Kreuznach, Germany, Jan. 13, 1749; studied art, and attracted by his talent the attention of influential persons. Aided by these, and especially by Goethe, he was enabled to go to Rome in 1778. His paintings did not, however, meet with success; he lost his interest in his art and supported himself finally as a guide and second-hand bookseller in Rome, where he died Apr. 23, 1825. As a poet and writer Müller is to be classed among the members of the Storm and Stress school. He has been called the romanticist among these writers on account of his love for the Middle Ages. He gained his first reputation as a writer by his *Idyllen* (1775), but his talent was more of a dramatic nature. Of the many dramas which he planned, he finished but a few, and among these *Golo und Genoveva* is his best work. He also wrote a *Faust*, but the published fragments of this drama give sufficient evidence that Müller was not equal to a theme of the proportions of the Faust legend. See B. Seuffert, *Maler Müller* (1877); A. Sauer in vol. lxxxi. of *Kürschners Nationalliteratur*. Julius Goebel.

Müller, Friedrich, Ph. D.: philologist; b. at Jemnik, in Bohemia, Mar. 5, 1834; studied at Vienna; since 1869 has been Professor of Comparative Philology at Vienna; is a member of the Imperial Academy of Vienna; author of a great number of most important ethnographical and linguistic treatises, among which are *Grundriss der Sprachwissenschaft* (7 vols., 1876–88); *Allgemeine Ethnographie* (1873; 2d ed. 1879); *Reise der österr. Fregatta Novara um die Erde: linguistischer Theil* (1867), *ethnographischer Theil* (1868); various treatises on Pāli, Zend, Modern Persian, Afghan, Kurd, Ossetan, Armenian, the African, and American languages in the *Mittheilungen der anthropologischen Gesellschaft in Wien*: editor of the *Wiener Zeitschrift für die Kunde des Morgenlandes*, and author of numerous articles therein, as well as in the journals *Ausland* and *Globus*. Benj. Ide Wheeler.

Müller, Georg Elias, Ph. D.: psychologist; b. in Grimma, Saxony, 1850; educated at Grimma, Leipzig, Berlin, and Göttingen; assistant professor in the University of Czernowitz in 1880; Professor of Philosophy at Göttingen in 1881. His principal works are *Zur Theorie der sinnlichen Aufmerksamkeit* (1873); *Zur Grundlegung der Psychophysik* (1878); *Ueber die Maasbestimmungen des Ortssinnes der Haut* (1879); *Theorie der Muskelcontraction* (with Dr. Fr. Schumann, vol. i., 1891); *Ueber die psychologischen Grundlagen der Vergleichung gehobener Gewichte* (1889); *Experimentelle Beiträge zur Untersuchung des Gedächtnisses* (1893). J. M. B.

Müller, Georg Friedrich: See the Appendix.

Müller, Johannes, von: historian; b. at Schaffhausen, Switzerland, Jan. 3, 1752; studied theology and history at Göttingen; devoted himself to the preparation of a *History of Switzerland*, of which the first volume appeared at Berne in 1780; was Professor of Statistics at Cassel 1781–83, but retired and lived at Geneva till 1786. In this year he was appointed court councilor and librarian at Mentz, and when the city was taken by the French in 1791 he repaired to Vienna, where he stayed till 1804, and was treated with much courtesy, but he was forbidden to continue his Swiss history. In 1804 he went to Berlin; was appointed historiographer to the King of Prussia, and received permission to use the Prussian archives for a history of Frederick II. Nevertheless, after the battle of Jena and the occupation of Berlin by the French, Napoleon succeeded in winning him over to his side, and in 1808 he accepted a position as minister of state to the King of Westphalia. This act, and the pronounced manner in which he extolled Napoleon, excited great indignation in Germany, and other circumstances, pecuniary embarrassments, political disappointments, etc., were added, making his last days melancholy. D. at Cassel, May 29, 1809. Besides his great works, the *History of Switzerland* and *Twenty-four Books of Universal History*, he wrote a number of monographs and pamphlets rich in ideas and elegant in style.

Müller, Johannes: physiologist; b. at Coblentz, Germany, July 14, 1801, in humble circumstances; began to prepare himself for the Roman Catholic Church, but abandoned in 1819 his theological studies, and devoted himself exclusively to medicine; took his degree in 1822, and became Professor of Physiology and Anatomy in 1826 at Bonn, and in 1833 at Berlin, where he died Apr. 28, 1858. As the founder of the physico-chemical school of physiology he enjoyed the fame of being one of the greatest physiologists of his age, and his publications brought new facts and new ideas to every point of his science. His principal works are *Elements of Physiology* (1833; translated by Dr. W. Baly, 2 vols., London, 1837–42); *De Respiratione Fœtus* (1823, his first publication); *De Glandularum Secernentium Structura* (1830); *Vergleichende Anatomie der Myxinoiden* (1835–45, etc.). J. M. B.

Müller, Johann Friedrich Wilhelm: engraver; son of Johann Gotthard Müller; b. at Stuttgart, 1782; d. at Pirna, Saxony, May 3, 1816; was educated partly by his father, partly in Paris; became an equally celebrated engraver, and was professor at the academy in Dresden. His engraving after the statue *La Jeunesse* attracted great attention by the manner in which he undertook to imitate marble, but his most celebrated works are the engraving of the *Madonna di S. Sisto*, by Raphael, and the portraits of Jacobi and Schiller, after the busts by Dannecker.

Müller, Johann Gotthard, von: engraver; b. at Bernhausen, near Stuttgart, Germany, May 4, 1747; received his first artistic education at the school of art in Stuttgart; went in 1770, with the support of Duke Charles, to Paris, where he studied engraving under Wille, and was appointed professor in 1776 at the academy of art at Stuttgart, where he exercised a great influence, and had many pupils. D. Mar. 14, 1830. Among the most celebrated engravings by him are *The Battle of Bunker Hill*, by Trumbull; *St. Cecilia*, after Domenichino; *St. Catharine*, after Leonardo da Vinci; and the portraits of Louis XVI., Dalberg, and Jerome Bonaparte.

Müller, Karl Otfried: Greek scholar and archæologist; b. in Brieg, Silesia, Aug. 28, 1797; studied in Breslau and under Boeckh in Berlin. At the early age of twenty-two, he was appointed professor extraordinary at Göttingen, professor ordinary in 1823. In Sept., 1839, he undertook what was to prove a fatal journey to Greece, for he died Aug. 1, 1840 of a fever which he contracted at Delphi, while copying in-

scriptions. Müller may be said to have permanently established the study of archæology inaugurated by Winkelmann. Many problems which it was reserved for later scholars to solve were first suggested by him. His best known works are *Orchomenos und die Minyer* (1820); *Die Dorier* (2 vols., 1824); *Die Etrusker* (2 vols., 2d ed. by W. Deeke, 1877); *Prolegomena zu einer wissenschaftlichen Mythologie* (1825); *Handbuch der Archaeologie der Kunst* (1848; 3d ed. by F. G. Welcker); *Aeschylus's Eumeniden*, Greek and German, with exhaustive essays on scenic antiquities, still of interest, because of the polemical introduction which gave rise to the famous quarrel with G. Hermann; *Varro de lingua Latina* (1833); *Festus* (1839), until recently (1891) the standard edition of this work; and finally the *History of Greek Literature* to the time of Alexander (2 vols., 1841; 3d vol. added by E. Heitz, the Hellenistic period by I. W. Donaldson; fourth edition in German 1883), still one of the best works on the subject, both in style and treatment. Cf. K. Hillebrand, in the French translation of Müller's *Varro*, pp. xvii.–ccclxxx.; *Briefwechsel zwischen August Boeckh und O. M.* (1883, pp. 442); Bursian, *Geschichte der classischen Philologie in Deutschland*, pp. 1007–1028. ALFRED GUDEMAN.

Müller, WILHELM: poet; b. at Dessau, Germany, Oct. 7, 1794; studied philology and history at Berlin; fought as a volunteer in the wars of liberation against Napoleon; went to Rome in 1817, where he stayed for nearly two years, and was in 1819 appointed Professor at the Gymnasium of Dessau, and librarian of the duke's library at the same place. D. Sept. 30, 1827. There are few German poets who have succeeded in reproducing the spirit of the Volkslied with such naïve originality as Müller did in his graceful, melodious *Gedichte eines Waldhornisten* (1821), *Lieder des Lebens und der Liebe* (1824), *Lyrische Reisen* (1827). Many of these which were set to music by the greatest German composers like Schubert have again become popular songs; besides, they exerted a great influence on Heine's lyrics, according to the latter's own confession; but Müller was also capable of vigorous political pathos, as is shown by his excellent *Griechenlieder*, which he sang in defense of the liberation of Greece. Müller's complete works were published by G. Schwab, 1830. His *Gedichte* were edited with an excellent introduction and notes by his son, Max Müller (Leipzig, 1868). JULIUS GOEBEL.

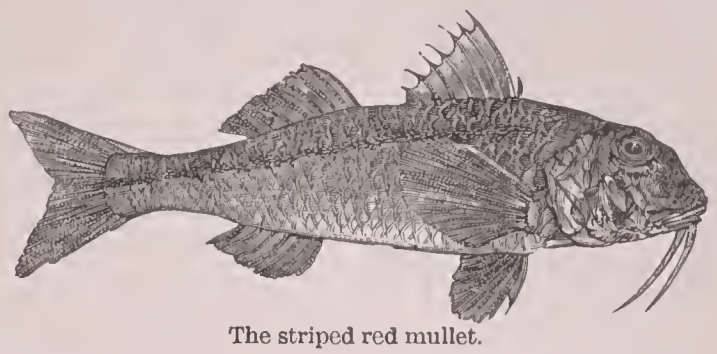
Müller, WOLFGANG: poet; b. at Königswinter, Prussia, Mar. 5, 1816; studied medicine at Bonn and Berlin; lived at Düsseldorf, Cologne, and Wiesbaden. D. June 29, 1873. He was the author of several charming epic poems, e. g., *Die Maikönigin* (1852); *Prinz Minnewein* (1854); *Der Rattenfänger von St. Goar* (1854); *Johann von Werth* (1858), etc. Much of his poetry is based on the legends of the romantic Rhine valley, as may be seen from his collections *Dichtungen eines rheinischen Poeten* (4 vols., 1871–74) and *Erzählungen eines rheinischen Chronisten* (2 vols., 1860–61). He was less successful as a dramatist, though some of his smaller pieces, like *Sie hat ihr Herz entdeckt*, still charm us with their exquisite simplicity. JULIUS GOEBEL.

Muller's Glass: See HYALITE.

Mullet [from O. Fr. *mulet*, dimin. of *mulle* < Lat. *mullus*, red mullet]: a name common to the fishes of the family *Mugilidæ* (group Percesoces), and often extended to the

The gray mullet.

very different family *Mullidæ* or surmullets and to other fishes. Of the true mullets of the American Atlantic and Gulf waters, the striped mullet (*Mugil cephalus*) and the white mullet (*M. curema*) are small but esteemed food-fishes. The waters of the Old World abound in true mullets of many species. They often ascend rivers, and can be naturalized in fresh water. They are caught and cured extensively in Europe. The gray mullet (*M. capito*) is one of the best. The *Mullidæ* or surmullets are popularly called mullets, red mullets, etc. Of the typical genus, *Mullus*, there are several valuable marine food-fishes. *Mullus surmuletus* of Europe is the finest. The red mullet of the Gulf of Mexico (*Upeneus maculatus*) is an abundant fish, caught



The striped red mullet.

extensively for table use, but its flesh is not excellent. See FISHERIES.

Mullion: in architecture, a vertical bar or slender pillar dividing a window into two or more parts. In Gothic tracery the earliest mullions seem to have been slender columns, sometimes single and sometimes clustered. In the Geometric, Decorated, or Rayormant period (fourteenth century) these columnar mullions were of extraordinary slenderness and height; they soon, however, gave way to bar-mullions, mere slender bars molded to the profiles of the moldings of the arched heads of each division or light of the window. In the enormous windows of the English Perpendicular period the mullions were intersected by frequent horizontal bars or *transoms*. Long after mullioned windows had been given up in France, under the influence of the Renaissance, we find in the Elizabethan mansions of England vast square windows of many lights divided by simple vertical mullions with one or more transoms in the upper portion. The early Renaissance in Florence, Bologna, Venice, and Milan also shows examples of arched windows divided into two subordinate arched lights by a central colonnette of Corinthian type. Mullions of stone or wood are commonly used in large windows of modern buildings. See ARCHITECTURE. A. D. F. HAMLIN.

Müll'ner, AMADEUS GOTTFRIED ADOLF: dramatist; b. at Langendorf, Prussian Saxony, Oct. 18, 1774; studied law at Leipzig, and practiced from 1798 as an advocate at Weissenfels, where he died June 11, 1829. He wrote on juridical subjects, novels, dramas, and critical essays, and became famous as the author of the two tragedies *Februar 29* (1812) and *Die Schuld* (1816), both of which are notorious samples of the so-called *Schicksalstragödie*, a literary aberration at the beginning of the nineteenth century. In imitation of the misapprehended Greek tragedy, the writers of the *Schicksalstragödien* introduced "fate" (*Schicksal*) into their plot as an invisible power which arbitrarily determined the destiny of the characters of the play. The absurdity of this undertaking was effectually ridiculed by Platen in his classic parody *Die verhängnissvolle Gabel*.

Mulock, DINAH MARIA: See CRAIK.

Mulock, WILLIAM: See the Appendix.

Mulready, WILLIAM: landscape and genre painter; b. at Ennis, County Clare, Ireland, Apr. 30, 1786. He studied at the Royal Academy, London, where he first exhibited in 1803; was elected a Royal Academician 1816. His illustrations for *The Vicar of Wakefield* are among the best things of their kind in British art, and he painted several pictures from the same subjects. *Snow Scene* and *Seashore Scene* are in the National Gallery, London; *The Bathers* is in the National Gallery, Edinburgh. D. in London, July 7, 1863. W. A. C.

Multan': town of British India; in the Punjaub (see map of N. India, ref. 4–B). It is interesting on account of the surrounding ruins; is of much commercial and manufacturing importance; and its magnificent Hindu temple and the graves of two Mohammedan saints draw many pilgrims from all parts of India. Pop. (1891) 74,510. C. C. A.

Multiple Point [*multiple* is from Lat. *mul'tiplex*, manifold, many-fold; *mul'tus*, many + *-plex*, -fold. Cf. *plica're*, to fold]: a point at which a curve intersects itself. If the curve passes twice through the same point it is a *double* point; if *three* times, a *triple* point; and so on. It is a characteristic property of a multiple point that the first differential coefficient of the ordinate at that point has as many values as the number of times that the curve passes through the point. Thus the curve whose equation is $x^4+2ax^2y-ay^3=0$ has a triple point at the origin, at which point the first differential

coefficient of the ordinate has the three values, 0, $+\sqrt{2}$, and $-\sqrt{2}$. It may happen that two or more branches of a curve are tangent to each other at some point; this point is a species of multiple point, at which the corresponding differential coefficient of the ordinate has two or more equal values.

Multiple Proportion, Law of: See CHEMISTRY.

Multituberculata: an order of mammalia, appearing in the Triassic period and becoming extinct in the Eocene. They are characterized by having the incisor teeth much enlarged, and the molars with tubercular grinding surfaces and distinct roots. It is supposed by Cope that they were closely allied to the strange order of *Monotremata*, represented to-day by the duckbill and the spiny ant-eaters of Australasia.

Mum'mius: a Latin writer of the early empire who wrote *fabulæ Atellanæ*. Only a few fragments are extant. See Ribbeck, *Com. Rom. Frag.*, p. 273.

Mummius, LUCIUS, surnamed ACHAÏCUS: the conqueror of Greece and the destroyer of Corinth; was prætor in 154 B. C., and became consul in 146. The Achæan League was just running its mad course of wild, hazardous policy under the leadership of Critolaus and Diæus. Metellus had defeated the league several times, but had not been able to suppress it completely; perhaps he did not wish to suppress it. At the moment of Mummius's arrival in Greece the league had gathered an army on the isthmus of Corinth, but it proved very easy for Mummius to defeat and disperse it, and after the victory he entered Corinth, bent upon establishing an example which should deter other Greek cities from attempting resistance to the Roman supremacy. Many of the inhabitants had fled; the rest were either massacred or sold as slaves. The city was then pillaged and burned. Its enormous treasures of art and luxury were either sold to the King of Pergamos, carried to Rome, or ruined.

Mummy [from O. Fr. *mumie* (> Fr. *momie*), from Pers. and Arab. *mūmiyā*, mummy, deriv. of *mūm*, wax (used in embalming)]: an embalmed human or animal body, preserved dry, in semblance of its original shape, by artificial means. The Egyptian name was *sāḥu*. Mummying has been practiced by various peoples for a variety of reasons, mainly religious. The art was most developed in Egypt, where it had distinct connection with the very ancient belief in a future revivification of the body, a belief of whose existence we have monumental proof from the second dynasty, and one which took its rise in the conception of the nightly journey of Ra, the sun-god, in the nether world, and from the Osiris myth. At death the soul and body are separated, and, according to Egyptian belief, in order to the continued existence of the soul in its separate state and to its reconnection with the body, the latter must be preserved as nearly intact as possible (see KA), the idea apparently being that the bodily organs continued of service to the dead in the journey through Amenti, the region of the departed. Hence came the care bestowed upon the mummy and the provision against harm by placing it in hidden pits, pyramids, and other tombs. (See MASTABA.) The antiquity of the process is great (bodies impregnated with pitch having been preserved from the earliest dynasties), but its source is unknown. It is disputed whether it is Egyptian in its origin or whether it was brought from Asia by the original invaders, who are supposed to have come in by way of the Wadi Hammamat from Southern Arabia. In the earliest native burials the bodies were not mummified, and were placed in a sitting posture or in a contracted lying position. It is thought that these distinctions in mode correspond to a difference in race. (Cf. Petrie, *Medum*, p. 21.) What is known of the process is derived from observation and from the accounts of Herodotus (ii., 85), Diodorus (i., 91), and others. In the main these sources confirm each other.

Egyptian mummying was performed with more or less elaborateness, according to the wealth and position of the deceased. Diodorus speaks of three methods, which varied in price; the most expensive costing about $1,250, the second about $300, while the last was very cheap. Every particular in the process was accompanied with ceremonials, symbolic acts, or recitations, more or less elaborate according to the wealth or poverty of the dead. Many papyri are more or less devoted to these details. When mummification was completed the body was delivered to the friends, placed in its human-shaped coverings, cartonnages or sarcophagus, and transported to the west side of the Nile where, as a rule, the necropolis was located. The dead, meantime, had become an Osiris, received an Osiris-name, and had begun the career of the departed Egyptian. Cf. Maspero, *Études de mythologie et d'archéologie égyptiennes* (Paris, 1893, i., p. 283 ff.) See EMBALMING and RITUAL OF THE DEAD.

The literature of the subject is quite large, though scattered, but the best book on the entire subject is that of E. A. Wallis Budge of the British Museum, *The Mummy* (Cambridge, 1893). CHARLES R. GILLETT.

Mumps [probably derived from verb *to mump*, to mumble, be sulky, in allusion to the appearance of the patient; cf. *mumpish* and *mumps* in sense of the sulks. An Eng. dialectal word *mump*, lump, protuberance, may, however, also have aided in determining the use of the term]: an infectious and contagious disease, belonging to the same general class as measles, scarlatina, whooping-cough, etc., and characterized by an acute inflammation with enlargement of the parotid gland. In some localities, especially those with a moist and cold climate, it is very frequently seen (endemic). Children from seven to fourteen years of age, principally males, are most liable; adults, however, are not exempt. Its period of incubation, or preparatory development, lasts from one to three weeks; its chief symptoms are moderate fever; pain on pressure over the affected gland, in front of and below the ear, most frequently the left, sometimes the right and occasionally both sides; considerable swelling of that region and the whole cheek and chin; difficulty in mastication, deglutition, and respiration is in proportion to the amount of swelling; change of voice; fullness of the head and dizziness. In some cases the spleen and numerous other glands are also enlarged. In males the testicles and seminal glands, in females the ovaries and breasts, may also swell, and catarrh of the mucous membranes of the eyelids, nose, and mouth, is frequent. The duration of the disease is from a few days to a week. The swelling will gradually subside; in some cases, however, the gland may remain large and hard, and in a few an abscess will form. The treatment is simple, but should be under the guidance of a physician. It consists of regulation of diet—less meat, more milk, gruels, fruit, etc.; vegetable acids (lemonade), or dilute hydrochloric acid, ten to fifteen drops in a tumblerful of water as a beverage; mild purgatives, such as Rochelle salts, Seidlitz powder, or cream of tartar. Locally, it is best to use cold applications, reserving warm water or poultices for those cases in which an abscess is forming. Internal medication can generally be restricted to a mild antipyretic when indicated by excessive fever, and the iodides, should induration remain. In case of abscess, incision, free drainage, and antiseptic treatment are indicated. A. JACOBI and F. E. SONDERN.

Munch, PETER ANDREAS: historian; b. at Christiania, Norway, Dec. 15, 1810; studied law at the university of his native city, but at the same time gave a great deal of his time to the study of history and of Old Norse language and antiquities, a study he had begun while at school. Munch was, together with Rudolf Keyser, the founder of what is called the modern Norwegian historical school, and his historical writings are alike distinguished by critical acumen, thorough learning, and ingenious combination. Munch was in 1837 appointed an associate professor, and in 1841 Professor of History at the University of Christiania. He made several voyages abroad in order to study foreign archives and libraries, and from 1858 to 1861 lived in Rome, studying the papal archives, to which he gained an access that rarely has been granted to non-Catholics. His principal work is *Det norske Folks Historie* (History of the Norwegian People, in 8 vols., Christiania, 1852–63), treating of Norwegian history until the Calmar Union. Munch published a great many works of a linguistic nature (Old Norse Grammar, *Det Oldnorske Sprogs Grammatik*, by P. A. Munch and C. R. Unger, 1847; *Forn-Svenskans och Forn-norskans Språkbygnad*, Stockholm, 1849; *Det Gothiske Sprogs Formlære* 1848), and on historic and mythologic subjects (*Nordmændenes ældste Gude- og Helte-sagn*, 1854; new edition 1880). He also translated and edited several Old Norse sagas, including Snorri Sturluson's *Heimskringla* and *Odd*, the monk's *Saga of Olaf Trygvason*, and with C. R. Unger the *Saga of St. Olaf*, *Chronicon Regum Manniae*, *Speculum Regale* (1848), and the *Elder Edda* (1847). A complete collection of Munch's essays (*Samle de Afhandlinger*, 4 vols., Christiania, 1873–76), was edited by Dr. Gustav Storm. D. in Rome, May 25, 1863. P. GROTH.

Munch, Peter Andreas: poet; b. at Christiania, Norway, Oct. 19, 1811; studied law at the University of Christiania without finishing his course; was editor of a newspaper, *Den Constitutionelle* (1841–46); was in 1850 made assistant librarian of the university library, and in 1860 given a position as extraordinary lecturer in the university without obligation of lecturing. After 1860 he spent most of his time abroad, and from 1866 he had his residence in Copenhagen. Among his numerous writings may be mentioned *Sorg og Trøst* (Grief and Consolation, a collection of poems, 1852; 7th ed. 1891); *Salomon de Caus*, a lyric drama (1854; translated by John Chapman, London, 1855); *En Aften paa Giske*, an historical drama (1855); *Lord William Russell*, a tragedy (1857; translated by John Heyliger Burt, London, 1862, under the title *William and Rachel Russell*); *Kongedatterens Brudefart* (The Princess's Bridal Journey, twelve romanzas, 1861; 3d ed., illustrated, 1878); *Pigen fra Norge* (The Maid of Norway, a romance, 1861; translated by Mrs. Robert Birkbeck, London, 1877); *Jesu Billede* (The Picture of Jesus, a cycle of poems after a Roman legend, 1865; 6th ed. 1885). Munch translated into Norwegian several of Tennyson's poems, among them *Enoch Arden* (1866), and Walter Scott's *The Lady of the Lake* (1871). His romance *Brudefærden i Hardanger* (The Bridal Procession in Hardanger), after the famous picture by A. Tidemand and H. Gude, and with music by Halfdan Kjerulf, is one of the most popular of Norwegian songs. D. at Copenhagen, June 27, 1884. P. Groth.

Münchau'sen, Hieronymus Karl Friedrich, Baron von: romancer; b. of noble family at Bodenwerder, Hanover, in 1720; served in the Russian cavalry against the Turks 1737–39; died at Bodenwerder in 1797. The baron was throughout life accustomed to entertain his friends (in a singularly modest way and with an air of truthfulness) with wonderful tales of his exploits in the wars, and had the reputation of being the greatest liar in Germany. The first published collection of his stories appeared in English, and was written by Rudolph Erich Raspe, a German exile, and published in 1785 in Oxford under the title *Baron Munchhausen's Narrative of his Marvelous Travels and Campaigns in Russia.* This collection was translated into German in the following year by G. A. Bürger, the famous German poet, and with many additions has since then been printed very often as one of the most popular books. See introduction to the reprint by E. Griesebach (Stuttgart, 1890), and Carl Müller-Fraureuth, *Die deutschen Lügendichtungen bis auf Münchhausen* (Halle, 1881). Revised by Julius Goebel.

Münch-Bellinghausen, Eligius Franz Joseph, Baron von: dramatist; b. at Cracow, Apr. 2, 1806; studied law, and held different government offices in Vienna at the imperial library, the Burgtheater, etc. He is best known in German literature by his pseudonym of *Friedrich Halm.* In 1834 his first drama, *Griseldis*, was performed at the Burgtheater, and had a great success. Then followed in 1836 *The Adept*, in 1837 *Camoens*, in 1838 *Imelda Lambertazzi*, in 1843 *Der Sohn der Wildniss* (Ingomar), in 1844 *Sampiero*, in 1847 *Maria de Molina*, in 1854 *The Gladiator from Ravenna*, etc. The last-mentioned drama is his best work; his subsequent ones are rather weak. As a dramatist, he belongs to the school of Schiller. He was famous in his time, and several of his pieces have been translated into English. He treated extraordinary psychological problems in his dramas, and by using strong contrasts in the characters and situations produced powerful effects. He also wrote some lyrical poems of inferior quality. His collected works were published at Vienna in 8 vols. (1857–64). D. in Vienna, May 22, 1871. Revised by J. Goebel.

Muncie: city; capital of Delaware co., Ind. (for location of county, see map of Indiana, ref. 5–F); on the White river, and the Lake Erie and W., the Cleve., Cin., Chi. and St. L., and the Ft. W., Cin. and Louis. railways; 54 miles E. of Indianapolis, 110 miles N. W. of Cincinnati. It is in an agricultural region, and has important manufactures, including glass, nails, iron, steel, handles, pulp, and paper. It is also in the center of the great Indiana natural-gas belt, which gives the factories free fuel. There are electric lights, electric street-railway, public library (founded 1874) which contains over 10,000 volumes, 3 national banks with combined capital of $250,000, and 3 daily and 4 weekly newspapers. Pop. (1880) 5,219; (1890) 11,345; (1900) 20,942. Editor of "Morning News."

Muncy: borough; Lycoming co., Pa. (for location of county, see map of Pennsylvania, ref. 3–F); on the Susquehanna river, and the Phila. and Reading and the Penn. railways; 14 miles E. by S. of Williamsport. It is in an agricultural and lumbering region, and has flour, saw, and planing mills, French burr feed-mill factory, large woolen-mill, foundry, and machine-shops. Pop. (1880) 1,174; (1890) 1,295; (1900) 1,934.
Editor of "Luminary and Lycoming Co. Advertiser."

Mundé, Paul Fortunatus, M. D.: gynæcologist; b. at Dresden, Saxony, Sept. 7, 1846; was taken to the U. S. in 1849. He studied medicine at Yale and Harvard Medical Colleges, graduating M. D. from the latter in 1866; served as volunteer assistant surgeon in the war between Prussia and Austria in 1866; from 1867 to 1870 was resident physician in the Würzburg Maternity Hospital and assistant to Scanzoni; in 1870 was surgeon in the Bavarian army during the Franco-German war; settled in New York in 1872; is Professor of Gynæcology, New York Polyclinic, gynæcologist to several New York hospitals, and a fellow of numerous societies. He was editor of *The American Journal of Obstetrics* 1874–92. Among his writings are *Minor Surgical Gynæcology* (New York, 1880). He edited the sixth edition of Thomas's work on *Diseases of Women.*

Mundella, Anthony John, M. P.: British statesman; b. 1825 of Italian ancestry; engaged in business in Nottingham; was sheriff of Nottingham 1852; organized the first courts of arbitration for the settlement of trade disputes 1859; entered Parliament as a Liberal 1868; was vice-president of the council on education and charity commissioner 1880–85; president of the Board of Trade in the Gladstone ministry 1886 and again in 1892; resigned in 1894 under Lord Rosebery. D. in London, July 21, 1897. C. H. T.

Mundy, Johnson M.: See the Appendix.

Munger, Theodore Thornton, D. D.: clergyman and author; b. in Bainbridge, N. Y., Mar. 5, 1830; graduated at Yale College in 1851, and from the Yale Theological School in 1855; was pastor of Congregational churches at Dorchester, Mass., 1856–60, Haverhill 1862–70, and Lawrence 1871–75; was in San José, Cal., where he established a Congregational church, 1875–76; was pastor at North Adams, Mass., from 1877 to 1885, when he became pastor of the United Society (Congregational), New Haven, Conn. He has published *On the Threshold* (1884), which has been issued in numerous editions; *Lamps and Paths* (1885); *The Freedom of Faith* (1883); *The Appeal to Life* (1887); and numerous literary and theological essays in reviews and magazines. George P. Fisher.

Mun'go (Saint), or **Kentigern**: one of the three earliest missionaries who introduced Christianity into Scotland. While his associates, St. Columba and St. Ninian, devoted themselves respectively to the tribes of the south, west, and north, Mungo was the apostle of the Welsh or British races inhabiting the districts between the Clyde and the northern boundaries of Cumberland. The son of a British prince, he was born at Culross, on the Forth, about 518, and died at a monastery he had founded on the site of the cathedral of the modern Glasgow, Jan. 13, 603. Many miracles were ascribed to him, and numerous fabulous biographies are preserved. See Forbes, *Historians of Scotland*, vol. v.
Revised by S. M. Jackson.

Mungoos [the native name; variously written mongoos, mongoose, or mungoose]: a carnivorous mammal of India (*Herpestes griseus*) belonging to the family *Viverridæ*, and related to the African Ichneumon (*q. v.*). It is about the size of a cat, but is lower and longer bodied. The tail is long, hair harsh, of a gray color, with blackish markings. In India the mungoos is domesticated, and kept about houses to free them of rats, and, above all, to kill venomous serpents. It is popularly believed to eat some plant which renders it poison-proof, but really owes its immunity to its quickness. F. A. Lucas.

Mŭng-Tse, or **Mêng-Tse**: See Mencius.

Mu'nich (Germ. *München*): capital of Bavaria; on the Isar, here crossed by three bridges; 1,868 feet above the sea, at the southern extremity of an extensive plain (see map of German Empire, ref. 7–F). The city proper is situated on the left bank of the Isar; only some suburbs extend along the right bank. In architectural respects it is the most beautiful and interesting city in Germany, and one of the richest in sculptures and paintings. Nearly in the center of the city, on the Max Joseph Place, which contains the bronze statue of King Max (1825) by Rauch, is the royal palace, consisting of three parts—the king's house, the ban-

queting-house, and the old residence. The king's house was built by Klenze 1826–35, and is an imitation of the Palazzo Pitti in Florence. Its interior is very rich in marbles and frescoes, among which are the celebrated Nibelungen frescoes by Schnorr. The banqueting-house was built 1832–42 in Renaissance style, and has a large balcony resting on ten Ionic columns. The old residence was built at different periods, and contains many beautiful bronze statues. The palace is connected by a winter garden with the theater, which has seats for 2,500 persons. On the other side of the palace is the royal garden, surrounded on two sides by arcades, which are connected with the banqueting-house. On the southern side of the Max Joseph Place stands the post-office, in Florentine style. The so-called generals' hall, an imitation of the Loggia dei Lanzi in Florence, was built in 1844. From this building begins the Ludwig Street, running northward, terminating at the Siegesthor (Gate of Victory). On it are the Odeon, built in 1828; the palaces of the Duke of Leuchtenberg and of Duke Max; the ministry of war; the library, built 1832–43 in Florentine style, and containing 950,000 volumes and 25,000 MSS.; the university, with 3,292 students in 1892, the seminary, and the Max Joseph School, which three buildings, built in 1840, form a large square. The Siegesthor, an imitation of the triumphal arch of Constantine at Rome, was finished in 1856. Starting from the royal palace to the N. W., and passing by the Theatiner church, built 1661–75 in Italian rococo style, one reaches the Wittelsbacher Place. It contains the equestrian statue of the Elector Maximilian I. by Thorwaldsen, and the Wittelsbacher palace (finished 1850), in mediæval style, with pointed arches. At the end of the Brienner Street is the Propylæum, built in imitation of the Propylæum of Athens, with reliefs by Schwanthaler. On this side of the gate is the Kunstausstellungsgebäude; to the right, the celebrated Glyptothek, built 1816–30 in Ionic style, with a portico resting on twelve columns, and a magnificent tympanum; the building contains twelve rooms filled with marbles, chiefly antique. Near by are an establishment for painting on glass and the famous Pinakothek. The old Pinakothek, built 1826–36, in Renaissance style, is 520 feet long, and contains 1,300 pictures, arranged in thirty-two rooms. The ground floor is occupied by a collection of engravings, containing about 300,000 pieces, a collection of drawings, numbering about 9,000, and a collection of Grecian and Etruscan vases. To the W. of this building is the Polytechnicum, a structure in rich Renaissance style, and to the E. the new Pinakothek, built 1846–53, which contains pictures by modern artists. Other noteworthy buildings are the bronze-foundry, with a collection of models and an exposition-room; the Schwanthaler Museum, containing nearly all the plaster models by this artist; the Academy of Science and Art, with an immense collection of fossils, a collection of minerals, of coins, of physical and optical instruments, etc. To the S. W. of the city, near the Karl Gate, stands the Hall of Fame, built in the form of a horseshoe, with forty-eight Doric columns, and finished in 1853 after a plan by Klenze. It contains the busts of eighty renowned Bavarians. In front of the buildings stands a colossal figure of Bavaria, 66 feet high, modeled by Schwanthaler. A beautiful view toward the Alps can be had from the interior of the head.

The principal churches are the Frauenkirche, Gothic in style, built in the fifteenth century, the metropolitan church of the Archbishop of München-Freysing; St. Michael's Hofkirche, built in the latter part of the sixteenth century, in Roman Renaissance style; the Auerkirche, built 1831–39 in Gothic style, with beautifully painted windows; the Basilica des heiligen Bonifacius, an excellent imitation of the old Italian basilica, finished in 1850, with sixty-six columns, beautiful frescoes, and thirty-four medallion portraits of popes. Here is the tomb of Ludwig I. (Ludwigskirche), built 1829–43, by Gärtner in the Italian round-arch style. Over the portal stand Christ and the apostles by Schwanthaler; the interior contains beautiful frescoes by Cornelius and his disciples. The Allerheiligenkirche or Neu Hofkapelle, E. of the royal palace, was built in 1837 in Byzantine style, and is a very elegant though small structure. The Protestantische Kirche was built 1827–32.

The city is generally well laid out, and has broad streets and many large public squares. It has grown rapidly: in 1801 it had but 40,000 inhabitants. The Academy of Fine Arts, comprising three divisions—architecture, sculpture, and painting—and under the leadership of able men, attracts steadily a great number of students. The same is the case with the Conservatory of Music. The city occupies also a high rank in science. There are many scientific associations, good educational and numerous benevolent institutions. The manufacturing industry includes the bronze-foundries, the porcelain-manufactures at Nymphenburg, the glass-painting establishments, all founded by the Government; also the optical institute founded by Fraunhofer, and manufactures of mathematical instruments, machinery, fire-arms, cotton, and silver. The breweries are very extensive. Grain is the principal article of commerce.

The city first appears in history in the twelfth century; in 1254 it was fortified, and from Emperor Ludwig of Bavaria it received many privileges. In 1632 Gustavus Adolphus of Sweden entered it victoriously. The Elector Karl Theodor improved the fortifications at the end of the eighteenth century. In 1800 it was captured by the French. In 1814 King Maximilian I. began the rebuilding and beautifying, which were continued by Ludwig I. and Maximilian II. The population in 1890 was 349,024; in (1900) 499,959.

Municipal Assessments: See the Appendix.

Municipal Corporations [*municipal* from Lat. *municipa'lis*, deriv. of *munici'pium*, a town having free local government and Roman citizenship]: corporations formed from the members of a city, town, or other community for purposes of local self-government. Public corporations, that is corporations formed for governmental or political purposes, may be divided into *quasi* municipal corporations and municipal corporations proper. The distinction between the two is important, inasmuch as the duties and powers of the latter are much broader than those of the former. Among the *quasi* municipal corporations are embraced such local governmental bodies as counties, towns, and school districts—bodies with extremely narrow powers, and formed generally for the purpose of administering in the localities affairs of general concern and importance. Among municipal corporations are embraced cities and villages which are formed primarily and almost exclusively for the purpose of administering the affairs affecting the particular districts in which such corporations are found. While almost all governmental districts possessing in any important degree the privileges of local self-government are at the same time municipal corporations, it is to be borne in mind that the incorporation of a place is, or at least was, not originally necessary in order that it possess rights of local self-government. Thus the English boroughs at a very early time received charters which assured to them certain governmental privileges, but they were not incorporated until about the middle of the fifteenth century. The first charter of incorporation in England is said to be that given to Kingston-upon-Hull, granted in 1429. From that time on charters of incorporation were granted with great freedom until most of the boroughs of any size became at the same time municipal corporations. The other divisions of the country, such as the counties and the parishes, did not become corporations until very much later. Indeed, the counties of England did not become incorporated until the passage of the Local Government Act of 1888. When municipal boroughs were first incorporated it was not the locality nor the inhabitants that formed the corporations thus created, but the most important individuals, generally members of the governmental body of the borough, i. e. the council, though sometimes the freemen were included. This idea has, with the more democratic character of municipal government, been abandoned, until now, in both the United Kingdom and the U. S., the corporation formed by the grant to a municipal borough or city of a charter of incorporation is not to be found in the officers or a narrow body of freemen, but in all the inhabitants residing within the municipal district.

While the original purpose of granting to municipal boroughs charters of incorporation was to enable them to act as subjects of private law, and thus to hold property and be capable of enforcing obligations contracted with them and of being forced by the courts to fulfill obligations which they had contracted, still most of the important municipal boroughs which were thus incorporated were at the same time governmental agencies as well. For example, the councils of almost all of the important municipal boroughs had under their direction and control the local police force. Further, in almost all cases a commission of the peace was issued to the individuals composing the council, who acted thus also as justices of the peace. The larger cities had also a special court of quarter sessions. In this way the more important municipal boroughs were

agents of the central government both for the purpose of the administration of justice and for the purpose of the administration of the police force. On account, however, of the degeneration of the boroughs and of their prostitution for purposes of central politics, which began during the period of the Stuarts in the interest of the king, and was continued after the revolution of 1688 in the interest of the great political parties from that time on controlled by the nobility, it was felt to be inexpedient to confer upon the municipal organization any of the other administrative duties which the Government had to assume as a result of the development of the kingdom. Thus when the suppression of the monasteries made necessary a system of administering poor relief, this branch of administration was conferred upon the parish organization which extended through the urban as well as through the rural districts. Later on also, when the administration of education became a governmental matter, and the municipal borough was made the urban school district, a school board was provided separate and apart from the municipal organization proper for the purpose of attending to the schools. In the same way when it became necessary to light and pave the streets, these matters were put into the hands either of the parishes or of special commissions or trusts formed by special acts of Parliament and not a part of the borough organization. The result is that the English borough was at the time of the formation of municipalities in the U. S., and is even at present, an organization mainly for the satisfaction of local needs, with very few functions of general government to discharge.

Naturally this was the conception of the sphere of activity of municipalities in the U. S. at the time municipalities began to develop; but as a result of their better organization in the U. S. during the colonial period they very soon came to be regarded not merely as organizations for the satisfaction of local needs, but also as important agents of the central government. While during the very early colonial period municipalities were considered to be so much private in character as not to be capable of possessing the power of taxation, with the development of their capacity as agents of central government the power of taxation—a distinctively public power—was granted them in order to enable them to discharge their public functions. Not only has this power been very generally granted to the cities, but the city itself, when of large size, is often made the agent of the State administration for the assessment and collection of central taxes; and in many other cases the city officers attend to certain matters of general interest, and the expense of a long series of matters which may not be attended to directly by city officials has devolved upon the city. In the U. S. in most of the large cities municipal officers, either elected by the people of the city or appointed by the municipal authorities, are intrusted with the care of the public health, the schools, and the support of the poor, attend to police and election matters, and have a series of duties to perform relative to the administration of judicial affairs. This gradual development of the city from an organization for the satisfaction of purely local needs into an agent of the central State government has resulted in an assertion by the latter of very much greater powers of control over the city than were exercised over the English borough. This control has been extended not only to those matters where the city acts as an agent of central government, but also to matters of purely local concern. Cities in the U. S. have as a result largely lost the power of regulating their own purely municipal affairs. As no city may exercise any power which the Legislature has not granted to it, and as the Legislature in the U. S. has generally been very niggardly in its grants of power to cities, every city which does not find a power that it desires to exercise contained in the charter or laws regulating its government is obliged to apply to the Legislature for a special grant of power. The result has been a continual interference by the legislatures of the States with the affairs of cities, an interference which has had so much of evil result that a majority of the States of the Union have prohibited the Legislature from interfering by such special act with the affairs of municipal corporations. It must be confessed, however, that the courts have felt obliged, on account of the difficulty of regulating at one time and by general law all the matters in which a city should exercise power, to allow the Legislature considerable freedom of interference in local concerns, notwithstanding the constitutional provisions mentioned.

At the same time that the position of the city has been changing there has been a corresponding change in the organization of city government. The original governing body of the municipal borough in both England and the U. S. was the council, in which all powers were centered. As a result, no doubt, of the more important functions which have been conferred by law upon municipal corporations in the U. S., there has been felt a need of more clearly defining the responsibility for the administration of city government, and the council has been split up. The judicial functions have generally been assumed by State officers, namely, the judges of the courts, the justices of the peace, and police magistrates. The executive functions have been conferred upon the mayor, who has been separated from and made independent of the council, and by executive officers who have been provided by statute; and the functions of deliberation have been retained by what was left of the council. This separation of functions began in the latter part of the eighteenth century or the beginning of the nineteenth. The modern tendency has been to increase more and more the powers of the mayor, conferring upon him almost all powers of appointment and removal. This is particularly true of the large municipal corporations of the U. S.

This increasingly public character of municipal corporations has had an influence not only upon its public legal, but also upon its private legal relations. Inasmuch as the private legal relations into which a municipal corporation enters result for the most part either in the formation of contracts or in the commission of torts, we may consider its private legal capacity under the two headings of contracts and torts. So far as contracts are concerned, all that need be said is that, like all corporations, municipal corporations may enter into only those contracts which their charters or the laws by which they are governed permit them to enter, and they must form such contracts only in the way in which the law has permitted them to act, and any excess of powers or deviation from the methods provided by law will result in their contracts being void and of no effect. When we come to consider the law of torts relative to municipal corporations, too much emphasis can not be laid upon the dual position which these bodies occupy. In so far as they may be regarded as organizations for the satisfaction of purely local and municipal needs, they are assimilated to private corporations, and their negligence in the performance of their duties, or their non-observance of the rights of others in the exercise of these duties, will result in a legal liability of much the same character as results in a similar case from the action of private individuals or private corporations; for whatever may have been the original rule—and there is some dispute as to this—as to their liability for torts, no rule of law is better settled than that the municipal corporation is liable for all damages caused by the negligent performance of these private and purely local or municipal duties. When, however, we come to consider the municipality as a governmental agent, the position which the government occupies in this respect must be borne in mind. The law has always been reluctant to recognize any liability on the part of the government for torts committed by its officers. This has been due to motives of public policy, to the fear that the action of the government would be paralyzed were it to be responsible for all incidental damages which might result from an exercise of its purely governmental and sovereign powers. The same rule has been applied to municipal corporations in that they are exempt from all liability for negligence in the performance of their governmental duties. The tendency is, however, to recognize a liability for the mismanagement of their property, whether such property is employed in the performance of a public or a private duty; this tendency has not been so marked as to justify the statement of the rule that in so far as they manage property they are not exempt from liability for negligence; but it will undoubtedly be the means by which the liability of municipal corporations will be extended in the future.

FRANK J. GOODNOW.

Municipal Government: the government of cities and towns. The rise of modern industry, with its use of steam and electricity, its development of the factory system in place of old-time handicrafts and household industries, and its adoption of such agents of expanding commerce as the railway and the steamship, has not only given an enormous stimulus to the growth of population, but has also tended to mass population in towns and cities. While agricultural production has vastly increased, the increase is due to the opening up of new areas rather than to any increase in the

density of the farming population, and in the thoroughness and intensity of manual labor as applied to the soil. In fact, the invention and use of labor-saving machinery in the operations of agriculture have, especially in the U. S., materially lessened the number of people who can advantageously be employed in the tillage of a given area. The consequence has been, as shown by successive national and State census reports, a steady falling off in the population of strictly rural communities, this decline being exhibited since 1875 in Iowa and Minnesota, as well as in States E. of the Mississippi river. In Scotland, England, France, and Germany, the strictly rural population has been either declining or at an absolute standstill for several decades. In Scotland and France a sharp decline has been visible, while an apparent slight gain in England and Germany has in fact been due to the encroachment of industrial and urban conditions upon the village life of farming districts, rather than to any increase in the number of people living a distinctly rural life. The growth of U. S. cities has been at an enormous rate of increase; but the growth of English, Scotch, and German cities has been at a pace almost as great. It may simply be said that about three-fourths of the people of England and Scotland are now living under the conditions that belong to urban life, and that in the older parts of the U. S. the town dwellers outnumber the country dwellers. The urban impulse is comparatively new in Germany, but is at the same time very strong. The French people are less mobile, yet their great towns are growing with considerable rapidity, while the national population as a whole is barely maintaining its volume.

When the modern urban movement began to exhibit strong tendencies in Great Britain, the old traditional town life was very simple. The functions of the municipal corporations described in MUNICIPAL CORPORATIONS (*q. v.*) were not very numerous, and did not require the expenditure of large sums of money; but the rise of modern industrial towns made necessary a wholly new *régime* of municipal life. It was discovered that the comfort and happiness of a rapidly increasing proportion of the population demanded the exercise of a new series of public functions. It was not enough that the police departments and local courts of justice—performing the negative function of preserving order and punishing misdemeanors—should be strengthened, but it became necessary to meet with the assumption of positive municipal functions the supply of various common necessities. There poured into the manufacturing towns a great access of population from villages and country districts, and these factory-workers were huddled into crowded and ill-constructed tenements under conditions that were deleterious and demoralizing in every respect. Much space would be required to describe the recurring epidemics and the varied evils consequent upon the aggregation of town populations without what we now term municipal improvements. The first great step in England toward the adaptation of municipal life to the needs of growing communities was taken in the reform of the organization of the town or borough corporations. These had, for the most part, fallen into the hands of self-perpetuating groups of men who exercised under mediæval charters the proscriptive and traditional authority of the municipal government. By the reform acts which were passed in 1833 for Scotch cities, in 1835 for English, and in 1840 for Irish, these old corporations were reconstructed, and municipal government was placed in the hands of the householders. The poorest class was excluded, but subsequent laws have removed disqualifications until every family now has its vote. Authority is exercised by a common council, which is nothing more nor less than a large committee of the voting population. The organization of the English municipal corporation is very simple. The electors have only to choose councilors, one each year from each ward, the most usual number of wards in the larger towns being sixteen. The term is three years, and one-third therefore of the council retires annually. The council elects the mayor, usually from its own number. It also adds to its body a number of so-called aldermen, equal to one-third of the elected councilors. The aldermen, in fact, are usually appointed from the councilors who have served longest, and their selection leaves vacancies to be filled by special ward elections. All the working departments of the municipal administration are manned by expert chiefs appointed by the council, holding their places upon a tenure that is practically permanent. The council through its standing committees supervises the various branches of the city government. The mayor is merely the council's presiding officer and most important member. He is elected for a single year and has no appointing power or special authority, all control of municipal affairs being vested in the council. The town-clerk, who is the legal representative and the archive keeper, is the most indispensable functionary of an English municipality. Like the other officials, he is an appointee of the council. Some differences in nomenclature distinguish municipal government in Scotland, but in all essential matters it is the same as the English system. As civilization has advanced and science has led the way, these simple representative city governments of England and Scotland have enormously increased their activities in behalf of the common wants of the population. They have spent great sums upon the introduction of adequate municipal water-supplies, and have in many instances established municipal gas and electric works which not only furnish ample and cheap illumination of streets and public places, but also furnish light to private consumers at reasonable prices. They have constructed great drainage and sewer systems, with which the plumbing of all houses is obliged to connect. They have established public abattoirs and suppressed private slaughter-houses, have erected produce-markets, and brought all food-supplies under strict municipal sanitary inspection. They have entered upon great projects for the demolition of unsanitary tenement-houses, have adopted stringent regulations guarding against further imperfect building, and have devised methods of sanitary visitation for the prompt suppression of nuisances of every class, and for the immediate isolation, in great municipal epidemic hospitals, of cases of infectious diseases. Through these and kindred measures they have greatly lowered the death-rate, and have reduced to small proportions the ravages of those diseases that are spread by infection and that are amenable to sanitary control. Great reforms for the convenience of traffic and for the better admission of air and light have been made by the reconstruction of street systems and by the retention of open spaces. Commendable activity has also been shown in the acquisition of parks and public pleasure-grounds. The health and comfort of the people have been promoted in many of these places by the establishment of public baths, while in several of them there are public laundries and wash-houses patronized by the housewives in the tenement districts. Public libraries and reading-rooms under municipal auspices have become frequent, as also have public halls and assembly-rooms. In many of the English and Scotch cities the street-railways have been constructed and are owned by the municipality itself, although it is the common practice to lease them to a private company for operation. The great city of Glasgow has now assumed the direct operation of its street-railways, and several of the smaller English cities have entered upon the same policy. The metropolis of London, under the Local Government Act of 1888, became an administrative county governed by an elected council of citizens; and since that time it has entered upon a policy for the promotion of the welfare of its great population that is similar in scope to that described as common to the industrial and manufacturing cities, such as Birmingham, Manchester, Glasgow, Sheffield, Leeds, and scores of other places.

Municipal government in France under existing forms is the outgrowth of the French Revolution. The laws of France—as also those of Italy and Belgium, which are historically and practically modeled upon the French system—have grown out of the great reforms instituted as a result of the French Revolution. All France is divided into communes. The principle of communal government is the same for the smallest country township as for the largest cities. Except as the general Government through the Department of the Interior exercises some discretionary power and takes occasional steps of interference, the communes are little republics. Universal manhood suffrage prevails, and the voters of each commune elect from time to time a certain number of members of the communal or municipal council. The size of the council varies according to the population of the commune, a sliding scale having been established in the general code for the government of communes and municipalities. The municipal or communal council appoints the mayor from its own number, and the mayor in turn selects a certain number of councilors to be his coadjutors and to act as a standing executive committee. The mayor and this committee are known as the *corps législatif*. Each member of the standing committee is given the supervision of some department of the municipal administration, and acts in the capacity of the chairman of a committee having charge,

let us say, of water-supply, or police, or some other branch of the local administration. The *corps législatif* holds frequent sessions, and the whole business of administering the affairs of the municipality comes under the direction of the mayor. The full council meets less frequently, but goes very exhaustively into reports from the mayor and executive corps, makes all the by-laws and regulations for the government of the commune or municipality, passes upon the levy of local taxes, and votes in detail the amounts to be expended for various purposes. This plan of municipal government, with some differences of detail, may be said to belong to all the Latin countries of Europe. It works effectively, and has shown its capability of bearing an unlimited expansion of local functions and undertakings. Thus of late years in Italy enormous physical reconstructions and public works of supply and improvement have been undertaken, and faithfully and ably carried out by the municipal councils, with their *sindaco*, as the mayor is called, and their group of experienced members selected as the executive corps.

In Germany municipal government as a sort of community-housekeeping has developed in many respects a higher state of perfection than anywhere else. The structure of municipal government in Prussia grows out of the general system of administration that dates from the reforms of Stein and Hardenburg early in the nineteenth century. Circumstances that were dominant at that time made it possible for property interests to retain a degree of special representation in government that English and French political reforms would not admit. The franchise, both for national and for local and municipal purposes, was based upon a three-class system which made taxation the measure of representation. The handful of men who stood highest on the tax-roll and paid one-third of the taxes were allowed to exercise as much authority at the polls as the great mass of workingmen whose names stood at the other end of the tax list, and who, in the aggregate, also paid one-third of the direct taxes. A middle class, paying the second third of the total sum raised by direct taxation, also exercised a like share of political authority. This system was not respected in the establishment of the present German empire, and simple manhood suffrage is the basis of the electorate that is represented in the imperial Reichstag; but in the government of Prussia and of Prussian municipalities the three-class system still prevails. It also exists in some other parts of Germany, though not in all. The body in which the authority of municipal government is reposed is the *Gemeinderath*, or common council. It is elected by the body of electors, or *Wahlmänner*, of which the three classes of voters have each selected one-third. The common council in a German town is elected for six years, one-third of the membership retiring every two years. The executive work is performed by a burgomaster, or mayor, and the body of department chiefs, known as the magistrates. The mayor is selected by the common council, and so are the high department chiefs, or magistrates, and these functionaries, the mayor included, have what is practically a life tenure upon their positions. In some cases they are appointed expressly for life or good behavior, while in other cases they have twelve-year terms with the practical assurance of reappointment. They are selected for expert knowledge, and administrative experience and ability. They constitute, with the burgomaster, what is known as the *Magistratsrath*, and they hold frequent conferences together upon some such plan as that already described in the account of the executive corps of the municipalities of Latin countries. Some of the magistrates are highly salaried, while another element of the body is composed of distinguished citizens who serve without pay, and who regard the office as an honor and the opportunity to serve their fellow citizens an agreeable public duty. This body often includes men who have been brought from other cities on account of their special ability, and the burgomaster himself is frequently selected on the strength of the good service he has rendered in a like capacity to some smaller city. The law department, the treasury department, the public-health department, and the educational department, also those of water-supply, gas-supply, streets and paving, architecture and building, care of the poor, property assessment, and various others, are all presided over by some member of the executive magistracy selected on account of his special attainments and qualifications. The minor positions in the official service of a German city are filled under rules and regulations which give protection against arbitrary removal, and it is easy for the cities to secure an abundant supply of expert and highly trained civil servants.

The German cities are run upon excellent business principles, and it is considered their function to undertake anything that will promote the wellbeing of the community, provided the undertaking will not involve a heavy burden of taxation without affording any compensatory relief. Thus magnificent water-supplies are the rule in German cities, but they are managed in such a way that while furnishing the citizens with good water at moderate charge the works are made to pay the expenses of management, all interest charges upon the cost of the plant, an ample fund for maintenance and for the accumulation of a sinking fund to meet bonded indebtedness as it falls due, and finally to pay over a clean profit into the city treasury to lighten the tax-rate. The gas-supply in Germany in like manner is, as a rule, provided by the municipal authorities as a profitable undertaking. Many of the German cities are establishing electric-light plants on similar business principles. Great markets and abattoirs are the rule in these German cities, and they are made self-supporting. The German towns have awakened greatly to the necessity of sanitary reforms in every direction, and they have applied scientific knowledge to the problems of the public health with a thoroughness nowhere else equaled. All great German towns maintain well-equipped chemical and bacteriological laboratories, which are constantly testing the character of the water-supply, and examining food that is offered for the consumption of the masses. Street-paving and public works of various kinds are prosecuted with a thoroughness that has given great reputation to German municipal administration. The street-cleansing service also excites the admiration of American visitors. It is the universal policy to maintain municipal savings-banks and pawnshops, so conducted as greatly to encourage thrift and to lessen the hardship of sudden misfortune. In nothing is German municipal administration more successful than in its system for the relief of the poor and the distribution of public charity. Under the executive magistrate who has oversight of that department there is a large central committee, upon which members of the council and non-official citizens are asked to serve. There is a subdivision of the city into main districts, and then into minute ones for the organization of relief. Small districts contain perhaps two or three hundred families each, sometimes including not more than two or three large tenement-buildings. For each of these districts a visitor is selected, whose responsible and upright character has commended him to the attention of the central authorities. Every citizen thus appointed is expected to serve. It is considered an honor and a serious public duty, and refusal to accept without good excuse would involve penalties under the law. The visitor becomes the good angel of his little district, knows all the families, and can not well be imposed upon. The families in turn know to whom they must first appeal in case of need. The visitor has at his call a physician, whose duty it is to render prompt medical relief. Each visitor must make frequent and regular report of every case of need that arises in his neighborhood, and every case of duplication or fraud is thus easily traced and exposed. The German municipalities are, either on their own account or as agents of the general Government, entering upon the policy of insuring workingmen against illness, accident, and the peril of an impoverished old age. These communities have shown themselves by far the most enlightened in the world in their methods of dealing with poverty, and have succeeded as no other modern communities have done in reducing city life to a system in which each individual and each family has its place as in a great household. The direct application of municipal energy to the task of providing a kind of education for children which would at once fit them for life under existing conditions, and enable them to enter advantageously into the industrial life of their own particular community, has been carried further in the German cities than anywhere else, with the possible exception of Paris. Not only is ordinary elementary education universal and compulsory, but the cities provide much manual, trade, and commercial instruction, and, through the universally established system of gymnastic drill, make provision for physical development.

The typical modern city is not to be sought in Western Europe or America alone, but may be studied to excellent advantage in the two capitals of the Austrian-Hungarian empire, Vienna and Budapest. These splendid cities have established admirable systems of municipal government, under which they have been marvelously reconstructed,

transformed, and adorned, and under which also the health and comfort of the population has been cared for no less than the externalities of fine architecture, broad boulevards, and ornate pleasure-grounds. The most recent tendency of large cities in all countries is that of a decline of population in their central wards and districts, and a vast development of less densely housed population in the suburbs. This new disposition to a readjustment of urban populations over a greater area is due principally to the rapid increase of transit facilities, by which for a small price a great host of people may be carried from business at the core of a town to homes on the circumference. Thus the multiplication of workingmen's low-fare trains and other facilities in London is fast depopulating the inner city; and a little area of 1 sq. mile, in whose busy streets and shops 1,000,000 people are engaged during the working hours, now shelters less than 50,000 at night. Of London, Paris, Berlin, Vienna, New York, and perhaps also of Philadelphia and Chicago, it may be said in a general way that there is a central population of approximately 1,000,000 people which for a considerable period of years has remained practically stationary, and which is now tending to a slight decline. All further growth of population attributed to these cities belongs to the portions lying beyond the inner wards which contain the one-million nucleus. If a still smaller nucleus of 200,000 or 300,000 is sought, one discovers that the enormous central districts show substantial declines. Thus the question of the disappearance of the slums is, under natural and healthful circumstances of evolution, tending to settle itself. Some intelligent and vigorous effort to assist these natural and wholesome tendencies can, however, greatly quicken the results that are desired. In Great Britain municipal governments, under a series of so-called "workingmen's dwellings acts" and "housing-of-the-people acts," are condemning and destroying the most objectionable tenement rookeries, and providing here and there in the crowded districts for small parks, playgrounds, and open spaces. They are also perceiving that prevention is better than cure, and that stringent regulation of new buildings may in the course of one or two generations result in a vastly improved housing for the population of an entire great city.

In the U. S. the problem of adjusting town conditions to the convenience and welfare of large masses of population has come into prominence more recently than in Europe, because in the U. S. the life of the farming districts and of country towns has until lately been the characteristic and prevailing system. The development of large towns since the civil war has led to much scandal in municipal administration and has brought some reproach upon the institutions of the country. It may be said for the large cities and towns of the U. S. that they have shown enterprise in the management of certain departments, such as the water-supply, the fire-extinguishing service, the provision of common schools, the creation of parks, and, in many cases at least, the establishment of public libraries. The chief difficulty of municipal government has grown out of a lack of adaptation of the municipal framework to the accumulation of business which modern civilization makes incumbent upon the ruling authorities of a large town. A hopeful period of reform has been entered upon, and simplicity and unity begin to take the place of an antiquated system of disconnected boards, commissionerships, trusteeships, separately elected mayors, and aldermanic groups, or common councils stripped of adequate authority, and therefore unable to command the membership of the best-qualified citizens. In the U. S. the policy has been to confer street-railway franchises and gas and electric franchises upon private companies, and the negotiations between these companies and the municipal bodies having power to grant franchises has been a constant source of scandal and corruption. The frequent interference of State Legislatures in the affairs of the cities has also made impossible any stability of municipal methods or any proper development of local responsibility. The municipal-reform movement has been based more than anything else upon the principle of local home rule for municipalities, in order that the people who pay the costs, bear the ills, and enjoy the advantages of any given municipal administration may exercise authority under a charter which shall not limit them unduly, and which shall guarantee them against outside intervention in matters of detail. The taxes collected for the maintenance of municipal government and local institutions in all civilized countries have lately grown to formidable proportions; and in the U. S. as well as in some European countries they constitute very much more than half of all the taxation levied for all purposes upon the taxpayer; but the citizen receives in return a series of services which are as essential to his health, comfort, and happiness as are the necessities of life which he procures through his private expenditures. Municipal indebtedness everywhere tends to assume large dimensions; but most of it has resulted from a tangible and commendable investment in public works which, either directly or indirectly, give ample pecuniary return. The fear, therefore, lest the rapid growth of modern municipal expenditure and the formidable development of municipal indebtedness may be leading on to disaster, or even bankruptcy, is not well founded. All municipal improvements essential to the health and general well-being of the community are to be considered as a co-operative investment which must result advantageously.

ALBERT SHAW.

Municipality: See the Appendix.

Municipal Law of England and the U. S. The municipal or national law of England has assumed its present form after a practically uninterrupted development of fourteen centuries. Although it has been largely influenced by Roman law, civil and canon, it is essentially, in its character as in its origin, a Teutonic system. Carried by English colonists to all quarters of the globe, it divides with Roman law the rule of the modern civilized world.

Anglo-Saxon Law.—During the first five centuries of the Christian era Britain was governed by Roman imperial law; but this law, like the rest of Roman civilization, was swept away by the heathen hordes from the coast of the North Sea, who invaded and conquered the island. English law began as "a slip of German law planted in England" (Maitland). It consisted at first of numerous bodies of tribal custom, varying in details, similar in essentials. The so-called "laws" or "dooms" issued by Kentish, Wessex, and English kings and their *witan* from the seventh to the eleventh century, and even those published by the Danish conqueror Canute, are simply statements of Anglo-Saxon custom. Like the contemporaneous "folk-laws" of continental Germany, these dooms consist mainly of provisions for the punishment of breaches of the peace and tariffs of penalties for private wrongs. After the conversion of the English to Christianity the Church exercised a certain humanizing influence upon the law—an influence which was more considerable in the eighth and ninth centuries than in the tenth and eleventh. The Church also introduced its own law of marriage, and familiarized the English with the use of deeds and testaments; but even in these matters its innovations were adapted to the national ideas and customs.

Norman Law.—The system of law which Rolf and his Norse followers found in Northern France when they conquered and colonized that region, the system which they accepted and perpetuated in their duchy of Normandy, and which William the Conqueror and his men carried with them to England, was also a transplanted slip of German law, viz., the law of the Franks; but through the legislative reforms of the Frankish kings and emperors, and in the practice of the Frankish courts, the law of the Franks had reached a higher stage of development than the closely related law of Saxon England. The Norman conquest of England brought these two systems face to face. The English, as the Conqueror had promised them, lived by their own law; the Normans by Norman law; the relations between the two races were ordered by special provisions. These special provisions, of course, were framed in a Norman spirit; and it was equally a matter of course that the Anglo-Saxon law, where it was still applicable, suffered at the hands of the unsympathetic Norman officials who had to apply it; but the fact that the Anglo-Saxon law was gradually superseded by the Norman was not due solely or even mainly to the conditions of competition, but to the technical superiority of the Norman system. English resistance to this process produced in the eleventh and twelfth centuries numerous compilations of Anglo-Saxon laws, falsely ascribed to Saxon or Norman rulers (e. g. the so-called laws of Edward the Confessor, of William the Conqueror, of Henry I.), but the infiltration of Norman ideas in these very compilations shows the hopelessness of the struggle. In the fusion of the two systems which accompanied the fusion of the two races, in the development of a common law for all Englishmen, the Norman law was by far the more important constituent. The language of the laws and of the reports, from the time of the Plantagenets to that of the Tudors, was Norman-French.

The Common Law.—The fusion of Saxon and Norman law was not accomplished by the development of a new popular custom—a new English folk-law. It was effected partly by legislation (royal charters, provisions, assizes, statutes), mainly by judicial decisions. The Norman conquest had given England a more strongly centralized government than existed anywhere upon the Continent before the fifteenth century. At a period when the administration of secular justice upon the Continent had fallen into the hands of the feudal seigneurs and the free cities, the king's writs ran throughout England; controversies were tried by royal justices in the county and circuit courts; and appeals lay to the central courts of exchequer, king's bench, and common pleas. These conditions alone would have insured a rapid development of national English law, but the process was hastened by the centralization of legislative power in the crown and the Parliament. When the imperial Roman law, revived in Italy, spread over Europe in the twelfth and following centuries, the English common law was sufficiently developed to avert any such "reception" of the lawbooks of Justinian as took place upon the Continent. Such influence as they exerted was indirect, and was limited to special departments of the law. The Lombard jurist Vacarius read Roman law at Oxford in the twelfth century, and one of the first important treatises upon English law, that of Bracton (properly Bratton, *circa* 1259), was strongly colored by Roman ideas; but even Bracton drew upon the Roman jurisprudence for his definitions, his classification, and his terminology rather than upon the Roman law for his rules; and in the later mediæval writers (Britton, Forteseue, Littleton, etc.) Roman influences are far less perceptible. In the thirteenth and following centuries it was not the universities that trained the lawyers, but the Inns of Court. It is true that one very important part of the English common law, the law of contracts, seems to exhibit numerous Roman grafts; but it may well be queried whether this fact is due to a direct acceptance of Roman rules or to their indirect transmission through the customs of European merchants. See MERCANTILE LAW.

The most important foreign influence, as in the Anglo-Saxon period, was that of the Church. From the Conqueror the ecclesiastical courts obtained an independent jurisdiction, which they sedulously strove to widen. Their encroachments were checked by many statutes (provisions of Clarendon, statutes of *præmunire*, etc.), and their subjection to the royal authority was repeatedly emphasized; but their jurisdiction over MARRIAGE (*q. v.*) and family law in general, and over the administration of estates, was never seriously questioned, and these branches of the English law are mainly the creation of the ecclesiastical courts.

It should be added that throughout the Middle Ages churchmen were frequently employed as judges in the secular courts (Bracton, for example, was an ecclesiastic as well as a justice of eyre and of assize), and that the chancellors, from Becket to Wolsey, were regularly ecclesiastics.

Equity.—Toward the close of the Middle Ages judicial law-making assumed a peculiarly bold and open form in the decisions of the court of chancery. The chancellors exercised the right of supplementing and even of overriding the common law by virtue of the equitable powers which all Teutonic peoples seem to have regarded as inherent in the crown—or which, if a wider generalization may be risked, all Aryan nations appear to have regarded as inherent in supreme political authority. (Cf. ROMAN LAW, *jus honorarium.*) In England these powers seem to have been little needed while the common law was in active development, and while new writs were constantly appearing to meet new exigencies; it was only when the common law had become relatively rigid that equity became an imporant agency in the development of the law. Some of the earliest traces of a special jurisdiction exercised by the court of chancery are found in the reign of Richard II.; under the Tudors the development of equity was very rapid; since the eighteenth century the courts of equity, both in England and the U. S., have practically confined themselves to administering the law established by previous decisions. The net result of the whole process has been to create "a kind of secondary common law" (Kent), which in our day has been substantially merged in the general body of the judge-made law. See EQUITY.

Blackstone.—The English law, common and statutory, as it existed toward the close of the eighteenth century, has been so set forth by Blackstone that his work has become a legal classic. The faults of his work are mainly due to the circumstances under which it was done, namely: That at the time when it was written the historical study of law was in its infancy; the analysis of legal institutions was crude and imperfect; and a thoroughly logical arrangement of the law was a problem that interested very few persons on the continent of Europe and nobody in England. A foreign scholar who is far more competent than most of Blackstone's critics to appreciate that writer's shortcomings, Heinrich Brunner, of Berlin, has justly said that "no other system of modern law has been presented in so complete and well-rounded a form as the English law in the *Commentaries* of Blackstone."

United States.—The English colonists brought with them to America the English law, common and statutory. After the Declaration of Independence it was expressly resolved in some of the States that this law was still in force. It was as unnecessary to pass such resolutions as to decree the continued employment of the English language. Except in those portions of the U. S. where the colonists and their institutions were French or Spanish, the English law, as it existed at the period of independence, is still the basis of law.

The colonists also brought with them those methods of developing the law which had been recognized and employed in England, viz., statutes and judicial decisions. In consequence, however, of the adoption of written constitutions which are not enacted by the ordinary legislative bodies, and by reason of the division of powers, legislative and judicial, which is incidental to the federal form of government, the sources from which law proceeds are more numerous in the U. S. than in England. *Written law* is made (1) by amendment of the Federal Constitution; (2) by acts of Congress and treaties; (3) by amendment of the several State constitutions; (4) by acts of the several State legislatures. *Unwritten law* (see LAW) is made (1) by the Federal judiciary and (2) by the several State judiciaries. As regards subsidiary or delegated law-making power (ordinance, etc.), see LAW.

The extent to which the common law, i. e. the judge-made law, is still in force in Great Britain and its colonies and in the U. S.—the extent, therefore, to which the *development* of the law is still in the hands of the judiciary—constitutes a striking difference between these countries and the countries of the Roman law. In the states of continental Europe and of Central and South America the entire law is ordinarily reduced by codification to statutory form; or at least the attempt is made to bring the whole law into such form; and the law-making power of the judiciary is limited to the interpretation of the written law and the filling of "open places." In Great Britain and in the U. S. considerable portions of the law have been reduced to statutory form, and even to the form of codes; but the great body of private law, especially the law of personal property and of contracts, still rests upon judicial custom or "precedent," and is developed not by legislation, but by the decisions of the courts.

LITERATURE.—Upon the history of English law as a whole no satisfactory work exists. The best is still Reeves's *History of the English Law* (3d ed. 1814; later editions by Finlason to be avoided). For literature of special historical investigations, see Brunner, *Quellen des Englischen Rechts*, in Holtzendorff's *Rechtsencyclopädie* (5th ed. Leipzig, 1890; English translation of Brunner's article from the 4th ed. by Hastie, Edinburgh, 1888), and Maitland, *Materials for English History*, in *Political Science Quarterly*, iv., 496, 628. For modern English law, see Stephen, *New Commentaries* (7th ed. London, 1874). For American law, see Kent, *Commentaries* (12th ed. by O. W. Holmes, Jr., Boston, 1873). A brief but very suggestive work is that of O. W. Holmes, Jr., *The Common Law* (Boston, 1881). On the question of judge-made law *vs.* statute, see Carter, *Codification of our Common Law* (New York, 1884), and Dillon and Munroe Smith in *Political Science Quarterly*, ii., 9, 105; iii., 136.

MUNROE SMITH.

Municipio Neutro (Brazil): See RIO DE JANEIRO.

Munjeet', or **East Indian Madder** [*munjeet* is from Hind. *manjit*, a drug used for dyeing red]: a plant (*Rubia cordifolia*) extensively cultivated in India, its root being used as a dyestuff for producing colors similar to those of common madder. It was formerly supposed to contain the same coloring-matters as madder, alizarin, and purpurin. Dr. Stenhouse (*Proc. Roy. Soc.*, xii., 633; xiii., 86, 145) has shown that it contains purpurin, but no alizarin. The substance supposed to be alizarin he has shown to be a distinct body, *munjistine*, having properties very similar to those of alizarin.

Munk, Hermann, M. D.: neurologist; b. in Posen, Prussia, Feb. 3, 1839; was educated at Posen, and Berlin and Göttingen Universities; became successively a physician (1860), docent in the University of Berlin (1862), assistant professor (1869), professor and director of the physiological laboratory in the Veterinary High School (1876). He is a member of the Royal Academy of Sciences in Berlin. He belongs to the school of physiologists known by the names of Müller, Dubois-Reymond, and Virchow. His principal works on physiology and physiological psychology are *Untersuchungen über das Wesen der Nerven-Erregung* (vol. i., Leipzig, 1868); *Die elektrischen u. Bewegungs-Erscheinungen am Blatte der Dionaea muscipula* (Leipzig, 1876); *Ueber die Functionen der Grosshirnrinde: Gesammelte Mittheilungen* (Berlin, 1881; 2d ed. 1890); numerous memoirs in *Zeitschr. für wissensch. Zoologie* (vol. ix.), *Arch. f. Anat. u. Physiol.* 1860–94), *Sitzungsber. d. Berliner Akademie d. Wiss.* (1880–94), etc. J. M. Baldwin.

Munk, Salomon: Orientalist; b. at Glogau, Silesia, May 14, 1805, of Jewish parentage; studied at Berlin (1820), at Bonn, and at Paris (1828); was appointed assistant in the department of Oriental MSS. in the National Library of Paris (1835); traveled in Egypt and Syria with Montefiore and Cremieux (1840), where he assisted in founding schools for Israelites; and was made Professor of Hebrew, Chaldee, and Syriac at the Collège de France (1865), though in 1852 he had become quite blind. In 1860 he was elected a member of the Académie des Inscriptions et Belles-Lettres, and a little later a member of the Consistoire Central Israélite. D. Feb. 6, 1867. His greatest work was the edition of the Arabic text, with French translation, of Moses ben Maimon's Guide of the Perplexed, *Le Guide des Égarés* (3 vols., Paris, 1856–66). He also wrote *Reflexions sur le culte des anciens Hébreux* (Paris, 1833); *Notice sur Rabbi Saadia Gaon* (Paris, 1838); *Palestine* (1845); *Philosophie chez les Juifs* (1848); *Notice sur Abou'l Walid Merwan* (1851; crowned by the Academy); *Mélanges de philosophie juive et arabe* (1857–59); *Commentaire de Rabbi Tan'houm de Jérusalem sur le livre de Habakkouk* (1843). He also wrote articles in the *Encyclopédie pittoresque*, *Dictionnaire des Sciences philosophiques*, and the *Dictionnaire de la conversation*.

Richard Gottheil.

Munkacsy, moon-kaat'sĕe, Mihaly: historical and genre painter; b. at Munkacs, Hungary, Oct. 10, 1846. His real name was Michael Lieb, and he was a carpenter's apprentice before he began the study of art. He studied at the Vienna Academy and under Franz Adam in Munich; went to Düsseldorf in 1867 and painted there *The Last Day of a Man Condemned to Death*, which at once brought him into notice. In 1872 he established himself in Paris and painted pictures of life in that capital. With his picture of *Milton Dictating Paradise Lost to his Daughters* (in the Lenox Library, New York) he entered on a new field, and this work and others exhibited by him at the Paris Exposition of 1878 attracted much attention. *Christ before Pilate* and *Christ on Calvary* are two large compositions which have been exhibited in all the large cities of the U. S. He visited the U. S. in 1886 and painted several portraits in New York.

Munn, George F.: See the Appendix.

Muñoz, Juan Bautista: historian; b. near Valencia, Spain, 1745. He graduated at the University of Valencia, devoted himself to historical studies, and in 1779 was commissioned historiographer of the Indies, with special orders from the king to write the history of America. Only the first volume of his *Historia del Nuevo Mundo* was published (Madrid, 1793); this brings the narrative down to 1500, and is a work of the highest value. D. in Madrid in 1799. His manuscripts were scattered, but most of them are now in the Academy of History at Madrid. H. H. S.

Munro', Hugh Andrew Johnstone, D. C. L.: classical scholar; b. at Elgin, Scotland, Oct. 14, 1819; educated at Trinity College, Cambridge, where he became a fellow 1843; published an edition of *Lucretius* (4th ed. 1885), one of the standard works of English scholarship; of *Horace* (1869); *Elucidations of Catullus* (1878); and articles in philological journals. He also wrote Greek and Latin verse. D. Mar. 30, 1885. Dr. Munro was the first university professor of Latin, from 1869 to 1872, when he resigned.

Munroe, Charles Edward: See the Appendix.

Munroe, Charles Kirk: See the Appendix.

Munster: the largest of the four provinces of Ireland; bounded N. and E. by Connaught and Leinster, and S. and W. by the Atlantic. Area, 9,481 sq. miles. Pop. (1891) 1,168,994. The province is divided into the counties of Cork, Clare, Kerry, Limerick, Tipperary, and Waterford.

Münster: capital of the province of Westphalia, Prussia; on the Aa; 101 miles by rail N. by E. of Cologne (see map of German Empire, ref. 3–D). It is an old but well-built and picturesque town, surrounded with beautiful promenades (its old fortifications), and containing many open places planted with trees and lined with elegant houses. The most remarkable among its buildings are the cathedral (built 1225–61), and the town-hall, in which the Peace of Westphalia was signed in 1648. From the twelfth to the eighteenth century Münster was the capital of an independent principality of the German empire. In 1719 it was merged into the archbishopric of Cologne, and in 1814 it was given to Prussia by the Congress of Vienna, together with most of its territory. It has many good educational institutions, printing establishments, dye-works, and manufactures of leather, woolen, cotton, and silk fabrics, paper, and sugar, and it carries on a considerable trade in its own manufactures and the products of the surrounding district. Pop. (1895) 57,135.

Münsterberg, Hugo, Ph. D., M. D.: psychologist; b. at Dantzic, Germany, June 1, 1863; studied at Dantzic, Geneva, Leipzig, and Heidelberg. From 1887 to 1891 was instructor and 1891–92 Assistant Professor of Psychology in the University of Freiburg in Baden, Germany; in 1892 became Professor of Experimental Psychology, Harvard University, Cambridge, Mass. His principal works are *Die Willenshandlung* (Freiburg, 1888); *Gedankenübertragung* (1889); *Der Ursprung der Sittlichkeit* (1889); *Beiträge zur experimentellen Psychologie* (1889–93); *Aufgaben und Methoden der Psychologie* (1891); and many psychological and philosophical articles in *Psychological Review*, *Reallexikon der medicin. Propädeutik*, *Zeitschrift für Psychologie*, etc.

J. M. Baldwin.

Muntaner', Ramon: chronicler; b. at Peralada, Catalonia, in 1265; d. in 1336; the most important authority on the early history of his country, as well as one of the most valuable of mediæval annalists. After having filled many positions of trust under his sovereign, and participated in the remarkable Catalan expedition to Rumelia and Greece, Muntaner retired to Xilvella, near Valencia, and at the age of sixty years began the composition of his chronicle. His narrative covers the period between the "miraculous" birth of King Jaume, Jacme, or Jayme, I., the founder of the Catalan nationality, in 1208, and the coronation of King Alphonso in 1328. Muntaner's chronicle was first printed at Barcelona in 1558 under the title *Chronica o Descripcio dels fets e hazanyes del inclyt Rey Don Jaume, primer Rey d'Arago, de Mallorques e de Muntpesller; feta per lo magnifich en Ramon Muntaner*. A reprint of this edition appeared at Barcelona in 1562. Lanz gave an edition of the text in the publications of the Stuttgart *Literarischer Verein* in 1844, and Bofarull has published at Barcelona the text with a Castilian version (1860). There is a good French translation by Buchon in the *Chroniques étrangères relatives aux Expéditions françaises pendant le XIII^e Siècle* (Paris, 1841); a German by Lanz (2 vols. 8vo, Leipzig, 1842); and an Italian by F. Moisé—*Due cronache catalane, etc.* (2 vols., Florence, 1843–44). See also G. Finlay, *Mediæval Greece and Trebizond* (London, 1851). Revised by A. R. Marsh.

Mün'ter, Friedrik Christian Carl Henrik: theologian and author; b. at Gotha, in the duchy of Saxe-Coburg, Oct. 14, 1761; studied theology and archæology at Copenhagen and Göttingen; traveled for three years in Italy on a stipend from the Danish Government; was appointed Professor in Theology at the University of Copenhagen in 1790, and Bishop of Sealand in 1808. D. at Copenhagen, Apr. 9, 1830. He published the Coptic translation of the book of Daniel (1786), the statute-book of the Templars (1794), a manual on early Christian doctrinal history (1801–04), valuable works on the introduction of Christianity into Denmark (1823–32), and of the Reformation (1802), a very learned disquisition on the religion of the Carthaginians (1823), and a work describing the symbols and artistic representations employed by Christians in the first century (1825).—His father, Balthasar Münter (b. at Lubeck, Mar. 24, 1735; d. in Copenhagen, Oct. 5, 1793), was minister of the German congregation at Copenhagen, and wrote in German *A Faithful Narrative of the Conversion and Death of Count Struensee* (trans. into English by Rev. G. F. A. Wendeborn, London, 1773; 3d ed. 1826).

Revised by S. M. Jackson.

Muntjak: the Javanese name adopted as the common name of a few species of small deer found in Southern and Eastern Asia and some of the neighboring islands. They are characterized by the great length of the pedicels, or processes of the frontal bones, supporting the antlers. The pedicels are continued forward on the skull as prominent, converging ridges; the antlers, which are short, turn inward at the tip, and have but a single brow-prong. The little side hoofs so well developed in other deer are small, and represented by the lower portion only. These little deer stand only about 2 feet high at the shoulder. The most common species, *Cervulus aureus*, often called barking-deer, occurs in British India, Burma, Ceylon, Java, Sumatra, etc. *Cervulus reevesii* is found in China. F. A. L.

Muntz: See Brass.

Munychia, myu-nik'i-a (in Gr. *Μουνυχία*): the name of one of the harbors of Athens, and also of a hill lying between the harbors Zea and Munychia. On the hill there was a temple of Artemis Munychia, in whose honor a festival (also called *Munychia*), in commemoration of the battle of Salamis, was held. The hill was the scene of the battle between the patriots under Thrasybulus and the Thirty Tyrants (404 B. C.). In 322 B. C. the hill served as a fortress for the Macedonian garrison of occupation. J. R. S. S.

Mün'zer, Thomas: Reformer; b. at Stolberg, in the Harz Mountains, about 1490; studied at Leipzig, and became preacher at Zwickau, in Saxony, in 1520, and in 1523 at Allstedt, in Thuringia. At first he worked in unison with the Reformers, though his preaching was always strangely mixed up with mystical and fantastical ideas, but afterward he turned, according to his own "inner light," against the "halfness" of Luther and Melanchthon, and demanded a radical reform of Church and state, which led to uproar and confusion. He entertained peculiar ideas of infant baptism, similar to those of the Anabaptists, with whom, however, he had no direct connection. His most characteristic views were a belief in continuous divine revelation through dreams and visions, and in the community of property, and he promulgated them in speech and writings with a somewhat coarse but often impressive eloquence. Expelled from Allstedt by the Government, he went to Nuremberg, and next to Schaffhausen, but returned soon to Thuringia, and settled at Mühlhausen. Here he succeeded in overthrowing the city council and appointing another which was entirely under his control; and when in 1525 the Peasants' war broke out in Southern Germany, he instigated the whole population in and around Mühlhausen and Langensalza to rise in revolt. Murder and plunder ensued, but on May 15, 1525, the peasants were totally routed at Frankenhausen after a long battle. Münzer was taken prisoner, put to the torture, and beheaded at Mühlhausen a few days afterward. His *Life* was written by Melanchthon (Hagenau, 1525), G. T. Strobel (Nuremberg, 1795), J. C. Seidemann (Dresden and Leipzig, 1842), and Heinrich Leo (Berlin, 1856). Revised by S. M. Jackson.

Mur: a river of Austria. It rises in the Mureck Mountains in the district of Salzburg, enters into Styria, where it becomes navigable at Judenburg, and passes by Gratz, flows through Hungary into Croatia, and joins the Drave at Legrad, after a course of 230 miles. It receives about 100 affluents, among which are the Kainach, Lasznitz, Sulm, Pöls, and Mürz, but none is navigable.

Murad: the name of five Ottoman sultans. Murad I. Ghazi the Victorious (1360–89), b. in 1326; son of Sultan Orkhan Ghazi; captured Adrianople in 1360, and in 1365 made it the Ottoman capital; subdued a large part of Asia Minor; captured Thessalonica in 1386, and crushed Servia at the battle of Kossovo (1389), where he was slain. Tireless and able in war and council, pious, frugal, and just, he is one of the most illustrious Ottoman sovereigns.—Murad II. (1421–51), b. in 1403; son of Mohammed I.; conquered Phrygia and Karamania, subjected the Peloponnesus to tribute, and consolidated the empire; but he was unsuccessful at the siege of Constantinople (1422) and of Belgrade (1439), and could not conquer the Albanian Scanderbeg or the Hungarian Huniadi. He loved his people, encouraged learned men, and built many mosques and colleges. Though twice abdicating in favor of his son Mohammed, he was each time soon afterward forced by his subjects to reascend the throne.—Murad III. (1574–95), b. in 1546, was a son of Selim II.; had his five brothers bowstrung on the day of his accession. He conquered Georgia (1578), and carried on a successful war against Persia (1577–90). Though brave, he was avaricious, uxorious, sanguinary, and feeble-minded, and the empire declined under his reign. He had 129 children.—Murad IV. Ghazi (1623–40), b. in 1611; son of Achmet I.; captured Bagdad in 1638, reduced the Druses, cowed the janissaries, and introduced a few reforms. He possessed ability, but was violent, revengeful, and unjust, and injured rather than benefited the empire.—Murad V. (May 29–Aug. 31, 1876), b. in 1840, was a son of Sultan Abd-ul Medjid. On the dethronement of his uncle Abd-ul Aziz, he succeeded, according to Ottoman custom, as the eldest member of the dynasty. Well educated, affable, and kindly, his accession gave rise to high hopes, but excitement, caused by the violent death of Abd-ul Aziz and by the assassination of some of his own ministers, brought on insanity, and he was deposed. His brother Abd-ul Hamid II., present sultan (1897), reluctantly succeeded.

E. A. Grosvenor.

Muræ'na [= Lat. = Gr. *μύραινα*, a sea-eel]: the typical genus of the moray family of fishes (*Muræniдæ*). It includes the *Muræna helena*, the famous muræna of the ancients, a European salt-water eel. Its flesh is white and good, and it was artificially bred by the ancient Romans, who prized it extremely. Other species of *Muræna* occur in tropical America.

Muræ'nidæ [Mod. Lat., from *Muræna*, the typical genus]: a family of fishes of the order *Apodes*, typified by the celebrated Muræna (*q. v.*) of the ancients. The body is elongated, as in the common eel; the scales absent; the head moderate; the opercular bones generally rudimentary and in part wanting; the mouth with the cleft moderately developed, or very large and extending far backward laterally; the intermaxillaries are rudimentary; the teeth well developed; the branchial apertures developed externally as lateral holes; the dorsal and anal fins variable, sometimes being well developed and sometimes nearly absent; the pectoral fins also either present or absent. The skull exhibits a number of well-marked characters, as shown by Cope; the parietals are largely in contact; the ethmoid very wide; the symplectic, maxillary, pterygoid, basal, branchihyal, and superior and inferior pharyngeal bones all wanting, except the fourth superior pharyngeal; this is jaw-like, and supported by a strong superior branchihyal; other superior branchihyals wanting or cartilaginous. The color is formed by the articulation of the lighter hues inclosing darker interspaces, sometimes by blue cross-bands, sometimes by white ocelli, and sometimes the coloration is uniform. The species are very numerous, chiefly in the tropical seas. Most of these fishes are voracious and some even ferocious. They are known to English-speaking fishermen as morays, a word derived from *Muræna*. Revised by D. S. Jordan.

Mural Circle [*mural* is from Lat. *mura'lis*, deriv. of *mu'rus*, wall]: an astronomical instrument consisting of a large graduated circle, to which is attached a telescope moving only in the plane of the meridian, and supported on the perpendicular face of a wall. It was used for the determination of the declinations of the heavenly bodies, but is now superseded by the meridian circle, which has the advantage of allowing both right ascension and declination to be determined at the same time.

Murat, Fr. pron. mü'raa', Joachim: soldier; b. at La Bastide Fortunière, in the department of Lot, France, Mar. 25, 1771; the son of an innkeeper; was educated at Cahors and Toulouse, where he prepared himself for the Church. Dismissed from the seminary, he entered a regiment of chasseurs, and, cashiered in the regiment, lived for some time as waiter in a *café* in Paris. On the establishment of the constitutional guard of Louis XVI. he became a member of that body of troops, and was afterward transferred to a regiment of cavalry. He was aide-de-camp to Napoleon in 1795; accompanied him to Egypt in 1798; was made general of division in 1799; married in 1800 Caroline, a sister of the First Consul, and was made marshal of France, imperial prince, and grand admiral in 1804. In most of Napoleon's great battles, Austerlitz, Jena, Eylau, Friedland, he took a distinguished part, and the emperor loaded him with honors. In 1805 he was made Grand Duke of Berg, and in 1808 King of Naples under the name of Joachim I. Napoleon. Murat wished to govern his kingdom independently of France, but every attempt in this direction Napoleon frustrated with indignation. After the battle of Leipzig, Murat hastened to Italy and opened negotiations with Great Britain and Austria, which powers guaranteed him, by a treaty

on Jan. 11, 1814, the possession of his throne on the condition of his joining the allies against Napoleon. He marched against Prince Eugene, Viceroy of Italy, but when he heard that the Bourbons insisted violently at the Congress of Vienna on his expulsion, he stopped, and when Napoleon returned from Elba he at once declared war against Austria (Mar. 31, 1815). Defeated Apr. 12 at Ferrara, and May 2 at Tolentino, he fled to France, where, however, Napoleon refused to receive him. He lived in the vicinity of Toulon, but after the battle of Waterloo he was compelled to leave France. With a few adherents he made a fantastic attempt to invade Naples, but was caught near Pizzo, tried before a court martial, and shot Oct. 13, 1815.

Murato'ri, Ludovico Antonio: historian; b. at Vignola, in the duchy of Modena, Oct. 21, 1672; studied theology and history at the University of Modena; took holy orders; became keeper of the Ambrosian Library at Milan in 1694, and of the d'Este Library and the ducal archives at Modena in 1700, and died Jan. 23, 1750. His contributions to the history of Italy are very valuable: *Rerum Italicarum Scriptores* (25 vols., Milan, 1723–51); *Antiquitates Italicæ Medii Ævi* (6 vols., 1738–42); *Annali d'Italia* (12 vols., 1744–49).

Muravieff: name of a family eminent in Russian literary, military, and political history, prominent during the reign of Ivan III. (1462–1505), who granted them large tracts of land, and especially noteworthy in the eighteenth and nineteenth centuries. (1) Muravieff, Michael: poet and diplomat; b. 1757; tutor of the grandchildren of Catherine II., who made him a senator, state secretary, and curator of the University of Moscow. D. 1807. His scattered literary works were collected and published at St. Petersburg in 1820, the chief being *The Inhabitants of the Suburbs, Dialogues of the Dead*, and *Essay on Literature and Morals.* —(2) Muravieff, Nicolas: mathematician; published the first algebra in Russian (1752); made lieutenant-general and governor of Livonia by Catherine II.; d. 1770.—(3) Muravieff, Nicolas Nicolaïevitch: general; son of preceding; b. 1768; played a brilliant part in the Russo-French wars of 1812–15; then devoted himself to a school, afterward imperial, which he had founded for Russian staff officers and to development of national agriculture. D. 1840. He left five sons, all of whom became distinguished.—(4) Muravieff, Alexander: general; oldest son of preceding; b. 1792; d. 1864; took part in conspiracy of 1825, on account of which he was exiled to Siberia, but was pardoned for his father's sake and recalled; served with distinction in the Crimean war; was appointed governor of Nijni Novgorod in 1856.—(5) Muravieff Karski, Nicolas: general; son of (3); b. 1793; fought in Russian campaigns of 1812–15; chief of staff during war with Persia (1827); general in Russo-Turkish war (1828–29); commanded the right wing at the capture of Warsaw (1831); commanded the army of assistance which disembarked in the Bosphorus (1833); was disgraced in 1838, but during the Crimean war commanded the army of the Caucasus and captured Kars (1855), for which exploit he received the title *Karski* and was made a prince. Though he fought in over fifty pitched battles he was never wounded. D. 1856.—(6) Muravieff, Michael: general and mathematician; son of (3); b. 1796; fought in campaigns of 1812–15; governor of Grodno (1830), where he crushed insubordination with severity; vigorously opposed emancipation of the serfs; put down the students' rebellion (1861) and the Polish insurrection (1863); was president of the Russian Geographical Society, and did much for Russian agriculture. D. 1866.—(7) Muravieff Amurski, Nicolas Nicolaïevitch: general; son of (3); b. 1810; served in the Caucasus; governor-general of Eastern Siberia (1847), and conquered the territory on the Amur for Russia (1858), whence he gained the title of *Amurski*; negotiated a treaty with Japan very favorable to Russian interests. D. 1881.—(8) Muravieff, Andrew: traveler and author (1798–1874); son of (3); a versatile and very popular writer; composed many works in German and Russian on history, religion, and his travels. The chief are *Pilgrimage to the Russian Holy Places* (1832); *Dante*, a drama (1841); *History of the First Four Centuries of Christianity* (1842); *History of Jerusalem* (1844); *History of the Russian Church* (1845); *Souvenirs of Rome* (1846); *Description of Georgia and Armenia* (1848); *Souvenirs of the East* (1851); *Impressions of the Ukraine and Sebastopol* (1859).—(9) Muravieff-Apostol, Ivan: author; b. 1769; ambassador to Saxony and Spain; versed in ancient and modern languages; translated many works into Russian. D. 1851. His best-known original production is archæological, *A Journey in the Crimea.* His three sons took part in the insurrection of 1825; the eldest, Sergius Ivanovitch Muravieff-Apostol, the chief of the conspiracy, was hanged; the second died of his wounds; and the third was exiled for twenty years to Siberia.

E. A. Grosvenor.

Murchison, Sir Roderick Impey, K. C. B., F. R. S., D. C. L., LL. D.: geologist; b. at Tarradale, Ross, Scotland, Feb. 19, 1792; studied at the military college, Marlow, and the University of Edinburgh; was an officer in the army 1807–15, serving in the Peninsula and Sicily; was the associate of Davy; became in 1825 a fellow of the Geological Society, and in 1826 F. R. S.; aided Sedgwick and Lyell in British and continental geological studies; was one of the founders of the Royal Geographical Society, and often its president; traveled extensively in Russia, Scandinavia, etc.; was knighted 1846, made K. C. B. 1863, baronet 1866; became in 1855 director-general of the geological survey of the United Kingdom. D. in London, Oct. 22, 1871. Among his leading works are the *Silurian System* (1839), enlarged to *Siluria* (1854), *Geology of Russia and the Ural* (1845), and *Geological Atlas of Europe* (1856). He was the recipient of numerous honors and distinctions, British and foreign. See *Memoir of Sir Roderick Murchison*, by Archibald Geikie (2 vols., London, 1874).

Mur'cia: province of Spain, part of the old province of the same name, which in 1833 was divided into the present provinces of Murcia and Albacete. Area, 4,478 sq. miles. The surface is mountainous, forming elevated plateaus and large, deep valleys. Where water is abundant the soil is exceedingly fertile, producing wine, oil, silk, hemp, and all kinds of fruits, but in places where water is deficient the country is nearly a desert. Mineral springs abound; copper, lead, iron, and salt are found. Pop. (1887) 491,436. Capital, Murcia.

Murcia: capital of the province of Murcia, Spain; on the left bank of the Segura; 50 miles N. by W. of Cartagena (see map of Spain, ref. 18–H). It is irregularly built, but its streets are clean and its houses substantial, often elegant. Its cathedral has a high tower, from the top of which there is a magnificent view of the surrounding valley, the *huérta*, the river which waters it, and the lofty mountains which inclose it. Murcia has good educational institutions, manufactures of silk, linen, mats, cordage, saltpeter, powder, glass, and musical instruments, and an extensive trade in the products of its fertile *huérta.* Pop. (1887) 98,538.

Murder [M. Eng. *morder, morther* < O. Eng. *morðor*, deriv. of *morð*, murder: Germ. *mord*, Goth. *maúrþr*; cf. Sanskr. *mṛta*, death; Gr. *βροτός* (for *μροτός*), mortal: Lat. *mors, mortis*, death]: the unlawful killing of a person with malice aforethought; or, as defined by Lord Coke, the unlawful killing by a person of sound mind and discretion of any reasonable creature in being and under the king's peace, with malice aforethought, either express or implied. This crime is punishable, almost without exception, in all countries with the death penalty; and when committed on one's self involved at the common law the forfeiture of the decedent's goods and chattels and ignominy to the dead body. (See Capital Punishment and Suicide.) By examining the separate elements of the latter definition, it will appear that to constitute the crime of murder the act of *killing* must have been by a person of sound memory and discretion—that is, by a person who is neither insane nor of such an age as to be incapable, either absolutely or by legal presumption, of the intent which is necessary to the commission of the crime. (See Insanity and Infant.) The killing must also be unlawful—that is, neither excusable nor justifiable. See Homicide.

The *person killed* must be a reasonable creature in being —that is, a living person fully born. At the common law, therefore, the killing of an unborn child was not murder, although if the child were fully born alive and then died from the effects of acts committed upon it before birth, this constituted murder. (See Infanticide and Abortion.) It was also a rule of the common law, which is still valid, that the death of the person must occur within a year and a day of the time of the wrongful act or injury which is the alleged cause of death, the day upon which the act is committed being included in the reckoning.

The expression "under the king's peace," or, as it is commonly expressed in the U. S., "under the peace of the State," excludes from being regarded as murder the killing of an

alien enemy engaged in actual hostilities: but the killing of an alien enemy otherwise constitutes murder.

The word malice in law has not only its ordinary signification of a mischievous or wicked intention, but also an artificial one denoting the malicious or wicked intention which by fiction of law is presumed to exist when a person does a wrongful act without just cause or excuse. (See MALICE.) *Malice aforethought*, as used in the above definition, is a phrase of rather indefinite meaning, which comes down from the old statutes of mayhem and those distinguishing murder from MANSLAUGHTER (*q. v.*). It is the same in meaning as the phrase "malice prepensed," which also occurs in the older books, in one of which it is said that "He that doeth a cruel act voluntarily doeth it of malice prepensed." The word aforethought has no great significance in the meaning of the phrase, and in the language of many opinions of judges and other law writings the phrase seems to be little distinguished from malice alone; but in the better usage malice aforethought implies a greater degree of wickedness or malevolence than malice alone.

The distinction between *express* and *implied* malice is an artificial one (malice in all cases being implied from the circumstances), and refers to the methods of proving its existence as a fact in any given case. Malice is said to be express in those cases in which the wrongful intention is inferred as an ordinary deduction of fact—that is, through processes of reasoning unaided by any legal presumptions from the evidence which is given for the very purpose of establishing its existence, such as lying in wait, former threats, old grudges, studied preparations, etc. Where the wrongful intention is inferred as a legal presumption and not as an actual fact, as where the law conclusively presumes malice from the existence of certain other facts, it is called implied malice. Thus malice is implied as a conclusive presumption of law from the killing of a person by one engaged in the commission of a felony. Whether malice is presumed from the mere fact of killing alone is disputed; but the better opinion is that it will not be presumed without some circumstance connected with the killing which raises a presumption of malice, although a killing could hardly be proved without showing circumstances which would raise or rebut such a presumption. The point therefore seldom or never has any bearing upon the real facts of any actual case, but it is nevertheless frequently raised by counsel and incorporated in the charge of the judge to the jury. In addition to those cases where there is a preconceived design to kill the very person whose life was taken and where the act was not excusable or justifiable, which are plainly murder, the malicious intent is presumed where a person is engaged in the willful commission of an act which shows him to be an enemy to mankind in general, as if he should deliberately fire a loaded gun into a crowd, although he might not design to take the life of any particular individual; also when engaged in the commission of, or the attempt to commit, a felony, or in the willful commission of an act dangerous and adapted to kill, or in the willful neglect of a legal duty of a nature adapted to kill, or in any other unlawful act of a similar nature.

It was a general doctrine of the common law that if the killing was done under great and immediate provocation, upon the spur of the moment, while the passions were inflamed, the crime was reduced to manslaughter; but no matter how great the antecedent provocation, after an interval had elapsed sufficient for the passions to cool and the reason to return, the homicide would then be murder.

Statutory Changes.—It will be seen from the foregoing that the common law included under the head of murder, and punished with the same penalty, many acts of a different degree of moral culpability. Thus a person committing an act which was intended to produce great bodily harm, but distinctly not intended to kill, was punished the same as a person who deliberately took life. Statutory changes, however, have aimed to remedy this vice of the common law, and have divided murder into two or, in some cases, three classes, leaving unchanged the common-law distinction between murder and manslaughter. The particulars of the statutes are various, and the language employed differs in the different States; but in general they class under the head of murder in the first degree those cases where there is a specific intent to kill; where the killing is done in the commission of arson, burglary, robbery, or rape; in many of the States, where it is committed by poison or by lying in wait; and in some States (as in New York) when committed "by an act imminently dangerous to others, and evincing a depraved mind, regardless of human life, although without any premeditated design to effect the death of any individual." There is no U. S. statute dividing murder into degrees, and consequently the Federal courts make no distinction, but follow the common law. See Wharton's *Law of Homicide*; Bishop's *New Commentaries on the Criminal Law*.

F. STURGES ALLEN.

Mure, Col. WILLIAM: classical scholar; b. at Caldwell, Ayrshire, Scotland, July 9, 1799; was educated at Westminster School and at the University of Edinburgh, and subsequently studied several years in Germany. He wrote articles for *The Edinburgh Review* upon the literature of modern languages, which were characterized as brilliant by Moore and Jeffrey; published *Brief Remarks on the Chronology of the Egyptian Dynasties* (1829); *A Dissertation upon the Calendar of the Zodiac of Ancient Egypt* (1832); traveled in Greece and the Ionian islands in 1838, publishing the *Journal* of his tour in 1842; and after many years of research issued his *Critical History of the Language and Literature of Ancient Greece* (5 vols., 1850–57), which was never finished, but of which the several portions upon the epic and lyric poets and the historians may be regarded as separate works. He also edited *The Caldwell Papers* (3 vols.) for the Maitland Club. Col. Mure was an able literary critic, best known as a strenuous defender of the unity of the *Iliad* and *Odyssey*, and the identity of their authorship in the person of Homer. He sat in Parliament for Renfrewshire 1846–55, and was lord rector of the University of Glasgow 1847–48. D. in London, Apr. 1, 1860.

Revised by BENJ. IDE WHEELER.

Muret, mü′rā′, MARC ANTOINE, de, often called MURETUS: humanist; b. at Muret, near Limoges, France, Apr. 12, 1526. He was an ardent and precocious student of classical letters, and taught with success at Poitiers, Bordeaux, Paris, and Toulouse. At the age of eighteen he wrote in Latin the school tragedy *Julius Cæsar*; he was connected with the French men of letters of the Pléiade, and furnished a commentary for Ronsard's *Amours de Cassandre* (in the 2d ed., 1553). Charges pressed against him by enemies drove him from France to Italy, where he studied law at Venice and Padua, and gained great reputation by his lectures in Rome, where he received employment in the service of Cardinal d'Este. He was ordained priest in 1576. D. in Rome, June 4, 1585. Besides his writings in Latin, *Orationes*, *Observationum juris liber singularis*, etc., he prepared editions of many Latin writers, and his *Variæ Lectiones* are still valuable, but he was especially famous for his Latin style. Editions of his works appeared at Verona (5 vols., 1723–30), Leyden (4 vols., 1789), Leipzig (3 vols., 1834–41). On his *Life*, see vol. iv., pp. 518–582, in Ruhnken's edition of his works, and the monograph of C. Dejob, *M. A. Muretus* (Paris, 1881), and Mark Pattison's essays, i., pp. 124–132.

A. G. CANFIELD.

Mu′rex [Mod. Lat., from Lat. *mu′rex*, the purple-fish, driv. of *mūs*, sea-mussel, like Gr. *μύαξ*, purple-fish from *μῦς*, mussel]: name of a large genus of gasteropod mollusks of the family *Muricidæ*. There are some 180 living species, and nearly as many fossil ones, found in the Eocene and later deposits. The living species are worldwide in distribution. *M. brandaris*, *trunculus*, and others furnished a part of the Tyrian purple dye of the ancients. The animals are all predatory; many of the shells assume singular forms. One of the most remarkable is the thorny woodcock or Venus's comb of collectors (*M. tribulus*), from the Spice islands. *M. regius* of the Pacific coast of tropical America is splendidly colored. See MURICIDÆ.

Murex′ide [from Lat. *mu′rex*, the purple-fish, purple], or **Purpurate** [from Lat. *pur′pura*, purple] **of Ammo′nium**: a substance formed by the action of ammonia on alloxantin, and by other reactions. It crystallizes in four-sided prisms, which are garnet-colored by transmitted and rich gold-green by reflected light. In water it forms a splendid purple solution. With mercuric salts it produces fine red and purple colors on silk, wool, cotton, and leather, and with zinc salts orange and yellow colors. These colors are very bright and resist the action of light; they are, however, very sensitive to sulphurous acid, which rapidly discolors them, so that they can not be used in cities where coal-gas is employed. At one time murexide, made from the uric acid of guano, was extensively used for dyeing and calico-printing. It was driven out by the aniline colors. See DYESTUFFS. See *Report on Murexide Dyeing*, by E. Kopp (*Rep. Chim. app.*, i., 79), and Hofmann's *Report* (1862,

p. 118); also *Jahresbericht* (1857, 649; 1858, 671; 1859, 752), and Wagner's *Jahresb.* for the same years.

Revised by Ira Remsen.

Murfree, Mary Noailles: novelist; b. near Murfreesboro, Tenn., about 1850. Her short stories and novels, written under the pseudonym *Charles Egbert Craddock*, are impressive and highly dramatic studies of life among the Tennessee Mountains. They include *In the Tennessee Mountains* (1884); *The Prophet of the Great Smoky Mountains* (1885); *The Despot of Broomsedge Cove* (1888); *In the Stranger People's Country* (1891); *His Vanished Star* (1894). H. A. B.

Murfreesboro: city (founded about 1800, State capital in 1817–27); capital of Rutherford co., Tenn. (for location of county, see map of Tennessee, ref. 6–F); near Stone river, on the Nash., Chat. and St. L. Railway; 32 miles S. E. of Nashville, 119 miles N. W. of Chattanooga. It is in an agricultural, cotton, and fruit-growing region, and has an historical value from the fact that engagements occurred here between the Union forces under Gen. Rosecrans and the Confederates under Gen. Bragg, on Dec. 31, 1862, and Jan. 2, 1863, the actions forming what is known as the battle of Murfreesboro or Stone river. The city is the seat of Soule Female College (Baptist, founded 1841), and has 6 churches, a national soldiers' cemetery, 2 national banks with combined capital of $175,000, and 3 weekly newspapers. Pop. (1880) 3,800; (1890) 3,739; (1900) 3,999. Editor of "Free Press."

Murfreesboro, Battle of: one of the most fiercely contested battles of the civil war in the U. S.; fought Dec. 31, 1862, and Jan. 2, 1863, between the Union forces under Gen. Rosecrans and the Confederates under Gen. Bragg. It is also known as the battle of Stone River.

Gen. Rosecrans moving out from Nashville Dec. 26, 1862, forced back Bragg's outposts, and on the 29th found his army in position about 2 miles in front of Murfreesboro, Tenn., facing nearly N. W., its right under Breckinridge resting on Stone river, its center under Polk and its left under Hardee. Rosecrans drew up his army in front of the Confederates, McCook on the right, Thomas in the center, and Crittenden on the left, resting on Stone river. The left of each army extended beyond the right of the other. The plans of battle adopted by Rosecrans and Bragg were nearly identical.

In the morning of Dec. 31 each advanced his left wing with a view to turning and driving in the enemy's right. Hardee being but a short distance from McCook, his attack made at daylight struck first, and being pushed with great vigor the Union right was slowly rolled back, until at the close of the first day Rosecrans's army was concentrated, its right and center along the Nashville Pike on a short line nearly at right angles to its original position, and its left curved back and resting on Stone river. No serious fighting occurred on Jan. 1. The lines were rectified and Rosecrans extended his left, placing one division under Col. Beatty on the east bank of the river in a position to enfilade a part of Bragg's line, making it necessary for Bragg to dislodge this division or abandon his line.

On Jan. 2 Breckinridge, by Bragg's order, assaulted Beatty's division, and by the force of his attack at first forced it back. The Union left in falling back, however, exposed the Confederates to a crushing artillery fire, by which they were stopped, and a vigorous countercharge drove them back to their original position.

No further attacks were made, and on the night of Jan. 3 Bragg withdrew to the Elk river. The Union force engaged was 43,400 men; its losses, 1,730 killed, 7,802 wounded, and 3,717 missing; total, 13,249, or 31 per cent. The Confederate force was 37,800; its losses, 1,294 killed, 7,945 wounded, and 1,027 missing; total, 10,266, or 28 per cent.

James Mercur.

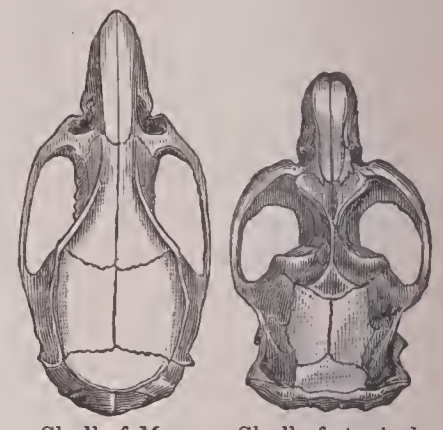
Murger, mür′zhā′, Henri: novelist; b. in Paris, Mar. 24, 1822; the son of a concierge and tailor. At the age of fifteen he was put into a notary's office, but found it uncongenial. The following year he became secretary to Count Leo Tolstoï. This position gave him independence and leisure to devote himself to writing. Little is known about his career during the next ten years. Probably he was leading the irregular and dissipated life of that artistic and literary Bohemia which he described so vividly in his best-known work, *Scènes de la vie de Bohème* (1848), of which he himself is thought to be the hero. In it the life of the Latin Quarter, with its mixture of gayety and wretchedness, youthful spirits and corruption, is reproduced with a realism that is relieved by touches of poetic feeling. Murger made himself the special painter of this life, and it furnished him most of the materials for his other novels, none of which equals the *Vie de Bohème*. D. in an asylum for the insane near Paris, Jan. 28, 1861. Among his other works are *Claude et Marianne* (1851); *Scènes de la vie de jeunesse* (1851); *Le dernier rendez-vous* (1852); *Le pays latin* (1852); *Adeline Protat* (1853); *Les buveurs d'eau* (1854). His poems were collected in one volume, *Les Nuits d'Hiver*.

A. G. Canfield.

Muriatic Acid: See Hydrochloric Acid.

Muric′idæ, or **Muric′inæ** [Mod. Lat., named from *Murex*, the typical genus]: a family of gasteropod molluscs, order *Rhachiglossa*, occurring mostly in the warmer seas. The shell has an anterior canal, and is ornamented by two or more series of thickenings (varices). The genera and species are numerous. One species is said to have been the source of the celebrated Tyrian purple. All the species are carnivorous. J. S. K.

Mu′ridæ [Mod. Lat., named from *Mus*, the typical genus = Lat. *mus*, *mu′ris*, mouse. See Mouse]: a large family of the rodent order and simplicidentate sub-order. The skull is well developed; the infraorbital foramen large, generally pyriform and contracted into a slit below (which is typically bounded externally by a plate of bone arising from the supramaxillary), and with a portion for the masseter muscle as well as for the infraorbital nerve; the lower jaw with the coronoid and condyloid processes in nearly the same vertical plane with each other and with the descending ramus, the last more or less twisted; molar teeth generally $\frac{3}{3}$ (rarely $\frac{4}{3}$ or $\frac{2}{2}$) $\times 2$; the hind legs are but moderately developed, and the animals normally progress by a running gait approaching to leaping; the tibia and fibula are united below; the metatarsal bones separate from each other; a cæcum is present. This family is by far the most extensive of the order, and contains more than 500 species, representing about fifty genera, which have been distributed among six sub-families—viz., *Murinæ*, to which the *Spalacinæ* and *Georhychinæ* are adjuncts, and *Arvicolinæ*, with which the *Siphneinæ* and *Ellobiinæ* are nearly connected. See Lemming, Mouse, Muskrat, and Rat. Revised by F. A. Lucas.



Skull of *Mus tectorum*. Skull of *Arvicola xanthognathus*.

Murillo. moo-reel′yō, Bartolomé Esteban: painter; b. at Seville, Spain, in 1613. The first instruction he received was from his cousin, Giovanni del Castillo. In order to earn his living he painted church banners and pictures for exportation to South America, and acquired great rapidity and facility of execution. After studying under Van Dyck and Pedro de Moya he visited Madrid, where his talent was recognized by Velasquez, who got him work at the Escurial, thus procuring him the means of remaining in that city, where he made numerous copies from Titian, Rubens, and Van Dyck. On his return to Seville in 1645 his work created a great sensation. He painted some large pictures for the convent of St. Francis, in which he showed himself to be a remarkable colorist; after these he painted *The Death of Santa Clara*, and *San Giovanni Giving Alms*. His fortune was made at last, and he had innumerable commissions. His most perfect works were produced at the age of thirty-five, and acquired for him the reputation of being the foremost of Spanish colorists. Among these are *St. Leander and St. Isidore*, and *St. Anthony of Padua*; also the pictures to adorn the Church of Santa Maria la Blanca, which are now in Paris. In 1667 and 1668 he directed the works in the cathedral, and painted an *Immaculate Conception* in one of its cupolas. The epoch of Murillo's greatest success was from 1670 to 1680, when, besides other works, he produced for the Capuchin church in Seville twenty-three pictures, which were sent to South America later. In 1687 he went to Cadiz to paint in the Capuchin church an altarpiece, *The Marriage of St. Catherine*, and while occupied on this picture he fell from the scaffolding. He returned to Seville,

but died from the effects of the injury Apr. 3, 1682. See Minor, *Murillo* (London, 1882), and Curtis, *Velasquez* and *Murillo* (1883). W. J. Stillman.

Murner, Thomas: clergyman and satirist; b., according to tradition, at Strassburg, Dec. 24, 1475; was educated in the school of the Franciscans, and ordained in 1494; studied theology at Paris and law at Freiburg in 1499. In 1506 he was made poet laureate by the Emperor Maximilian; taught logic at Cracow; became doctor of divinity, and led a roaming life, preaching in many cities and drawing large crowds by his witty sermons. Being an opponent of Luther, he was invited to come to England by Henry VIII., but he soon returned to Strassburg, where, in the meantime, the Reformation had been introduced. He fled to Switzerland and preached for a time at Lucerne, but was forced to flee again, and went to Heidelberg. Finally he received a small parish at Oberehenheim, Alsace, where he died about 1536. Murner was the greatest satirist of the sixteenth century, far more original and witty than Sebastian Brant, whom he followed in his earlier productions. His principal works are *Der Schelmen Zunft* (1512); *Die Narrenbeschwörung* (1512); and *Die Geuchmat* (1519), in which he mercilessly and with great power of language ridicules the follies of his contemporaries. Though he did not spare the clergy with his attacks, he was nevertheless opposed to the Reformation as an unjustified innovation of the individual Luther. He answered the numerous libels which, on this account, were heaped upon him by the Lutherans in the best and most stinging of his satires, *Von dem grossen lutherischen Narren* (1522). The hatred of his religious opponents has followed Murner up to modern times, blackening and defaming his character, and not until recently has history begun to do justice to this extraordinary man. See Lappenberg, *Murners Ulenspiegel* (1854); K. Goedeke, *Murners Narrenbeschwörung* (1879); G. Balke in Kürschner's *Deutsche Nationalliteratur* (vol. xvii.); Kawerau, *Thomas Murner und die Kirche des Mittlelalters* (1890); M. Spanier in Paul and Braune's *Beiträgen* (xviii., 1–72). Julius Goebel.

Murphy, James Gracey, LL. D., D. D.: clergyman and author; b. in the parish of Comber, County Down, Ireland, Jan. 12, 1808; was educated in the Royal Academical Institution at Belfast and Trinity College, Dublin, where he spent three years as sizar and three as scholar; was minister at Ballyshannon 1836–41; classical head master in the Belfast Academical Institution 1841–47; Professor of Hebrew in the Assembly's Theological College at Belfast from 1847 till he retired at his own request in 1888. He has published *A Latin Grammar* (London, 1847); *A Hebrew Grammar* (1857); *Nineteen Impossibilities in Colenso's Pentateuch* (Belfast, 1863); *The Human Mind* (Belfast, 1873); *Commentaries on Genesis* (Edinburgh, 1864; Andover, 1866); *Exodus* (Edinburgh, 1866; Andover, 1868); *Leviticus* (Andover, 1872); *Psalms* (Edinburgh, 1875); *Revelation* (London, 1882); *Chronicles* (Edinburgh); *Daniel* (London, 1884); and *Sacrifice in Scripture* (London, 1889).
C. K. Hoyt.

Murphy, John Francis: landscape-painter; b. at Oswego, N. Y., in 1853; was elected member of the Society of American Artists in 1883; National Academician 1887; member of the American Water-color Society; was awarded the Webb prize at the Society of American Artists in 1887; second Hallgarten prize, National Academy, 1885. His pictures are notable for harmonious color schemes. Studio in New York. W. A. C.

Murphysboro: city; capital of Jackson co., Ill. (for location of county, see map of Illinois, ref. 10–D); on the Big Muddy river, and the Chi. and Tex., the Mobile and O., and the St. L., Alton and Terre H. railways; 6 miles W. of Carbondale, 90 miles S. E. of St. Louis. It is in an agricultural and coal-mining region; contains 8 churches, 2 public-school buildings with 23 departments, including a high school, 2 national banks with combined capital of $100,000, and 2 daily and 2 weekly newspapers; and has manufactories of flour, lumber, fire-brick, ice, mineral waters, and cigars. Pop. (1880) 2,196; (1890) 3,880; (1900) 6,463.
Editor of "Era."

Murray, Alexander, D. D.: Semitic scholar; b. at Dunkitterick, Kirkcudbrightshire, Scotland, Oct. 22, 1775, the son of a shepherd. He displayed from childhood extraordinary proficiency in the acquisition of languages, and was enabled to enter the University of Edinburgh at the age of nineteen. He took orders in the Church of Scotland, and after serving in several parishes was elected in 1812 Professor of Oriental Literature at the University of Edinburgh. His knowledge of Semitic languages procured from the widow of James Bruce a commission to classify the extensive collection of manuscripts formed by that traveler, and also to bring out a second thoroughly revised and annotated edition of Bruce's *Travels in Abyssinia*, which appeared in 1807 (7 vols.), accompanied by a *Life* of the author. In 1812 he published *Outlines of Oriental Philology, comprehending the Grammatical Principles of the Hebrew, Syriac, Chaldee, Arabic, and Abyssinian Languages*, a manual intended for the use of his students. D. at Edinburgh, Apr. 15, 1813. He left in MS. a *History of the European Languages, or Researches into the Affinities of the Teutonic, Greek, Celtic, Sclavonic, and Indian Nations*, published at Edinburgh in 1823 (2 vols).

Murray, David, Ph. D., LL. D.: educator; b. at Delhi, N. Y., Oct. 15, 1829; graduated at Union College in 1852; was successively a professor and principal of the Albany Academy from 1853 to 1863, and from 1863 to 1873 Professor of Mathematics and Physics in Rutgers College. In 1873 he entered the service of the Japanese Government as foreign adviser to the department of education. He is the author of a *Manual of Land Surveying* (New York, 1872), a contributor to Mori's *Education in Japan* (New York, 1872), and the editor of an *Outline History of Japanese Education* (New York, 1876) and *The Story of Japan* (New York, 1894). He returned from Japan in 1878, became secretary of the board of regents of the University of the State of New York, and resigned in 1888.

Murray, George Henry: See the Appendix.

Murray, Sir Herbert H.: See the Appendix.

Murray, Hugh: geographer; b. at North Berwick, Scotland, in 1779; became at an early age a clerk in the excise office at Edinburgh, and devoted his leisure to literature, especially to geography. He edited *The Scots' Magazine*, contributed to *The Edinburgh Gazetteer* and the *Transactions* of the learned societies, and wrote for the Edinburgh Cabinet Library seven volumes of *History of Discoveries and Travels*—namely, *Africa* (2 vols., 1817), *Asia* (3 vols., 1820), and *North America* (2 vols., 1829): and ten volumes of descriptive geography—namely, *British India* (3 vols.), *China* (3 vols.), *United States of America* (3 vols.), and *Marco Polo's Travels* (1 vol., 1839). His principal work was the *Encyclopædia of Geography* (1834). D. in London, Mar. 4, 1846.

Murray, James A. H., LL. D.: lexicographer; b. at Denholm, Roxburghshire, Scotland, in 1837; taught school for some time in Hawick; was foreign correspondent in the Oriental Bank, London; graduated at London University, and while senior assistant master of Mill Hill School became in 1879 president of the Philological Society and editor of the *New English Dictionary* (see Dictionary); the presidency he again held in 1880. He is thoroughly familiar with most European and many Oriental languages, and became widely known as a philologist through his *Dialect of the Southern Counties of Scotland* (in *Trans. Lond. Philol. Soc. 1870–72*, London, 1873). For the Early English Text Society he edited the minor poems of Sir David Lyndesay (1871); *The Complaynt of Scotlande* (1872); and *The Romance and Prophecies of Thomas of Erceldoune* (1875). In 1884 he was honored with an annual civil-list pension of £270.

Murray, James Clarke: philosophical writer; b. in Paisley, Scotland, Mar. 19, 1836; was educated at Glasgow and Edinburgh Universities, and spent some time at Göttingen and Heidelberg. In 1862 he was appointed Professor of Mental and Moral Philosophy in Queen's University, Kingston, Canada, and since 1872 he has held the same chair in McGill University. He has published *An Outline of Sir William Hamilton's Philosophy* (Boston, 1870); *The Ballads and Songs of Scotland* (London, 1874); *Memoir of David Murray* (Paisley, 1881); *Handbook of Psychology* (London, 1885); *An Introduction to Ethics* (Boston, 1891).
Neil Macdonald.

Murray, or **Moray**, James Stuart, Earl of, known in Scotch history as the "good regent": b. about 1533; was a natural son of James V. by Lady Margaret Erskine, who afterward married Sir Robert Douglas of Lochleven; was made by his father commendator of the priory of St. Andrews in 1538, and subsequently acquired the priory of Pittenweem and that of Maçon in France, with a dispensa-

tion to hold three benefices, and took in 1544 an oath of fealty to Pope Paul III. In 1547 he accompanied his half-sister Mary (afterward Queen of Scots) to France, and in the following year repelled a descent of Lord Clinton upon the island of St. Monan, on the coast of Fifeshire. In 1556 he joined the Scottish Reformers, and soon assumed the political leadership of the Protestant party. He was one of the Scottish commissioners to witness Mary's marriage to the Dauphin of France (1558); was appointed member of the council for civil affairs Dec., 1559, and one of the lords of the articles June, 1560; was sent as envoy to France Apr., 1561, to invite Mary to return to Scotland as queen, and on her arrival in August became her prime minister and chief adviser, protecting the Protestants in the enjoyment of their religious privileges, while he insisted upon the queen's right to worship according to her Catholic antecedents. In Feb., 1562, he was created Earl of Mar, and soon afterward married Lady Agnes Keith, daughter of the earl marischal, but in the same year resigned the title of Mar in favor of his uncle, Lord Erskine, who claimed it by right, and received in its stead the earldom of Murray; defeated the rebel Earl of Huntly at Corrichie, and governed Scotland with prudence, though incurring the displeasure of Knox and the extreme Protestants by his studied neutrality in the religious conflict then beginning. In 1565 he took up arms to prevent Mary's marriage with Darnley, but was defeated and escaped into England. He was recalled in 1566, and arrived at Edinburgh the day after the assassination of Rizzio, to which he was supposed to have been accessory, as also to the murder of Darnley in the following year, though his complicity in the latter crime is much less certain. He left Edinburgh the day before that event, and proceeded to France, also visiting Queen Elizabeth in England; returned to Scotland and induced Mary to abdicate July 22. He was proclaimed regent Aug. 22; defeated his sister's forces at Langside May 13, 1568, and firmly established his authority; at the trial of Mary at York for the murder of Darnley, gave his testimony against her, and produced as evidence the famous "casket letters," the authenticity of which has ever since been warmly debated. Murray ruled with skill and success until he was assassinated in the streets of Linlithgow by James Hamilton of Bothwellhaugh, Jan. 21, 1570.

Murray, John: publisher; b. in London, Nov. 27, 1778; son of a Scotchman named John McMurray (b. in Edinburgh, 1745; d. in London, Nov. 16, 1793), who founded a prosperous bookselling shop in London. Succeeding at the age of fifteen to his father's business, young Murray ultimately became the friend and liberal patron of a famous circle of literary men, most of whose works he published. Among them were Byron, Moore, Campbell, Crabbe, Irving, and Gifford, the latter of whom edited for many years Murray's *Quarterly Review*, founded in 1809 as a Tory organ in opposition to *The Edinburgh Review*. In 1812 Murray removed his business from Fleet Street to Albemarle Street, where it still remains. D. in London, June 27, 1843.—His son, bearing the same name, b. in 1808, and educated at the University of Edinburgh, edited a series entitled the *Home and Colonial Library*, personally superintended the preparation of the well-known *Murray's Handbooks of Travel*, and brought out, among others, the works of Hallam, Grote, Milman, Layard, Wilkinson, Rawlinson, William Smith, Lyell, Murchison, Livingstone, and Darwin. In 1869 he established *The Academy*, a scholarly literary and critical weekly paper. Revised by H. A. Beers.

Murray, John: naturalist; b. in Coburg, Ontario, 1849, of Scotch ancestry. His early education was received at Coburg, and at sixteen he was sent to the University of Edinburgh, where he took honors in natural and physical sciences, doing much of his work in the physical laboratory under Prof. Tait. In 1867 he began the marine investigations with which his name is so intimately connected. In that year he went on an expedition to Spitzbergen and Greenland, and in 1872 was appointed one of the naturalists of the Challenger Expedition (*q. v.*). On the return of the expedition he was appointed by the British Government as first assistant under Sir Wyville Thomson on the staff to prepare the final report on the scientific results of the expedition. On the death of Thomson he became director of the staff, and under his editorship fifty fully illustrated volumes have been issued. Of these he prepared the volume of the summary of results, and was joint author of the volumes on deep-sea deposits and the narrative of the cruise. In 1880–82 he had charge of the scientific work on the deep-sea expeditions of the Knight Errant and Triton in the North Atlantic. He is the author of numerous scientific papers, largely upon physical geography and oceanography, and is a member of numerous learned societies. He received the degrees of LL. D. from Edinburgh, D. Sc. from Cambridge, and Ph. D. from Jena. He resides at present in Edinburgh. J. S. Kingsley.

Murray, Lindley: grammarian; b. in Swatara, near Lancaster, Pa., Apr. 22, 1745; removed in 1753 to New York with his father, a Quaker merchant; was admitted to the bar in 1776; became a successful merchant of New York, and in 1784 retired from business; settled in Holdgate, near York, England, and devoted himself to literary pursuits; best known by his *English Grammar* (1795), which was for many years regarded as the best authority on the subject, and had a prodigious currency, particularly in Great Britain; published also an *English Reader*, a spelling-book, and other educational works, an *Autobiography*, and some religious works. D. in Holdgate, Feb. 16, 1826.

Murray, William: See Mansfield, Earl of.

Murray, William H. H.: See the Appendix.

Murray, William Vans: lawyer and statesman; b. in Maryland in 1762; received a classical education; went to London after the peace of 1783, and studied law in the Temple for three years; was elected a member of the Maryland Legislature on his return, and sat in Congress 1791–97; took a very prominent part in the early legislation of the U. S., and had few superiors in erudition, eloquence, wit, judgment, or skill in debate. He was appointed by Washington minister to the Netherlands in 1797, and became envoy to France in 1799, where the convention signed at Paris Sept. 30, 1800, which put an end to the serious difficulties between the U. S. and France, was mainly his work. He returned to his post at The Hague, where he remained until Dec., 1801. D. at Cambridge, Md., Dec. 11, 1803. He was the author of a treatise on *The Constitutions and Laws of the United States.*

Murray Bay [named from Gen. Murray, governor of Quebec in 1759], or **Malbaie**: a watering-place on the north shore of the St. Lawrence, in Charlevoix County, Province of Quebec; about 90 miles E. of city of Quebec (see map of Quebec Province, ref. 3–F). The bay on which the village is built is the estuary of the Murray river, which drains the region of a thousand lakelets. The scenery around the village is very picturesque, with frowning hills behind and beetling cliffs in front. Though the water of the bay continues cold during the greater part of the summer, the sea-bathing is one of the attractions of the place. The population of the parish is 3,500. There are two churches, and the river affords very good motive-power for a number of saw-mills. The place is reached from Quebec by steamer. J. M. Harper.

Murray River: the principal river of Australia; rises on the western slope of the Australian Alps, and falls into Encounter Bay in lat. 35° 26′ S., after a tortuous course of 1,200 miles. Its mouth is too shallow to be entered by large vessels, but the lower portion is navigable. The chief tributaries are the Murrumbidgee and the Darling, both on the N. The latter is longer than the entire Murray, but it is a desert river with little water, except after severe local storms. The entire basin of the Murray (including the Darling) is about 240,000 sq. miles.

Murree: a town and sanitarium of the Punjaub; 30 miles N. E. of Rawal Pindi; on the upper slopes of Murree Mountain; from 6,200 to 6,500 feet above sea-level (see map of N. India, ref. 3–C). It is in summer the seat of the government, and is connected with Rawal Pindi by a good wagon road. The temperature ranges from 17° F. to 99° F., but the place is cool even during the summer, averaging about 65° F. It has several large hotels, a school for the education of the children of European soldiers, and a brass-foundry, and is the center of a large business. Pop. 2,500; in summer, 12,000 to 14,000. M. W. H.

Murshedabad′: town of British India, in Bengal; on the Bhagirathi river (see map of N. India, ref. 7–I). It was formerly the capital of Bengal, and is a large and straggling town, extending along the river for a distance of nearly 8 miles. With exception of the palace and some mosques, it is meanly built, its houses being mostly mud huts. It is situated on the main road between Calcutta and the Northwest Provinces, and has an important trade. Pop. (1881) 39,231. Revised by C. C. Adams.

Musæ'us (in Gr. Μυσαῖος): 1. A singer, seer, and priest who flourished in the times before Homer. He was a pupil or son of Orpheus (*q. v.*), and introduced hymns and other sacred poetry into Attica. His poems were collected by Onomacritus, who forged many of them. 2. A grammarian who imitated Nonnus (*q. v.*), and wrote an epic poem on the story of Hero and Leander, edited by Passow (Leipzig, 1810) and by Dilthey (Bonn, 1874). See also Schwabe, *De Musæo Nonni imitatore* (Tübingen, 1876). 3. An epic poet of Ephesus, lived in Alexandrian times, and wrote a *Perseïs* and poems in honor of Eumenes and Attalus. See Düntzer, *Fragmente der epischen Poesie* (Cologne, 1840).

J. R. S. Sterrett.

Musä'us, Johann Karl August: author; b. at Jena, Mar. 29, 1735; studied divinity; became in 1763 governor of the court pages at Weimar, and in 1770 became a professor in the gymnasium. D. at Weimar, Oct. 28, 1787. He is remembered as the author of *Volksmärchen der Deutschen* (1782), a collection of pleasing tales, for a long time very popular. He wrote also *Grandison der Zweite* (1760); *Physiognomische Reisen* (1778–89), against Lavater; *Freund Heins Erscheinungen* (1785); and *Straussfedern* (1787–97), which show the influence of Wieland. See *Life* by Müller (1867).

Revised by Julius Goebel.

Musca: See Fly.

Muscadine [from Fr. *muscadin*, musk-lozenge; from Late Lat. *mus'cus*, musk, whence Eng. *musk*]: name applied to a species of grape (*Vitis rotundifolia*), indigenous to the southern parts of the U. S. It is also popularly called bullace or bullitt grape, and fox-grape. The white scuppernong grape, which is one of its varieties, is much esteemed.

Mus'cæ Volitan'tes [Lat., liter., flitting flies]: a name given to the black, or more rarely very bright, floating objects which sometimes seem to appear before the eyes. If fixed and permanent black spots appear, moving with one or both of the eyes, there is reason to suspect organic disease of the eye, and an expert oculist should be consulted. If the spots fall or swarm upward, it is believed that they are caused by small and unimportant opacities floating in the humors of the eyes.

Muscat, or **Mascat**: an imamate in Arabia with indefinite boundaries; one of the eight divisions of Oman, lying S. W. of the Gulf of Oman and included between 22° and 27° N. lat. and 53° and 58° E. lon. This has been its general outline since 1856. It comprises also a narrow strip of land along the shores of Laristan and Moghestan. The coast-line, sometimes low, presents generally a succession of high precipitous rocks. Between and behind these cliffs, as well as far inland, are frequent patches of land which artificial irrigation renders marvelously fertile. Cotton, rice, maize, coffee, and tropical fruits of every sort are produced in abundance. There are no rivers but many springs. The climate is exceedingly unhealthful for Europeans, a dry, burning heat continuing for long periods night and day. The imam is the merchant-in-chief, practically controlling all the business relations of his subjects, which he regulates in accordance with his own interests. No reliable estimate of the population or extent of the imamate has ever been made.

E. A. Grosvenor.

Muscat, or **Maskat**: capital of Oman, an independent state of Southeastern Arabia; in a fertile plain in lat. 23° 38′ N., lon. 58° 40′ E., surrounded by gardens and plantations of date-palms, on the border of an inlet of the ocean which forms a spacious and safe harbor (see map of Persia and Arabia, ref. 7–J). The city is fortified, but rather poorly built. Its inhabitants consist of Arabs, Hindus, Negroes, and Jews, and carry on a very important trade in coffee, pearls, salt fish, dyestuffs, and other Persian and Arabian goods. The population is variously given at from 20,000 to 60,000. See Muscat in the Appendix.

Muscatine: city (settled under the name of Bloomington in 1836, incorporated as a city in 1853); capital of Muscatine co., Ia. (for location of county, see map of Iowa, ref. 6–K); on the great bend of the Mississippi river, and the Cin., Rock Is. and Pac., and the Burl., Cedar Rap. and N. railways; 30 miles W. of Davenport, 203 miles W. of Chicago. It contains 17 churches, 9 public-school buildings, 2 commercial colleges, several parochial schools, Commercial Club building, Young Men's Christian Association building, a national bank with capital of $50,000, a savings-bank with capital of $60,000, 2 private banks, and 2 daily and 5 weekly newspapers. The manufactories include large sawmills, sash, door, and blind factories, iron-rolling mill, oat-meal mill, large box-factory, plumbing-supply factory, woven-wire picket-fence factory, brick and tile works, iron-foundries, marble-works, cigar-factories, pearl-button works, machine-shops, potteries, carriage, wagon, and harness factories, and large pickling-works. The natural slope of the ground affords excellent drainage, the streets are lighted by gas and electricity, the river is here crossed by a wagon bridge, and the city has electric railways. Pop. (1880) 8,295; (1890) 11,454; (1900) 14,073.

Manager of "Journal."

Musch'elkalk [= Germ.; *muschel*, shell + *kalk*, lime]: in Germany, a great limestone, belonging in the middle of the Triassic period, and resting, typically, upon the Bunter sandstone, and covered by the Keuper or red marl beds. It is named for its abundant fossils, and supplies lime, marl, rock-salt, gypsum, and building-stone.

Musci: plural of *Muscus*, a class of plants. See Mosswort.

Muscle [O. Eng. *muscle*, from Lat. *mus'culus*, muscle, mussel, liter., dimin. of *mus*, mouse, which some muscles resemble in form]: the tissue through the direct agency of which the various movements of animals are effected. Very early in embryonic life a part of the great mesodermic layer differentiates into elongated elements distinguished by the possession of contractility in limited and definite directions; these elements form the muscular tissue, whose minute structure is described in detail in Histology (*q. v.*). In man and the higher animals muscular tissue is separated into two varieties, *voluntary* and *involuntary*, according to its control by the will or independence of action: the voluntary muscle constitutes the great masses of sarcous substance or "flesh" of animals by which the various movements are carried out at will; the involuntary muscle, on the contrary, forms the walls of the hollow organs, as the stomach, intestines, blood-vessels, etc., whose contractions are beyond the control of volition. The number of individual contracting bands or "muscles" increases with the subdivision of labor and the specialization of action in the higher types, in man over two hundred distinct muscles being recognized. The close association of these organs with the skeleton separates them into the corresponding groups of the muscles of the *axis* and those of the *extremities*, many of the latter group passing from the more fixed points of the axial skeleton to the upper parts of the freely moving limbs. The more rigid point of attachment of a muscle is spoken of as its *origin* in contrast to its *insertion* or attachment to the part moved; in many cases, however, the position of greatest fixation varies from time to time with the particular action to be secured. Muscular tissue is attached to other parts by means of dense white fibrous tissue, usually in the form of *tendons* or of aponeurotic expansions; in early life the tendons are relatively small and exceedingly pliant, as evinced by the greater suppleness and agility of youth as contrasted with the increasing rigidity of age due to the invasion of the muscular tissue by the encroaching tendinous structures. See Histology.

G. A. Piersol.

Muscle-reading, or so-called **Mind-reading**: the apparent detection of the thoughts of another from simple muscular contact with him. This phenomenon, under the phrase mind-reading, has given rise to much mystification of audiences and many extravagant claims to powers of clairvoyance, etc. It has now been shown by a number of well-planned experiments that it is impossible to think intently of directions, figures, etc., without making very slight muscular movements, or twitchings, or tensions in the direction or around the figures thought of. The muscular system reflects in a very remarkable way the course of thought through all its concrete imagery. It is therefore possible that certain persons, of delicacy of touch and with training, should be able by simple contact to interpret these slight movements of the hand-muscles of another, and so to seem to divine his thoughts directly. The most interesting experiments, apart from those on hypnotic subjects, were reported by Prof. Joseph Jastrow. (See articles on *Involuntary Movements*, *Popular Science Monthly*, Apr., Sept., 1892.) The performances of many well-known operators can probably be explained in this way—i. e. Cumberland, Bishop, Randall Brown, etc. On the claims to mind-reading in which the influence of muscular movement is not so evident, see Telepathy.

J. Mark Baldwin.

Muscle-sense: the sense which reports feelings of the activity of the muscles of the body as concerned in movement. It is in its development the earliest of the senses. As to the existence of such a class of sensations as seen in lifting, pushing, straining, and in the weariness that follows muscular exertion, there is no doubt. Beaunis finds that a singer retains control over the vocal chords after their sensitiveness to touch has been destroyed by cocaine. Clinical cases show the same for the limbs. This indicates that the skin is not the exclusive organ of muscular sensations. Further than this the muscular sensations have characteristics peculiar to themselves.

First, there seems to be a consciousness of the state of the motor apparatus as a whole, as capable or incapable of the movement in question. It is felt in the system as a disposition or indisposition for action. Considered as a state of readiness or the contrary, it may be called feeling of *motor potential.* It seems to be plain in the different consciousness we have of the power of the right and left arms respectively.

Fatigue is another general sensation classed here. It takes on a peculiar character according as the fatiguing movement is voluntary or mechanical; at least voluntary movement is more fatiguing than mechanical movements. No doubt in the case of voluntary movement more nervous energy is employed; and it seems equally clear that in the case of voluntary movement the higher nervous centers are more taxed. Mosso and Waller have shown that there is both nervous and muscular fatigue. Simple intellectual work exhausts the muscles as well as the brain.

Combined with touch, the muscular sense affords us knowledge of extension and force, and contributes important elements to our consciousness of self and the world. Sensations of contact, repeated on successive portions of the skin or by the same portion on different parts of the object, present data for the projection of a flat surface. It is by pressure added to these sensations that we come to apprehend depth. It is sufficient to remark this here. Spencer, speaking of the sensation of resistance as involving that of effort, says: "This sensation is at the bottom of our conception of the material universe, for extension is (as apprehended) only a combination of resistances; movement is the generalization of a certain order of resistances; and resistance is also the substance of force." For the general bearings of the muscular consciousness and its place in psychological theory, see PSYCHOLOGY and WILL.

Kinæsthetic sensations are sensations arising directly from the movements or positions of the members of the body as reported by the afferent or sensor nerves. See SENSATIONS.

Besides the particular and more or less clearly localized feelings (such as those due to passage through the air, stretching of the skin, etc.), there seems to be a sense of whereness or *massive locality* of the limb, as a whole, in reference to the body.

Kinæsthetic Sensations as Immediate or Remote.—The sensations of movement heretofore described have their stimuli in the organ itself which makes the movement. Such feelings are *immediate.* On the contrary, such movements may themselves serve to stimulate one or other of the special senses, giving a new class of sensations which report the movement. Such movement reporting sensations from other senses are *remote* kinæsthetic. For example, when I move my arm with my eyes shut and in the presence of noises which prevent my hearing the rustle of my clothing, etc., my sensations of movement are immediate. I now open my eyes and see the arm move and listen attentively and hear it; the optical and auditory sensations now added to my consciousness are remote kinæsthetic feelings. It is important to note that our feelings of movement are perhaps never free from these contributions from remote sources. They almost always enter in a complete statement of the case. See James, *Principles of Psychology* (New York, 1890, pp. 488 ff., vol. ii.).

The nervous arrangement which underlies this confluence of immediate and remote sensations is an illustration of the dynamic unity of the brain as a whole. The activity of one center stimulates the other directly, and both discharge into the motor course with which one is immediately and the other remotely connected, as is clearly illustrated by cases in which patients are unable to move their limbs as long as their eyes are closed, but can do so when they see their limbs. This means that the direct channel into the limb center is blocked, but the indirect channel through the visual center is still open. (See INNERVATION.) On the other hand, instead of re-enforcing a discharge, a remote sensation or memory may inhibit it altogether, as where our sense of the great distance of a desired object obtained through the eyes leads us to give up altogether the effort to reach it.

Furthermore, what is true of sensations in general as regards their possible reproduction or memory is true of these states of the sensibility. From the nervous point of view, any form of stimulus which excites the kinæsthetic center or centers may bring up images of movement, and may, through these images, serve to start a brain process which issues in a series of real movements. What we may call the motor or stimulus value of these sensations is accordingly preserved in a weaker degree in the motor or stimulus value of their memories, both immediate and remote. For literary references, see PSYCHOLOGY. J. MARK BALDWIN.

Muscogees: See MUSKHOGEAN INDIANS.

Mus'covite [named from *Muscovy*, the ancient name of Russia]: the most common species of mica, otherwise known as common or potash mica. Muscovite occurs crystallized in hexagonal prisms, belonging to the orthorhombic system; also in scales and plates, which are sometimes aggregated into stellate and plumose groups. It is remarkable for its eminent cleavage parallel to the base of the prism, the thin folia being separated easily by the thumb-nail. Its hardness on the cleavage planes is from 2 to 2·5, and its specific gravity from 2·75 to 3·1; its luster varies from pearly to metallic, and its color from white to gray, pale green, greenish yellow, and brown. It is remarkably elastic. In composition muscovite is a silicate of alumina, potash, and iron (silica, 43 to 50 per cent.; alumina, 31 to 39 per cent.; potash, 5 to 12 per cent.; ferric oxide, 1 to 8 per cent.). The name muscovite (or, as it was formerly called, Muscovy glass) is in allusion to its use in Russia as a substitute for glass in windows. In the U. S. it is largely used, under the misnomer of "isinglass," for the same purpose in stoves. It is one of the more abundant minerals, occurring in plutonic and metamorphic rocks, and also in broken flakes in many unaltered sandstones and clays, which are hence described as "micaceous." See MICAS.

Muscovy Duck: a South American duck (*Cairina moschata*) about 2 feet in length, and, in its wild state, of a black color with blue and green reflections. The species has been extensively domesticated, and its name is a perversion of musk-duck, applied to the bird on account of its peculiar odor. F. A. L.

Muses [plur. of *Muse*, viâ Fr. from Lat. *Mu'sa* = Gr. Μοῦσα, Muse, usually in plur. Μοῦσαι, Muses]: in Greek mythology, the daughters of Zeus and Mnemosyne (Memory). They were fountain nymphs, who were worshiped in the groves and grottoes, and at the fountains of Olympus and Helicon, whose waters were thought to inspire song. From fountain nymphs they were exalted to the rank of goddesses of song, to whom poets prayed for inspiration. Later on they are the patrons of the different kinds of poetry and of the arts and sciences. So Calliope, she of the beautiful voice, is the muse of epic poetry; Clio, she who makes famous, the muse of history; Euterpe, she who makes glad, the muse of lyric poetry; Melpomene, she who sings, the muse of tragedy; Terpsichore, she who rejoices in the dance, the muse of the dance; Erato, the lovely one, the muse of erotic poetry; Polyhymnia, or Polymnia, the rich in hymns, the muse of sacred song; Urania, the heavenly one, the muse of astronomy; Thalia, the blooming one, the muse of comedy and idyllic poetry. In art Calliope is represented with a tablet and stilus in her hand, Clio with a scroll, Euterpe with a double flute, Melpomene with a tragic mask in her hand and a chaplet of ivy on her head, Terpsichore with a lyre and plectrum, Erato with a stringed instrument, Urania with a globe, and Thalia with a comic mask and shepherd's crook in her hands and a chaplet of ivy on her head. Polyhymnia has no distinguishing attributes, though she is easily recognized by her ample dress, and grave and thoughtful demeanor. Even after the Muses had become goddesses of song, it was not forgotten that they were originally fountain nymphs, and so their sanctuaries were situated at fountains. Fountains in which the Muses took especial delight were the Castalia, at the foot of Mt. Parnassus at Delphi, and the Aganippe and Hippocrene on Mt. Helicon. Epithets taken from the various seats of their cult were applied to them—e. g. Pierian, Castalian, and many others. Apollo was the leader of the Muses (*Musagetes*). By reason of their connection with dramatic poetry

they were especially near to Dionysus, whose nurses and companions they were. J. R. S. STERRETT.

Muse'um [= Lat. = Gr. Μουσεῖον, temple dedicated to the Muses, hence a place for study, literature, art, etc.; liter., neut. of μουσεῖος, pertaining to the Muses, deriv. of Μοῦσαι, Muses]: an institution for the preservation of works of art, antiquities, and objects of natural history, and for their utilization in research, and in the culture and enlightenment of the people. Originally, museums were places sacred to the Muses, such as the groves of Parnassus and Helicon; later, temples in various parts of Greece were known by this name; and still later the meaning of the word changed, and it was applied to a place of study or a school. Athenæus in the second century spoke of Athens as "the museum of Greece." The Museum of Alexandria, founded by the Ptolemys, B. C. 296, was a portion of the palace at Alexandria, which was set apart for the study of the sciences, and contained the great Alexandrian library; this was really a great university, the abiding-place of men of science and letters, who were divided into many companies or colleges, for the support of each of which a large revenue was allotted. After the burning of the Alexandrian Museum, the term museum, as applied to a great public institution, dropped out of use until the seventeenth century. The disappearance of the word is an indication of the fact that the idea for which it stood had also fallen into disfavor. It was not until the modern arts and sciences had been born, and a distinct literary and scientific class had been developed, that it was possible for the modern museum to come into existence, although there had always been collections of works of art and objects of natural history in many parts of the world.

The idea of a great national museum of science and art of the modern type was first outlined by Bacon in his *New Atlantis*, and the British Museum, founded in London in 1753, containing collections of books and manuscripts, as well as works of art and nature, was in some degree a realization of that plan. This institution is, at least to English-speaking people, the most important in the world bearing the name of museum, partly because of its magnificent library, and also from its unrivaled archæological collections—Egyptian, Assyrian, Oriental, Greek, Roman—prehistoric and mediæval; its coins, its manuscripts, and its prints. The equally important natural history departments were removed in 1883 from Bloomsbury, where the parent institution still stands, to new quarters near the Art Museum in South Kensington, and placed under the control of a director, who is practically independent of the executive officer of the British Museum, its principal librarian. In modern usage the museum is always separated from the library.

Museums may be classified in two ways—(1) by the character of their contents, or (2) by the object for which they were founded. Under the first head they may be grouped as follows: (1) Museums of art; (2) historical museums; (3) anthropological museums; (4) natural history museums; (5) technological museums; (6) commercial museums. Under the second category they may be classed as (1) national museums, these being often in groups rather than combined in one; (2) local, provincial, or city museums; (3) college museums; (4) professional or class museums. The museum of art is the depository for the most precious material products of man's creative genius—paintings, sculptures, architecture (so far as it can be shown by models, drawings, and structural fragments), and specimens of the illustrative arts, such as engravings, and illustrations of the application of decorative uses. Perhaps the oldest museum of art, and one which is still among the most important, is that founded by Cosmo de' Medici in Florence at the beginning of the sixteenth century. It is preserved in the Uffizi Gallery, and is connected by a bridge across the Arno with a similar collection, of more recent origin but under the same administration, known as the Pitti Gallery, which is especially rich in paintings of the Italian schools.

Every city in Italy has its art museum. The Vatican Gallery in Rome is one of the most celebrated, including most important collections in painting and antique sculpture, besides numerous other departments; while the Capitoline Museum and the Lateran Museum contain treasures of the greatest importance. The Museo Borbonico at Naples is rich in similar collections, and includes also most important archæological material from Herculaneum and Pompeii, from excavations of Etruscan cities and from Egypt. The Gallery of Bologna; the Academy of Fine Arts at Venice, with its works by Titian, Tintoretto, and Veronese; the Brera and the Ambrosian Galleries in Milan; the museums of Turin, Modena, Padua, Ferrara, Brescia, and Perugia are remarkable, as well as that at Parma, particularly rich in the works of Correggio; and the Academy of Fine Arts at Siena, devoted to the work of the early Tuscan artists.

The art museums of France are next in importance to those of Italy. The Louvre, founded in 1793, is one of the richest in the world as regards not only painting and sculpture, but all other subjects which fall within the limits of a museum of art, and is supplemented by the Luxembourg Museum, containing the masterpieces of living artists, the Museum of the School of Fine Arts, and the Musée des Thermes, or Cluny Museum, devoted to the decorative arts of the Middle Ages. Every considerable city in France has its own collections, those of Lyons, Dijon, Bordeaux, and Toulouse being among the most important.

In Germany, those of Berlin—the Old Museum and the New Museum—those at Munich—the Pinakothek and the Glyptothek—and that of the Zwinger in Dresden, the resting-place of the Sistine Madonna, are the richest, while those of Cologne, Frankfort-on-the-Main, Darmstadt, Ratisbon, Weimar, and Breslau also deserve special mention. In Austria-Hungary, the Belvidere Museum at Vienna is one of the highest rank; in Russia, the Hermitage Museum at St. Petersburg; in Spain, the Prado at Madrid; in Belgium, those of Antwerp and Brussels; and in Holland, those of Rotterdam and The Hague.

The National Gallery in London has an excellent collection of paintings of all schools. The South Kensington Museum, near London, is connected with the department of science and art, and is especially rich in material for instruction in all the arts of design; and there are collections in most of the cities of the United Kingdom.

In the U. S., the Museum of Fine Arts in Boston, the Metropolitan Museum of Art in New York, the Museum of Fine Arts in Cincinnati, the Corcoran Art Gallery in Washington, the Museum of Fine Arts in St. Louis, the Academy of Fine Arts in Philadelphia, the Art Institute of Chicago, and the Walters collection in Baltimore are the most important. The museums in the U. S., however, are far from rich in materials illustrating the earlier periods in the history of painting and sculpture.

The museums and galleries just enumerated should be regarded only as types. So many hundreds of important museums, public and private, exist, that it is impossible even to mention them by name. Besides these general collections, there are special museums devoted to the work of single masters, such as the Thorwaldsen Museum in Copenhagen, and the one at Brussels containing only the works of the eccentric painter Wiertz, the Donatello Museum in the Bargello at Florence, and the Michelangelo collections in its Academy of Fine Arts and in the Casa Buonarrotti.

Museums of history are intended to preserve objects associated with the events in the history of nations or races, or illustrating their condition at different periods in their national life. Every museum of art and every archæological museum is also a museum of history, by reason of its wealth of portraits of historical personages, pictures of historical events, and the delineations of customs, costumes, architecture, and race characteristics. Historical museums are manifold in character, and of necessity local in interest. Some relate to the histories of provinces and cities. One of the oldest and best of these is the Märkisch Provinzial Museum in Berlin. Conspicuous among these also are the Museum of the City of Paris in the Hôtel Carnavalet, and the museums of the cities of Brussels and Antwerp. Some historical museums relate to a dynasty, as the Museum of the Hohenzollerns in Berlin. The cathedrals of Southern Europe and St. Paul's in London are in some degree national or civic museums. There are special museums, either devoted to single men—like the Galileo and the Dante and Buonarrotti Museums in Florence, or the Goethe Museum in Weimar and the Beethoven Museum at Bonn; to the great men of the nation, as the National Portrait Gallery of Great Britain, the German Valhalla at Ratisbon, and so forth; or to great men of a special profession, such as the Gallery of Artists in the Pitti Museum of Florence, consisting of portraits of all the great artists of the world, painted by themselves. In this class would come also collections of autographs and manuscripts, like the Dyce-Forster collection at South Kensington, and collections of personal relics. Among historical museums should also be mentioned those representing the earliest history of a race or country, such as the

magnificent Musée Gallo-Romain at St.-Germain, near Paris, devoted to the history of France up to the end of the Roman occupation; the Romano-German Museum at Mentz, and the Etruscan Museums at Florence, Bologna, and elsewhere in Italy; the Ghizeh Museum near Cairo, Egypt (formerly the Boulak Museum); the museums at Constantinople, the Acropolis Museum at Athens, and many others. Such institutions as the Bavarian National Museum at Nuremberg and the National Museum in Munich have to do with the later periods of national history, and there are throughout Europe numerous collections of armor, furniture, costumes, and architectural and other objects, illustrating the life and arts of the Middle Ages and the later periods, which are even more significant from the standpoint of the historian than from that of the artist. Important among these is the Royal Irish Academy at Dublin.

Museums of anthropology and ethnology include such objects as illustrate the natural history of man, his classification into races and tribes, his geographical distribution, past and present; the origin, history, and methods of his arts, industries, customs, and languages, particularly among primitive and semi-civilized peoples. Museums of anthropology and history meet on common ground in the field of archæology. In practice, historic archæology is usually assigned to the latter and prehistoric archæology to the former, since prehistoric material may be studied to the best advantage by the use of the natural history methods which have been adopted by anthropologists, but not as yet by students of history. Ethnographic museums were proposed by the French geographer Jomard, and the idea was first carried into effect about 1840 in the establishment of the Danish Ethnographical Museum. In Germany the best are in Berlin, Dresden, Munich, and Leipzig. Austria has in Vienna two for ethnography, the Court and the Oriental Museums. Holland has the National Ethnographic Museum in Leyden, and smaller collections in Amsterdam, Rotterdam, and at The Hague. France has the Trocadéro; Italy the important prehistoric and ethnographic museums in Rome and Florence. The Philippine collections in the Museo de Ultramar in Madrid and the Hawaiian collections in the Bernice Pauahi Bishop Museum at Honolulu are important. In England less attention has been given to this subject than elsewhere in Europe, the Christy collection in the British Museum being the only important one specially devoted to ethnography, except the Blackmore Museum at Salisbury. In the U. S. the principal establishments arranged on the ethnographic plan are the Peabody Museum of Archæology in Cambridge, and the collections in the Peabody Academy of Sciences at Salem and the American Museum of Natural History in New York. The vast ethnological collections in the National Museum in Washington are classified on a double system, in one of its features corresponding to that of the European, in the other, like the famous Pitt Rivers collection at Oxford, arranged to show the evolution of culture and civilization without regard to race. This broader plan admits much material excluded by the advocates of ethnographic museums, who devote their attention almost exclusively to the primitive or non-European peoples.

In close relation to the ethnographic museums are those which are devoted to some special field of general thought and interest. Most remarkable among these is the Musée Guimet, founded in Lyons in 1878 and removed to Paris in 1886, which is intended to illustrate the history of religious ceremonials among all races of men, a field also occupied by one department of the National Museum in Washington. Other good examples of this class are some of those in Paris, such as the Musée de Marine, which shows not only the development of the naval and merchant marine of the country, but also, by trophies and other historical souvenirs, the history of the naval battles of the nation. The Musée d'Artillerie does for war, but less thoroughly, what the Marine Museum does in its own department, and there are similar museums in other countries. Of musical museums, perhaps the most important is the Musée Instrumental, founded by Clapisson, attached to the Conservatory of Music in Paris, that in Brussels, and that in the National Museum in Washington. There is a magnificent collection of musical instruments at South Kensington, but its contents are selected with reference to their suggestiveness in decorative art. There is a Theatrical Museum at the Académie Française in Paris, a Museum of Journalism at Antwerp, and Museums of Pedagogy in Paris and St. Petersburg. These are professional rather than scientific or educational, as are perhaps also the Museum of Practical Fish-culture at South Kensington and the Museums of Hygiene in London and Washington. The Psychological Museum founded by Mantegazza in Florence in 1886 is the only one of its kind.

The value of archæological collections, both historic and prehistoric, has long been understood. The museums of London, Paris, Berlin, Copenhagen, and Rome need no comment. In the Peabody Museum in Cambridge, the Metropolitan Museum in New York, and the National Museum in Washington are immense collections of the remains of man in America in the pre-Columbian period, collections which are yearly growing in significance as they are made the subject of investigation, and there is an immense amount of material of this kind in the hands of other institutions and of private collectors in the U. S.

Museums of natural history contain those objects which illustrate the phenomena of nature in animals, minerals, and plants, and whatever illustrates their origin, growth, functions, structure, and geographical distribution, in the present and in the past. Museums of natural history and anthropology meet on common ground in man. In practice the former usually illustrates the relations of man to other animals; the latter, man in his relations to other men. Every great nation has its museum of nature. Probably the natural history department of the British Museum is the most extensive, with its three great divisions—zoölogical, botanical, and geological. The Musée d'Histoire Naturelle, in the Garden of Plants in Paris, founded in 1795, with its galleries of anatomy, anthropology, zoölogy, botany, mineralogy, and geology, is one of the most extensive, but far less potent in science now than in the days of Cuvier. In Washington there is the National Museum, with its great anthropological, zoölogical, botanical, mineralogical, and geological collections, administered under one organization, together with a large additional department of arts and industries or technology. The American Museum of Natural History in New York, the Museum of the Academy of Natural Sciences in Philadelphia, the Boston Society of Natural History, the California Academy of Sciences, the Peabody Museum of Yale College, the E. M. Museum of Princeton University, the Museum of Archæology and Palæontology of the University of Pennsylvania, and the Milwaukee Public Museum are also important.

Passing to specialized natural history collections, perhaps the most noteworthy are those devoted to zoölogy, and chief among them is that at Harvard University, known as the Museum of Comparative Zoölogy, which was founded by Agassiz "to illustrate the history of creation as far as the present state of knowledge reveals that history," and was in 1887 pronounced by the English naturalist Alfred Russell Wallace "to be far in advance of similar institutions in Europe as an educational institution, whether as regards the general public, the private student, or the specialist." Next to Cambridge, after the zoölogical sections of the museums of London and Paris, stand the collections in the Imperial Cabinet in Vienna, and those of the zoölogical museums in Berlin, Leyden, Copenhagen, and Christiania, and the museums of Brussels, Florence, and La Plata, so rich in palæontological materials. The university museums at Oxford and Cambridge and the Liverpool museums are also noteworthy.

Among botanical museums, that in the Royal Gardens at Kew, near London, is pre-eminent, with its colossal herbarium containing the finest collection in the world, and its special museum of economic botany, founded in 1847, both standing in the midst of a collection of living plants. There is also in Berlin the Royal Botanical Museum, founded in 1818 as the Royal Herbarium; in St. Petersburg, the Herbaria of the Imperial Botanical Garden. The Natural Herbarium in Washington is the property of the Smithsonian Institute and of the Department of Agriculture.

Among the geological and mineralogical collections the mineral cabinet in Vienna, arranged in the imperial castle, is among the first. The Museum of Practical Geology in London, which is attached to the Geological Survey of the United Kingdom, was founded in 1837 to exhibit the collections of the survey, in order to show the applications of geology to the useful purposes of life. The department of economic geology in the Field Columbian Museum in Chicago, an outgrowth of the department of mines in the exhibition of 1893, is one of its most striking features.

Of museums of anatomy there are thirty of considerable magnitude, all of which have grown up in connection with schools of medicine and surgery, except the magnificent

Army Medical Museum in Washington. The Medical Museum of the Royal College of Surgeons in London is probably first in importance.

Museums of technology, or industrial museums, are devoted to the industrial arts and to manufactures, and exhibit (1) materials and their sources; (2) tools and machinery; (3) methods and processes; (4) products and results. In this group would be included museums of agriculture, as that of the U. S. Department of Agriculture in Washington; of mining, such as the Museum of Practical Geology in London, in part, and the Museum of the School of Mines in Paris; and of fisheries, such as the Museum of Practical Fish-culture in South Kensington, and the fisheries section of the National Museum in Washington, which formed so important a feature of the International Fisheries Exhibition in Berlin in 1880 and in London in 1883; museums of textiles, such as the museums of tapestries in Florence, that in the Escorial in Spain, and that at the Gobelin establishment near Paris; of the ceramic industries, such as the Sèvres Museum in Paris, and indeed such collections are usually included in museums of decorative art, one of which may be found in every great city; museums of transportation, by far the most important of which is the Railway Museum now (1894) being formed in connection with the Field Columbian Museum in Chicago, which has also important collections in other technological fields. A collection of waste products and undeveloped substances usually forms a part of the technological museums; and there are special museums of animal products, such as that at the Bethnal Green Museum in London, and of vegetable products, such as the Museum of Economic Botany at Kew, near London.

Commercial museums exhibit salable articles of all kinds, with illustrations of markets, means of commercial distribution, prices, and commercial demand and supply. One of the best of these is the Musée de Melle at Ghent. Commercial museums are especially useful in great centers of manufacture and trade, especially when coupled with an efficient service of foreign correspondents. Such museums may be properly connected with a technological museum, although its methods are likely to be more akin to the exhibition, exposition, or fair, involving a frequent renewal of exhibits in connection with commercial changes, and also certain features of competition and advertising display on the part of private exhibitors.

The principal types of museums have been referred to in connection with a classification based on their contents. It is therefore unnecessary to review them under the second form of classification proposed at the beginning of this article. It should be said, however, that every great national capital has a single museum, or a group of them, supported by the national government, and intimately connected with national educational enterprises.

In Italy, while there are national museums in Rome and Florence, the whole country is under the control of a Government commission charged with the preservation of the treasures of history and art. The treasures of every church and monastery are under public control, and many of these and other public edifices have been declared public monuments. The tract in which the Forum at Rome is situated has been constituted an outdoor museum, under the name of the Passagiata Archeologica.

In the U. S. the National Museum at Washington, established as a part of the Smithsonian Institute in 1846, is charged with the care of all the collections of the Government. There are also, however, the Army Medical Museum, the Naval Museum of Hygiene, and the Corcoran Gallery of Art, the latter under the control of a private corporation.

The modern museum is the latest of the great agencies which have been developed for the increase and diffusion of knowledge, and in this capacity it stands by the side of the university, the learned society, and the public library. The museum is even more closely in touch with the masses than the university or the learned society, and quite as much so as the public library, while, even more than the library, it is a recent outgrowth of modern tendency of thought. It is maintained by many that the degree of civilization to which any nation, city, or province, has attained is best shown by the character of its public museums and the liberality with which they are maintained. GEORGE BROWN GOODE.

Mushroom-poisoning: See TOXICOLOGY.

Mushrooms [(by folk-etymology from *mush* and *room*) from O. Fr. *mouscheron* > Fr. *mousseron*; cf. *mousse*, moss]: popular name of edible Fungi of the order *Hymenomyceteæ*, especially species of the genus *Agaricus*. (See FOOD.) In the U. S. the name toadstool is applied to nearly every kind of parasol-shaped mushroom, the common belief being that they are poisonous.

The common mushroom, *Agaricus campestris*, is a species of the *Agaricaceæ*, the first family of the *Hymenomyceteæ* (see FUNGUS), growing almost everywhere. It is the famous *champignon* of the French, *pratiola* of the Italians, and was known to the ancients by upward of a score of synonyms. The fleshy pileus is white in the young state, becoming of a yellowish brown when mature. It usually grows in clusters and never attains a great size. The ring is present and conspicuous. Though subject to many variations, it is easily recognized by its fleshy pileus, solid stipe, and pink-colored gills, often becoming purple with age. It is the most generally eaten of esculent fungi. This mushroom is used to a great extent as an article of food in France, and especially in Paris, around which it is largely cultivated; old deserted mining-caves have been appropriated for the purpose, and many miles of mushroom-beds are reached by the aid of ladders and lanterns. It is usually found in the wild state scattered over a rich meadow or pasture in early morning after a warm shower in the night. The mushroom is only one of over 1,000 well-defined species of the genus *Agaricus*, at least one-fourth of which are not only harmless, but well worthy the time and care of the market-gardener. Closely related to *A. campestris* is *A. arvensis*, popularly called "meadow-mushroom," from its place of growth. It is larger than *A. campestris*, stronger in flavor, and less esteemed. From its size and coarseness it has in England received the name of "horse-mushroom." Specimens are mentioned weighing 14 lb. The "nail fungus," *A. esculentus*, is the smallest species used for food. The pileus does not exceed an inch in diameter, and is flat and clay colored. It is found in fir woods, and is used largely in Vienna as a flavor for sauces under the name of *Nagelschwamm*. One of the most poisonous species of the genus is the "fly agaric," *A. muscarius*, so named because the fungus is often steeped and the solution used for the destruction of the house-fly. The pileus is raised upon a long stipe, reaching a diameter of 4 to 6 inches, having its bright red surface studded with large white protuberances. Very closely allied to the fly agaric is *A. cæsareus*, though not poisonous and very excellent for food. It can always be distinguished by its yellow gills, while *A. muscarius* has them of a pure dead white. The genus *Coprinus* differs from *Agaricus* mainly in the deliquescent character of the gills. *C. comatus* is the leading esculent species, and commands attention by its singular and graceful form. The whole surface is delicate and silky, the cap tinged with brown at the top and grayish at the base, soon becoming covered with scales. The gills are very close together, and pass in color from pink to brown. These plants should always be gathered before they begin to deliquesce. In the genus *Cortinarius* the veil is composed of arachnoid threads and the spores are rusty. The edible species are few in number. In *Hygrophorus* the main feature is the waxy character of the hymenium. There are three species of culinary importance, the best being the small pure white *H. virgineus*. It is common, and, like the brown *H. pratensis*, is found in open pastures. The members of the genus *Lactarius* are distinguished by the milky juice which exudes from them when bruised. *L. deliciosus* has the orange-colored pileus marked with zones of a darker color. The milk is at first yellow, soon turning green. This species deserves its name *deliciosus*, and is sought for and highly prized by all lovers of edible Fungi. *Russula emetica*, as its name would indicate, acts as an emetic to most persons, though a few can eat it with impunity. It may be distinguished by its rosy pileus, brittle gills, and white stipe dotted with red spots. The genus *Cantharallus* has thick branched gills, with edges blunt and roundish. *C. cibarius* is the beautiful little yellow chanterelle so highly esteemed by the French. It is easily distinguished by its bright golden-yellow color, and odor much resembling ripe apricots. In *Marasmius* the species are characterized by having a dry hymenium, folds thick and tough and acute at the edge. The species are generally quite small. *M. oreades*, from its peculiarity of growing in circles, and the early superstitious belief that these rings had some connection with elfs and goblins, has long been known as the "fairy-ring fungus." These rings are now known to be formed by the spreading out in all directions of a cluster of these

plants, the result of the exhaustion of the nourishment directly beneath. It is a very small and common species, and has gained a good reputation among mushroom-eaters as furnishing a delicate dish.

In the second family of the *Hymenomyceteæ*, *Polyporaceæ*, the gills of the *Agaricaceæ* are replaced by *pores* or tubes. The genus *Boletus* has the pores easily separated, and furnishes a number of esculent species, of which *B. edulis* is the most important. The pileus is smooth and brown, with the tubes at first yellow, becoming green by age. The reticulation of the stem is one of the leading characteristics of the species. It is an inhabitant of the woods. Some prefer to this the *B. æstivalis*, which is an early summer species. *B. luridus* is sometimes eaten without harm, but should not rank among esculent species. It has a pileus 3 to 6 inches broad, and varying in color from a brick-red to brown. The flesh is at first yellow, changing to blue. In the genus *Polyporus* the pores are not easily separated, and many of them are without stems. A few species are of worth as articles of diet. *P. giganteus* and *P. intybaceous* are of very large size, a single specimen sometimes weighing 40 lb. They both, like many other species of the genus, grow upon the trunks of trees. In gathering them for food it is best to select the younger specimens, and use only the inner portion. *P. fomentarius* is touch-wood or "punk," and grows to a great extent on the trunks of dead and decaying trees. The property of its being luminous in the dark has long been known. Amadou or German tinder is a commercial product from this and several other species of *Polyporus*. It consists of slices of the plant beaten out in thin strips and saturated with a solution of nitrate of potash. It is used as a rapid and easy means of starting a fire. The last genus of *Polyporaceæ* is *Fistulina*, characterized by having the hymenium inferior and a papillated surface when young, which changes into tubes bearing the spores. *F. hepatica*, so named from its resemblance to the liver, is fleshy and juicy, and very appropriately bears the common name of beefsteak fungus. It assumes a great variety of forms, from that of a strawberry to that of a tongue. When cut it resembles a beet-root. It grows upon trunks of trees throughout the summer, and is eagerly sought for.

The third family of the *Hymenomyceteæ* is termed *Hydnaceæ*, in which the leading characteristic is the numerous projecting spines or teeth, over the surface of which the hymenium is spread. The most common edible species is *Hydnum repandum*, found in woods and shady places. The pileus is fleshy, regular, and red, lobed, or undulated, spines pale-yellow, stem 2 inches long. When raw it has a peppery taste and the odor of horseradish. Less common, *H. coralloides* in its young state much resembles a cauliflower, because of its peculiar branching. It is a tree-inhabiting plant, and is esculent. *H. caput-medusæ*, as its name would suggest, has the branching top of the one just mentioned. Among others used for food are *H. subsquamosum* and *H. rufescens*. The members of the family *Clavariaceæ* are easily recognized by being club-shaped, fleshy, and branching. Among these are found a number of edible species. The most beautiful colored species is *Clavaria amethystina*. It is of a fine violet color, and is seldom found in large quantities. Dr. Curtis enumerates thirteen species of *Clavaria* eaten in Carolina, but they are generally little known. In the family *Tremellaceæ*, or the gelatinous Fungi, only one species has received much attention as an article of food—viz., the curious "Jew's ear," *Hirneola auricula-judæ*. It gets its name from its strong resemblance to the human ear. This species is collected in large quantities in Tahiti and shipped in a dried state to China, where it is used for soap.

There are no simple rules that may be taken as infallible guides for distinguishing esculent from poisonous species. The following rules are only of a general character, having some exceptions: (1) *Avoid bright colors* (this would throw out the highly prized chanterelle of the French and several other species); (2) *avoid those that change color when cut or broken*; (3) *avoid those with a milky juice* (*Lactarius deliciosus* has a milky juice, and is still delicious); (4) those that *deliquesce should be avoided*—the *Coprinus comatus* is a grand exception to this rule. The safest of all rules is, never to use a fungus about which there is any doubt; this will require a thorough acquaintance with at least a few of the edible species, which will take no more time than to become familiar with the same number of shrubs or trees. Care should also be exercised to gather only the fresh plants, and they should not be allowed to remain a long time before being eaten. Climate and the seasons seem to exert an influence over fungi as regards their edible qualities. A much larger per cent. of the spring species are edible than those of autumn.

Most fungi require for their best development a moist atmosphere, with the exclusion of bright sunlight. The common and most successful method of cultivating the mushroom and edible toadstools is to mix fresh horsedung with loam in such proportions as to prevent too violent fermentation, when it is put in long narrow beds of a foot or 18 inches in height in the center, into which the mycelium or spawn is placed, and the whole coated over with a layer of loam. These beds are usually protected from the light and drying influences of the sun by low sheds, having the roofs thatched to prevent too rapid evaporation of moisture. A covering of hay or straw is often placed directly upon the beds.

Bibliography.—For extended information, the reader may consult Robinson, *On Mushroom-culture* (London, 1870); Cuthill, *On the Culture of the Mushroom* (1861); Krombholz, *Abbildungen und Beschreibungen der Schwämme* (Prague, 1831); C. H. Persoon, *Traité sur les Champignons comestibles* (Paris, 1818); F. S. Cordier, *Hist. et Descr. des Champignons alimentaires et vénéneux* (Paris, 1836); Dr. Badham, *Treatise on the Esculent Funguses of England* (London, 1863); M. C. Cooke, *British Edible Fungi* (1891); Mrs. T. J. Hussey, *Illustrations of British Mycology* (London, 1855); J. J. Paulet, *Iconographie des Champignons* (Paris, 1855). See also the articles Fungi, Morel, and Vegetable Kingdom.

William G. Farlow.
Revised by Charles E. Bessey.

Music [viâ O. Fr. from Lat. *mu'sica* = Gr. *μουσική* (sc. *τέχνη*), any art over which the Muses presided, especially lyric poetry set to music, lit. fem. of *μουσικός*, pertaining to the Muses, deriv. of *Μοῦσαι*, Muses]: a succession of combination of sounds arranged with such connection and mutual relation as to express to the ear some distinct form or train of thought, and awaken certain corresponding emotions. Sounds when thus regulated affect the mind through the *ear*, as painting and sculpture under similar conditions affect it through the *eye*. The latter, however, deal with tangible objects, or with ideas formed from material types and their attributes, while the agency of music is limited to certain relations existing between sounds, variously ordered and combined, and the inward springs of emotion. In all time past, and even among the rudest tribes and nations, we find traces of effort to make both the eye and the ear subservient to the stirring up of pleasurable or other feelings. (See Ethnology.) To some such impulse it is most natural to refer not only the production of the rough drawings, chiselings, and carvings often found among tribes and nations of barbarians, but also the varied and persevering attempts of the same untutored races to find gratification for the ear amid the din and clang of their imperfect musical instruments. The results in both cases could not be otherwise than strange in their conception and often marvelous in their ugliness. From this state of primitive rudeness the progress of the finer arts to higher stages of cultivation was not equally rapid. All historical records, and the still existing monuments and relics of antiquity, bear evidence that architecture, painting, and sculpture gradually rose to perfection, while music still remained a subject of dark and confused speculation. For long ages, and even through the most brilliant periods of ancient civilization and intellectual splendor, it was the fate of music to be an enigma defying all solution; and we read of no master-minds springing up to reveal its long-hidden beauties or to discover and systematize its real principles till near the close of the Middle Ages. The music of the present day, both as a science and an art, is therefore a growth of the last three or four centuries; and (with a rapidity equaled only by the rise and advance of Gothic architecture) it has already reached so high a stage of development as seemingly to leave little room for further discovery, either in its scientific or practical and mechanical departments.

In the present article it is purposed to give in a simple manner a general view or outline of the musical system as now ordinarily understood and received; and as it is presumed that the reader already possesses some elementary knowledge of music, it will be the less necessary to enter into details on Notation, Scale, Mode, and other preliminary matters, concerning which full information will be found under their respective heads in the present work.

Sounds may conveniently be regarded as either musical or unmusical. This distinction is irrespective of their several qualities as loud or soft, harsh or smooth, etc.; for certain sounds which are essentially musical may nevertheless be painful to the ear, while, on the contrary, others which are strictly *un*musical may have no such unpleasant effect. The radical peculiarity or mark of a musical sound is that it possesses a definite *pitch* (or intelligible grade of acuteness), arising from the number, equality, and permanence of the vibrations given forth by the body from which the sound proceeds. The pitch (i. e. the degree of acuteness or gravity) of any such sound is dependent on the rapidity of the vibrations excited by the sonorous body. It is estimated that a string or the column of air in a pipe giving the sound represented by C C C C will make 32 vibrations in a second of time; for the octave above—viz., C C C—the vibrations will be 64, or double the original number; for C C the vibrations are quadrupled in rapidity, being 128 in a second; and so on for the still higher octaves. These various octave sounds differ from each other only in their relative acuteness, just as the letters A, a, a differ only in point of size. The intermediate sounds passed over in rising from one C to another have also their proportionate rates of vibration; and when theoretically considered such intermediate sounds may be almost infinite in number; but for practical purposes the system of music is founded on a select number of these possible musical sounds, forming a scale or series; and it is found, both by experiment and by a certain demand of the human ear, that the degrees or intervals thus selected must follow each other in a certain order, number, and inequality of distance to fit them for musical use. These intervals, counting upward from a root or starting-point, are known as the second, third, fourth, fifth, sixth, and seventh, and they are commonly ascertained by dividing a sounding-string into one-half, one-third, one-fourth, etc., of its length, thus gaining all the sounds necessary for the filling up of the octave. (In the article Monochord this process is described.) The notes or sounds thus obtained are named after the first seven letters of the alphabet, the letters being repeated for each successive octave. In Ex. 1 an octave of this scale (called the *diatonic* scale) is represented according to the order in which the large and small intervals stand to each other:

Ex. 1.

1	2	3	4	5	6	7	8
C	D	E	F	G	A	B	C

Here it will be seen that in the compass of the octave there are five *whole* degrees or "tones," and two *half* degrees or "semitones," and that in a series beginning on C these two semitones fall between the third and fourth and the seventh and eighth degrees. It will also be noticed that in the space from the first to the third degree two whole tones are comprised, making a "major" or greater third. All music written on a scale thus constructed is said to be in the *major mode*; and no similar scale can be formed from the notes in their common order by beginning elsewhere than on C, except by modifying them by means of flats or sharps. This modification is for the purpose of rendering their tonal succession ever similar, thus complying with the law which demands a semitone (or half step) only between the third and fourth and seventh and eighth degrees, in case of the major scale from whatever degree the scale may begin. Another series of notes equally well fitted for the expression of musical ideas may be obtained by beginning on A instead of C. In this the positions of the tones and semitones are widely different, as shown in Ex. 2:

Ex. 2.

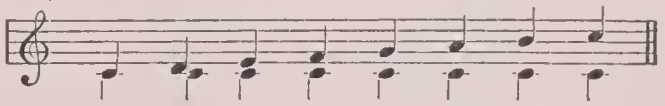
1	2	3	4	5	6	7	8
A	B	C	D	E	F	G	A

Here the semitones are from the second to the third and from the fifth to the sixth. This kind of scale constitutes the *minor mode*, and in the natural order of the notes it can begin only on A. The minor mode is less perfect than the major, as the whole tone between the seventh and eighth in the *ascending* scale is unsatisfactory to the ear, and needs to be raised one semitone higher; but in doing this it sometimes becomes necessary to elevate the sixth also. This scale also serves as a standard formula, and modified by the same means (sharps and flats) determines the order of tones and semitones adopted in modern tonality for all *minor* scales. This subject of the modes, with special reference to these peculiarities of the minor, is illustrated in the article Mode.

Thus far we have noticed only the *diatonic* scale, which consists of a mixture of tones and semitones in the order described; but as each whole tone in this scale admits of division into two semitones, we obtain by such a division another form of scale (called the *chromatic*), consisting of a complete series of twelve semitonic intervals in the compass of the octave. The chromatic scale may be variously written, either by the use of flats or sharps. These two scales (the diatonic and chromatic) furnish all the material from which modern music is constructed. However varied, discursive, or even capricious a composition may be, either in melody or harmony, all its tonal degrees are derived from the simple elements of one or other of these scales. It remains here to be noted that before the rise of the modern system of music several other "modes," different from the major and minor, were in common use. The ancient Greeks recognized three genera of scales and intervals—viz., the diatonic, the chromatic, and the enharmonic, the last consisting of quarter tones. Of these genera, however, the diatonic alone appears to have formed the basis of all the music in actual use, or which was capable of being conceived and performed with any approach to accuracy of intonation. For a more extended view of the formation and characteristics of the ancient scales, the reader is referred to the article Mode (*Ecclesiastical Modes*).

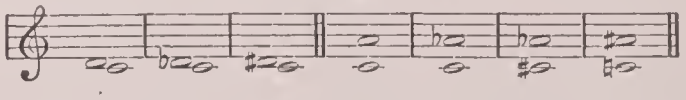
The term "interval" is used to denote the distance of one sound or note from another as reckoned by the degrees of the diatonic scale. Counting upward from any given degree, the intervals and their names are as represented in Ex. 3:

Ex. 3. 1st. 2d. 3d. 4th. 5th. 6th. 7th. 8th.



Simple intervals are those which lie within the compass of one octave, as those in the example. *Compound* intervals are those which reach beyond the limits of an octave, as the ninth, tenth, eleventh, etc. On the diatonic-chromatic scale the interval of a semitone admits of the distinction of major or diatonic, and minor or chromatic. The *major* semitone is that which involves two different degrees of the scale, as B, C or E, F; but the *minor* semitone has both of its terms on the same degree, as C, C♯, or B, B♭. Each of the other intervals may be various in the number of tones and semitones comprised in it. Thus a second may be either major, minor, or augmented, and a sixth may be similarly varied, and also diminished, though the notes representing them remain on the same degrees. These differences are created by the elevation or depression of the terms of those intervals by the occurrence of sharps or flats. In illustration of this see at *a* in Ex. 4 the major, minor, and augmented second; and at *b*, the major, minor, diminished, and augmented sixth:

Ex. 4.—*a* *b*
Maj. Min. Aug. Maj. Min. Dim. Aug.



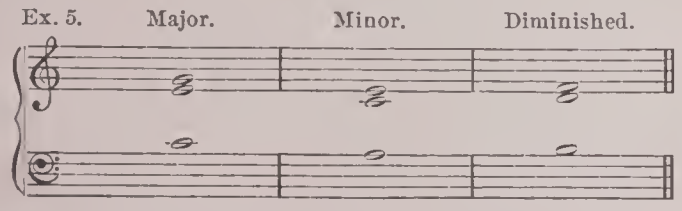
On examining the *contents* of these several intervals it will be found that the minor is one semitone less than the major, the diminished one semitone less than the minor, and the augmented one semitone greater than the major; in other words, the major sixth contains nine semitones, the minor contains eight, the diminished only seven, and the augmented ten. Though all the intervals may thus be subject to modification, and may be viewed in several aspects, yet the unison, octave, fifth (and the fourth as the inversion or complement of the fifth) are those alone which are called "perfect," because they are producible on the scale in only one form, as C C, D D, etc., or C — G, D — A, etc. The only exception is the imperfect fifth, B — F, which, however, is treated as perfect in the progressions of the *minor* scale, as will be seen hereafter. In the article Interval (*q. v.*), at Ex. 3, all the intervals of the octave (including also the ninth), as now in use, with their several names, are given in their proper order and relations.

Certain names are also given to the intervals within the

octave, to indicate their relations to the root, prime, or keynote. Thus the keynote itself is called the *tonic*; the fifth above is the *dominant*; and the third midway between these is the *mediant*. Similarly, the fifth below the tonic is the *subdominant*, and the third between it and the tonic is the *submediant*; the note immediately above the tonic is called the *super-tonic*, and the interval directly below the tonic is the *sub-tonic* or *leading note*. Intervals are also classified as consonant and dissonant, fundamental and inverted, etc.; these distinctions will also be found explained in the article Interval.

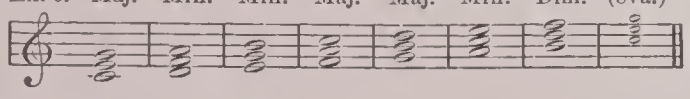
The intervals just enumerated are the elements of all musical compositions. When arranged in a continuous series of single sounds, selected and properly linked together, the composition so made is called a *melody*, and the union of two or more melodies in simultaneous utterance is called *harmony*. The subject of Melody the reader will find already discussed in this work under its appropriate head, and attention will now be given to that far more intricate and extensive branch of the science which relates to *harmony*. The great primal maxim which forms the basis of the modern structure of harmony is thus expressed by an able writer of the German school: "All musical harmony arises from *two chords*, called the *fundamental concord* and the *fundamental discord*, and from the different uses that can be made of them by *inversion*, *suspension*, *anticipation*, and *transition*. All musical harmony, even the most complicated, if only regular, is reducible to the said *two chords*, the fundamental note of which is called the *fundamental bass*." These two chords are the *triad* and the *chord of the seventh*, of each of which there are several varieties. Any of these chords may be used in a complete or an incomplete form; i. e. with *all* their terms or intervals expressed, or with one or more omitted. The *triad*, which we are now to consider, is the first and simplest of the two fundamental chords. It consists of a bass, with its third and fifth, and may be major, minor, or diminished; the first having a major third, the second a minor third, and the last a minor third with a diminished fifth. These three triads are shown in Ex. 5:

Ex. 5. Major. Minor. Diminished.



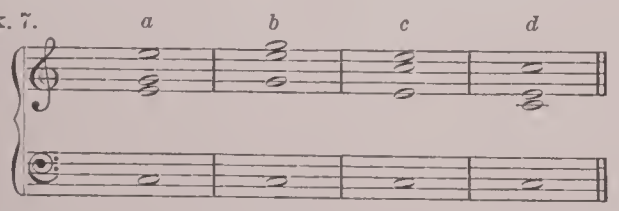
A triad may be built on each of the natural degrees of the scale; and on experiment it will be seen that three of these triads are major, three are minor, and the remaining one is the diminished triad. See Ex. 6.

Ex. 6.—Maj. Min. Min. Maj. Maj. Min. Dim. (8va.)



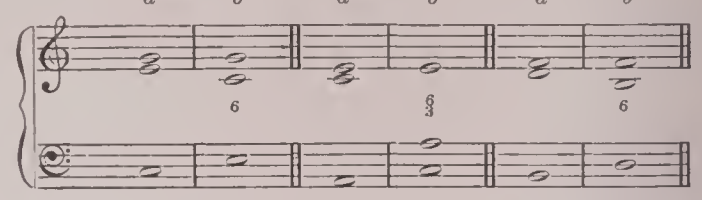
In this normal or original form of the triad the lowest note or term is the root or "fundamental bass"; and so long as this lowest term remains unchanged it is a matter of indifference whether the other terms (the third and fifth) stand in close or dispersed relation to it. One or more of the intervals of a triad may also be *doubled* (either on the unison or the octave), or in certain cases one of the terms may be omitted. Thus, in Ex. 7, the octave of the root is omitted and the third doubled; at *b* the octave is omitted and the fifth doubled; at *c* the fifth is omitted and the third doubled; and at *d* the fifth is omitted and the octave doubled:

Ex. 7. *a* *b* *c* *d*



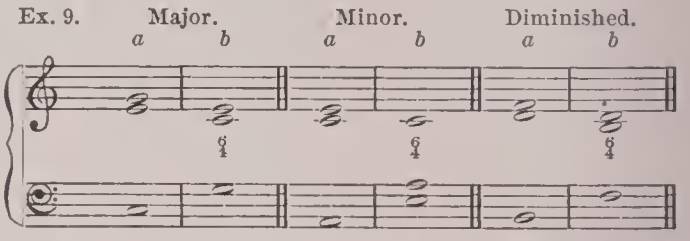
It is not to be understood that in composition all these forms are equally good; and they are here adduced merely to show what changes may take place among the *upper* intervals of the triad while the fundamental bass remains the same. When the root or fundamental bass is no longer the *lowest* term of a chord, but one of the higher terms is substituted for it, the chord is said to be *inverted*; and there can be as many inversions of a chord as there are intervals to change places with the bass. As a triad consists of two such intervals besides the root—viz., a third and a fifth—it follows that it is capable of two inversions. (See Inversion.) The first inversion of the major, minor, and diminished triads (in which the original third becomes the bass) may be seen at *b*, *b*, *b* in Ex. 8, with their respective fundamental forms prefixed at *a*, *a*, *a*:

Ex. 8. Major. Minor. Diminished.
a *b* *a* *b* *a* *b*



As the triad originally consisted of a bass, third, and fifth, it assumes in this inversion the form of a bass, third, and sixth. Hence it is represented by the figures $\frac{6}{3}$ or 6. In the second inversion, the original fifth becomes the bass, while the former third makes the interval of a sixth, and the octave of the fundamental stands between them as a fourth, as in Ex. 9, at *b*, *b*, *b*:

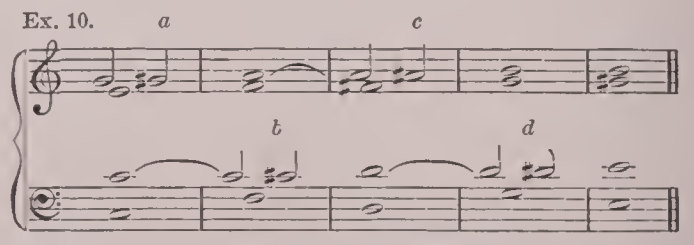
Ex. 9. Major. Minor. Diminished.
a *b* *a* *b* *a* *b*



The triad thus inverted is indicated by the figures $\frac{6}{4}$. Inversions are not to be confounded, as we have said, with mere "changes of position" among the *upper* parts of a chord. These changes, however various, do not affect the real nature and quality of a chord, or its standing in relation to its fundamental bass; but an *inversion* involves a radical change of that relation, and is productive of new and often far richer effects than those ordinarily attending the uninverted chord. Hence the large number of inverted chords in all compositions which rise above the rank of the simple choral or the plain ecclesiastical chant. Inverted *triads* have also a property—somewhat analogous to that of the chord of the seventh—of suggesting to the mind an idea of *progress* or continuance; and this oftentimes with such definiteness as to lead the hearer to anticipate, in a measure, the course of the ensuing progression, and to keep his thoughts in a sort of protracted suspense till the harmony brings the ear into repose on some expected turn or cadence. Impressions of this kind are not usually excited by triads in their original form, as each *such* triad has in itself a certain element of finality or conclusiveness, which either disappears or is not sensibly felt when the chord is inverted.

Besides the three *fundamental* triads, there are several others. Among these is the *augmented* triad, which has a major third and an augmented fifth. In modern works the augmented fifth is also frequently found in conjunction with the *minor* third. This augmentation is effected by an accidental sharp or its equivalent; and therefore, as *this* term of the chord is foreign to the diatonic scale, the real origin and nature of the augmented triad admit of a ready explanation as a passing note of greater or lesser duration. See Ex. 10, at *a*, *b*, *c*, *d*.

Ex. 10. *a* *c* *b* *d*



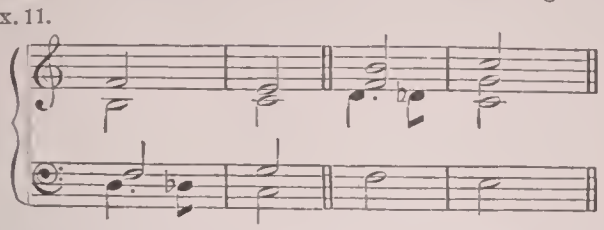
In this triad the elevated fifth becomes a "leading note" to the succeeding chord, and therefore always *ascends*, as in the example. See Note.

The same explanation will apply to the contrary process of depressing or flattening the third of the triad, as in Ex. 11.

From this review of the triad we now proceed to the *chord of the seventh*. This is formed by adding a third to

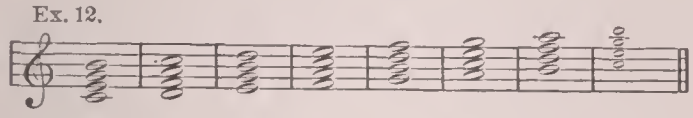
the triad, thus making it a chord of four parts or terms—viz., a bass, third, fifth, and seventh. As each degree of the

Ex. 11.



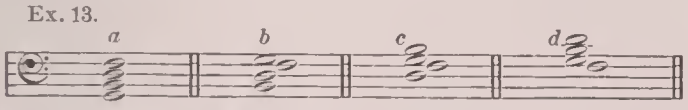
diatonic scale may be the basis of a triad (see Ex. 6), so by the addition of a third to each triad we obtain an equal number of chords of the seventh, as will appear from Ex. 12.

Ex. 12.



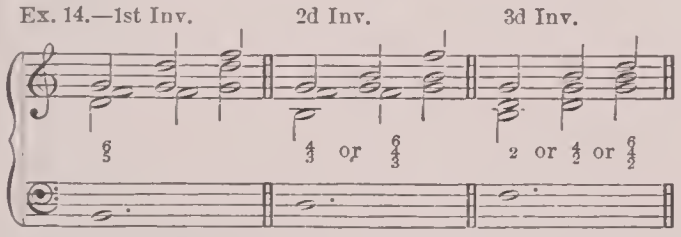
As all these are composed of major and minor thirds variously combined—several of them also being identical in structure—we may classify them thus: (1) That with a major triad and minor seventh—viz., G; (2) those with a minor triad and minor seventh—viz., D, E, and A; (3) that with a diminished triad and minor seventh—viz., B; and (4) those with a major triad and major seventh—viz., C and F. From the ordinary degrees of the scale we have thus four different forms of this chord, which for convenience may be referred to as the sevenths on G, A, B, and C. These four kinds of sevenths are called *fundamental*, but the most important is that founded on the dominant of the key or tonic, as it is not only the most pleasing to the ear, but also the chief agency in the formation of cadences and in digressions from one key to another. All the fundamental sevenths are, for the most part, subject to the same rules and are capable of the same inversions, which are three in number. (The *diminished* seventh has not here been mentioned, as from its very peculiar form and character it is reserved for treatment elsewhere.) In the three *inversions* of the chord of the seventh, the third, fifth, and seventh become successively the bass, and the other parts (including the octave of the root) will stand to the new bass in the order (1) of a third, fifth, and sixth; (2) a third, fourth, and sixth; and (3) a second, fourth, and sixth, as in Ex. 13, where *a* is the fundamental position of the chord, *b* the first inversion, *c* the second, and *d* the third:

Ex. 13.



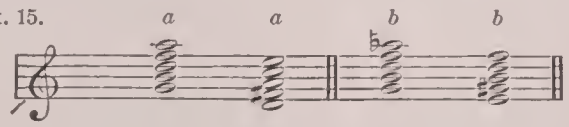
When represented by figures, the first inversion is known as the "chord of the sixth and fifth"; the second, the "chord of the fourth and third"; and the third, the "chord of the second"; these names being derived from the new positions assumed by the intervals of the chord under its several inversions. (See FIGURED BASS.) The above example is given in "close" harmony to show more clearly the nature of the changes made by inversion; but in each inversion the upper parts may be "dispersed," or taken at greater distances from the bass, without in any way affecting the nature of the inversion itself. See Ex. 14.

Ex. 14.—1st Inv. 2d Inv. 3d Inv.



Besides the triads and the chords of the seventh there are three other combinations yet to be noticed, on account of their frequent occurrence and the different theories adopted for their explanation. These are the chords of the ninth, eleventh, and thirteenth. The chord of the ninth differs

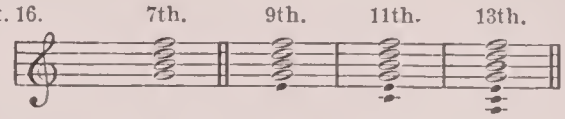
Ex. 15.



from the seventh by the addition of a third above. The ninth itself may be either major, as at *a*, *a* in Ex. 15, or minor, as at *b*, *b*.

Like the triads and chords of the seventh, the chord of the ninth may be inverted, but several of its inversions are harsh, except in rapid movements, and are therefore little used. Ordinarily, one (or more) of the middle intervals is omitted, and the effect of the chord is generally more pleasing when thus incomplete. The "chord of the *eleventh*" exceeds the ninth by the addition of another third, and the "chord of the *thirteenth*" extends beyond the eleventh by the addition of still another third. Respecting the origin of these three chords there are various theories, of which the two principal ones only will be here noticed: first, that supported by Rameau, under which they are called "chords by *supposition*," or chords formed by *supposing* one, two, or three thirds to be added *below* a chord of the seventh. For example, by supposing a third to be placed below such a chord, the *ninth* is formed; by adding to this another third, we obtain the *eleventh*; and by yet another, the chord of the *thirteenth*. This process is exhibited in Ex. 16, where the thirds which are thus supposed are marked by black dots:

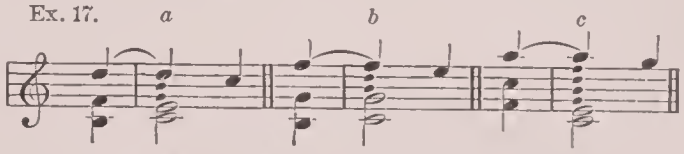
Ex. 16. 7th. 9th. 11th. 13th.



To this system it is objected (1) that there is no apparent reason why those thirds should be supposed at all; (2) that such a theory ignores the natural bearings of the *sound* of the chords in question, and their possible relation to other sounds into which they may be resolved, and offers instead of this a mere mathematical calculation. On the other theory, that of Kirnberger, these chords are not considered as fundamental, but having their origin in *suspensions*; and when so regarded their explanation is rendered both easy and satisfactory.

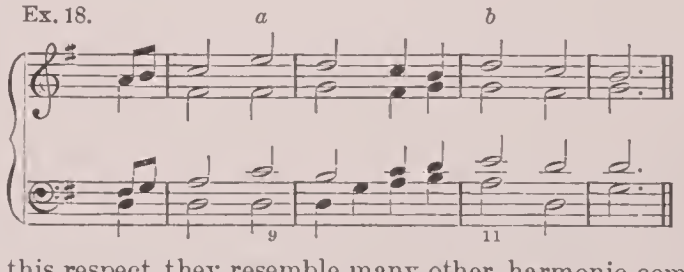
To illustrate Kirnberger's theory as briefly as possible, we give at *a* in Ex. 17 the ninth as suspension of the octave; at *b* the eleventh as suspension of the tenth; and at *c* the thirteenth as suspension of the twelfth; the dots are merely explanatory:

Ex. 17. *a* *b* *c*



It is to be observed, however, that though these chords have thus their *origin* in suspensions, yet they often occur independently—i. e. unconnected with actual or apparent suspensions. See Ex. 18, at *a* and *b*.

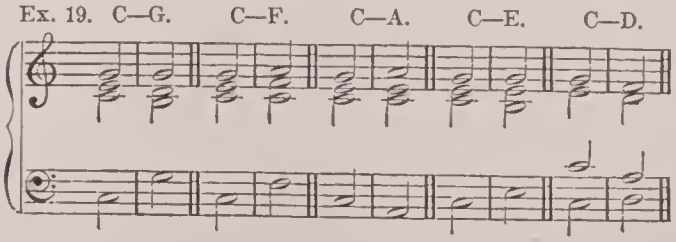
Ex. 18. *a* *b*



In this respect they resemble many other harmonic combinations, which are traceable only to the numerous forms generated by anticipations, transitions, etc.

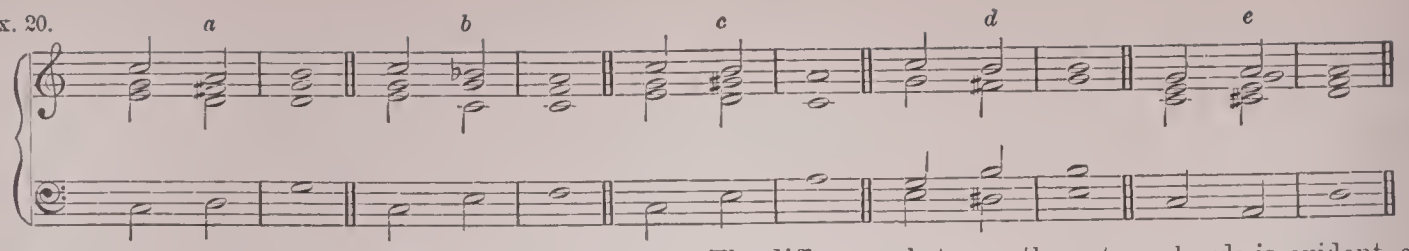
The *progressions* of the fundamental triads and chords of the seventh are next to be noted. "Progression" is the movement from one chord to another more or less related to it. We shall first consider the ordinary progressions of the *triads*. From a major triad (that of C, for example) we may proceed to the triads and inversions of the dominant (G), the subdominant (F), the relative minor (A), the mediant (E), and the super-tonic (D), these being the most nearly related triads to that of C. See Ex. 19.

Ex. 19. C—G. C—F. C—A. C—E. C—D.



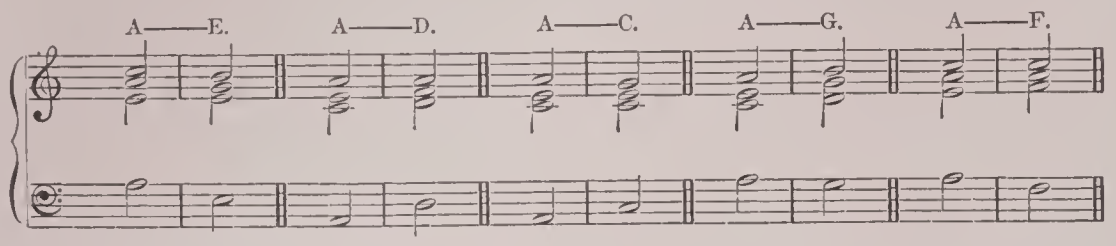
Also to the *leading chords* of these related triads, with or without the seventh, as at *a*, *b*, *c*, etc., in Ex. 20:

Ex. 20.

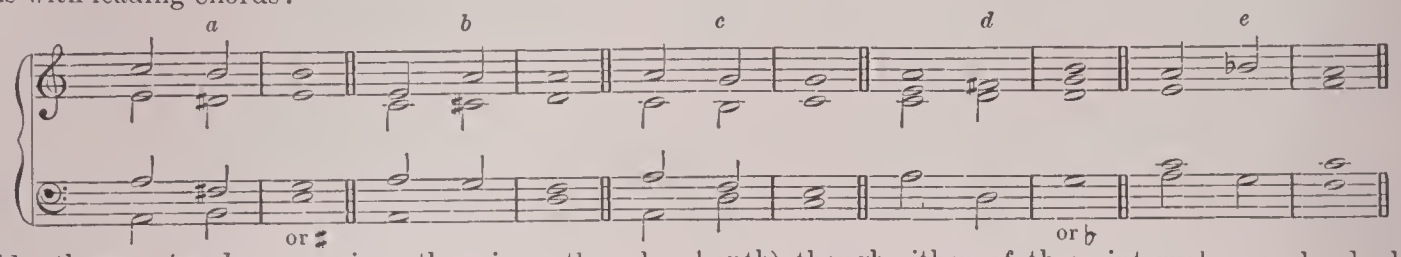


From a *minor* triad we may proceed in like manner, the *order* of the related keys being slightly different. See Ex. 21.

Ex. 21.

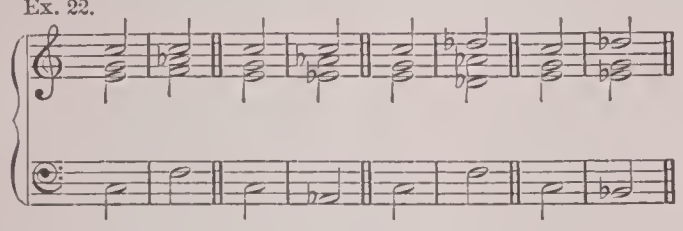


Or thus with leading chords:



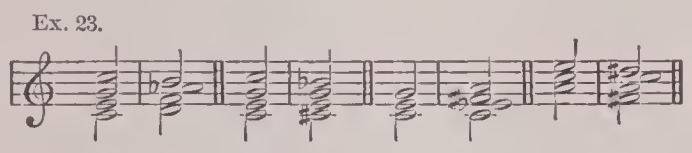
Besides these *natural* progressions, there is another class called the *abrupt*, in which the triad proceeds to chords more or less unrelated or remote. These progressions generally imply the omission of some intermediate chord; and sometimes the first chord is assumed to be not the tonic, but the dominant of its scale. See Ex. 22.

Ex. 22.



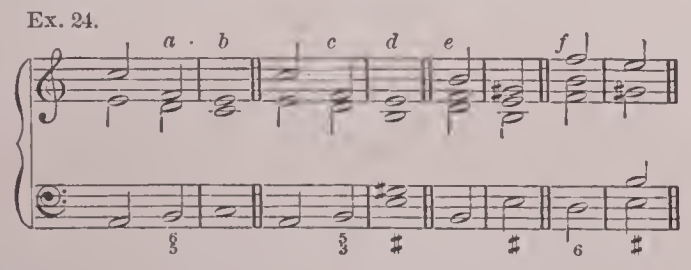
From a triad, either major or minor, we may proceed directly to any chord of the diminished seventh or its inversions, as in Ex. 23:

Ex. 23.



The progressions of the *diminished* (or imperfect) *triad* are peculiar, and require special notice, as the resemblance of that chord to an incomplete chord of the seventh often leads to mistakes. This triad consists of a bass, with a minor third and imperfect fifth. It has its place or seat on the second degree of the minor scale and the seventh of the major. The base or root is therefore the leading note in the major scale, and a triad so placed consists of precisely the same notes or intervals as the first inversion of the seventh on the dominant with the root omitted. Hence such a chord is ambiguous, and its real nature can only be determined by its connection and the harmony immediately following it. This will be apparent from Ex. 24, where the notes at *a* and *c*, though the same, are shown by their progressions at *b* and *d* to be essentially different chords, the first being an incomplete inversion of the seventh, and the other the real diminished triad.

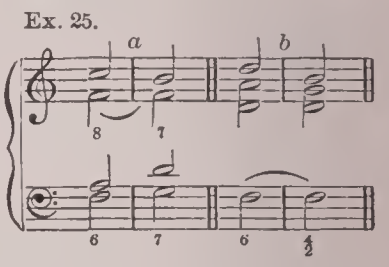
Ex. 24.



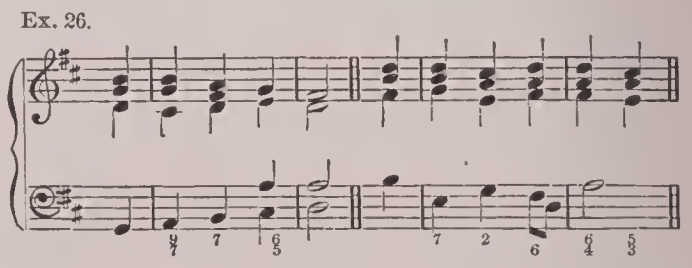
The difference between these two chords is evident, as the bass and fifth at *a* in the example can not be doubled (the one being the leading note and the other the essential seventh), though either of these intervals may be doubled in the case of the diminished triad, as shown at *e* and *f*. The diminished triad is simply the supertonic harmony in the *minor* scale, and its treatment is in most respects similar to that of the supertonic of the *major* scale.

In the progressions of the *chord of the seventh* and all dissonances two points are to be noted—viz., *preparation* and *resolution*. Any such dissonance is said to be "prepared" when it has been heard as a consonance in the same part or voice in the *preceding* measure. Thus in Ex. 25 the first F in the alto is a concord followed by the same F as a discord of G. The two Fs in the bass are respectively F the third of D and F the discord of G. In the strict style of composition this rule was held to be obligatory, except in a very few cases, but in the free style numerous instances of unprepared dissonances occur in the writings of the best composers. Like several other rules which have been modified or abrogated under the advances of modern harmony, that of preparation has lost much of its stringency, and is frequently overlooked in cases where it can add nothing to the clearness or compactness of the harmony. Such instances of unprepared sevenths as the following (Ex. 26) are frequent, and are approved by Albrechtsberger and other theorists:

Ex. 25.

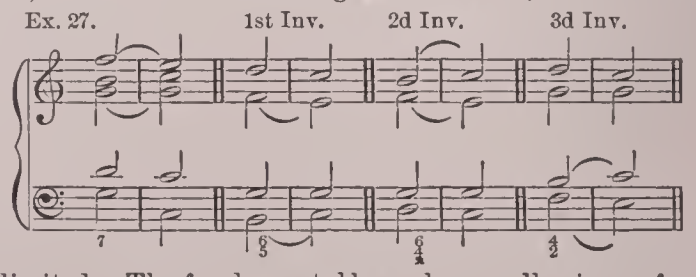


Ex. 26.



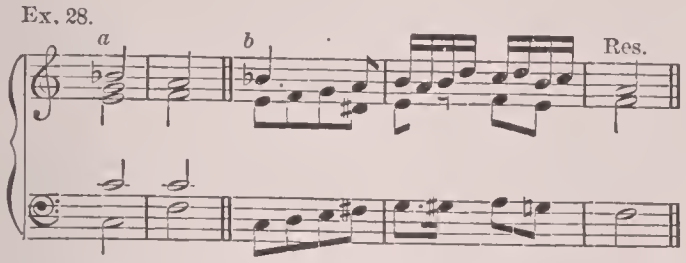
In the *resolution* of the chord of the seventh the general rule is that the third (from the root) moves one degree upward, and the seventh one degree downward, the fifth being unlimited. The fundamental bass also usually rises a fourth or descends a fifth. See Ex. 27.

Ex. 27.



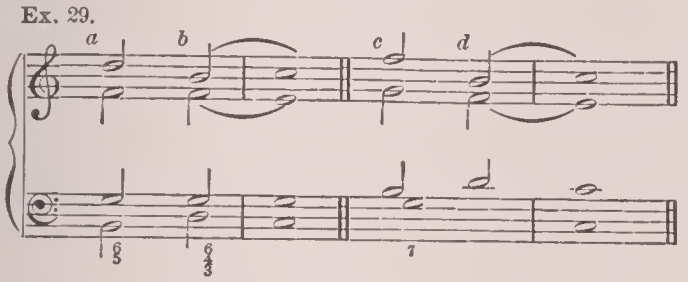
The resolution does not always take place on the very next note, but may be delayed by the intervention of several notes and even by extraneous harmonies. Compare *a* and *b* in Ex. 28.

Ex. 28.



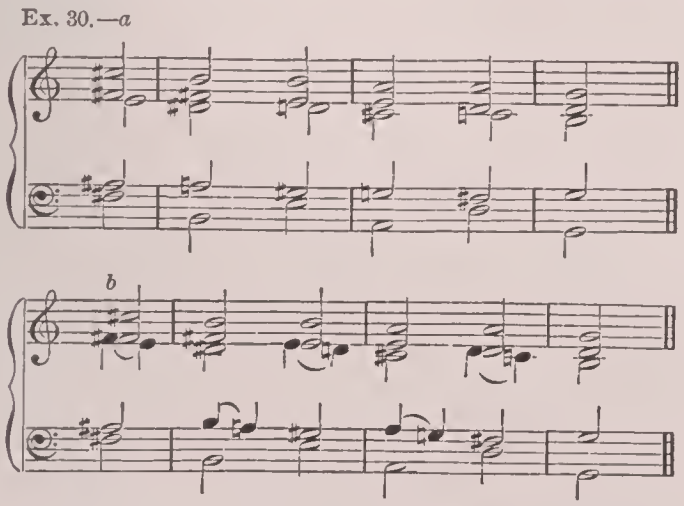
It is not necessary that the resolution of the chord should always occur in the *same part* which makes the dissonance, for any part may move from its own to another term of the chord by an exchange of place with some other part; but in all cases the resolution must finally take place. Thus in Example 29, at *a*, the third (or leading note) is in the bass, and the fifth is in the treble; but at *b* these two parts make an exchange of notes, and the resolution proceeds accordingly. At *c* the seventh in the treble part is transferred to the alto at *d*, and the treble takes the leading note, which before was in the tenor:

Ex. 29.



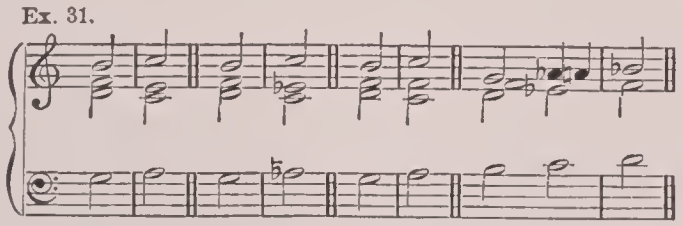
A seventh, instead of resolving into the perfect triad, may be succeeded by another seventh, and this also by another, thus forming a train ending with the usual resolution, as at *a* in Ex. 30. Theorists explain this kind of progression by supposing that the ear perceives a transient resolution after each seventh, which immediately passes into the next dissonance. This is shown by the crotchets at *b* in the example (Ex. 30), which make each chord first a triad and then a seventh:

Ex. 30.—*a*



On the same theory of the skipping or omission of some intermediate note numerous other progressions of the seventh are to be explained. Several of these are given in Ex. 31:

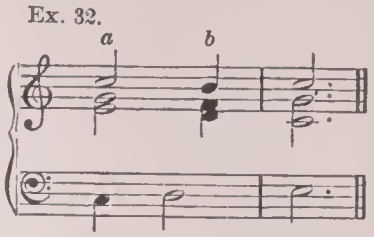
Ex. 31.



That the sevenths may proceed at once, like the triads, to any chord of the diminished seventh, will need no demonstration.

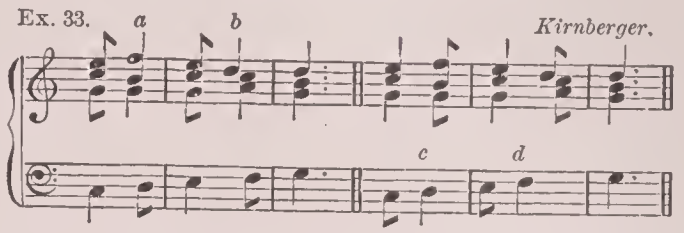
To the chords already described must be added those accidental combinations called *anticipations* and *suspensions*. An "anticipation" is the premature advance of one of the terms of a chord by which it intrudes (as it were) upon the next chord. An instance of this may be seen at *a* in Ex. 32, where the second note of the bass, by moving one crotchet too soon, comes in collision with the triad of C in the upper parts, and *anticipates* the harmony at *b* to which it properly belongs.

Ex. 32.



In Ex. 33, at *a* and *b*, the upper parts make anticipations by moving one quaver in advance of the bass; and at *c* and *d* the bass moves in a similar manner in advance of the upper parts:

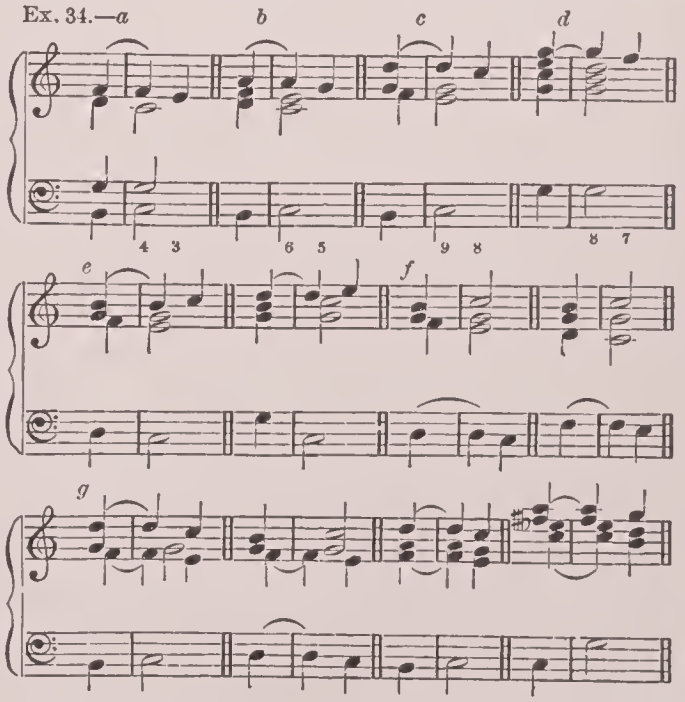
Ex. 33.



Anticipations are for the most part discordant, since they bring a foreign element into the harmony; in some cases, however, they contribute to the smoothness and elegance of a movement.

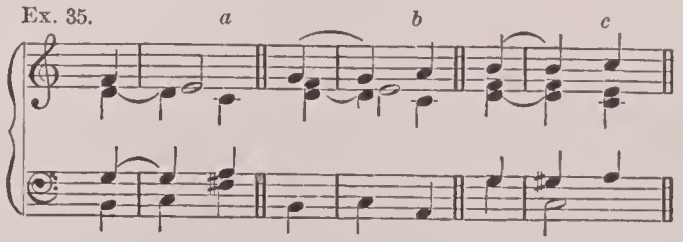
Suspensions are the reverse of anticipations. They occur "when one or more notes of a *preceding* chord are carried into a *succeeding* one to which they do not belong." Any one of the intervals of a triad or chord of the seventh (or two or more together) may be suspended. These suspensions are always on the accented part of a bar or note, and are resolved on the unaccented. A note may be suspended either from above or below. Illustrations are given in Ex. 34, where at *a* the third in the upper part is suspended from above by the fourth; at *b* the fifth is suspended by the sixth; at *c*, the octave by the ninth; and at *d*, the seventh by the octave. At *e* the suspensions are from below, and at *f* they occur in the bass. Instances of double, triple, and quadruple suspensions are added at *g*:

Ex. 34.—*a* *b* *c* *d*



Suspensions are not always resolved on their own proper triads, but another fundamental harmony is substituted, as in Ex. 35, at *a*, *b*, and *c*:

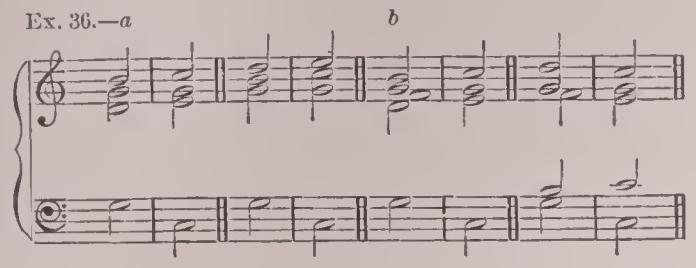
Ex. 35.



Cadences are terminations, closes, or boundaries of musical ideas. In their simple or radical form they consist of a leading chord and a major or minor triad. Cadences are perfect, imperfect, deceptive, and extended; also medial or final. The *perfect* cadence consists either of the triads of

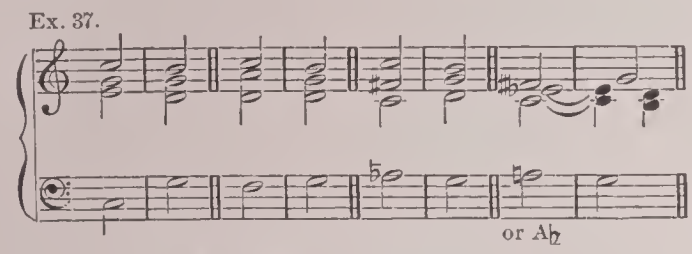
the dominant and tonic, or of the principal seventh and the triad of the tonic. See both forms illustrated at *a* and *b* in Example 36.

Ex. 36.—*a* *b*



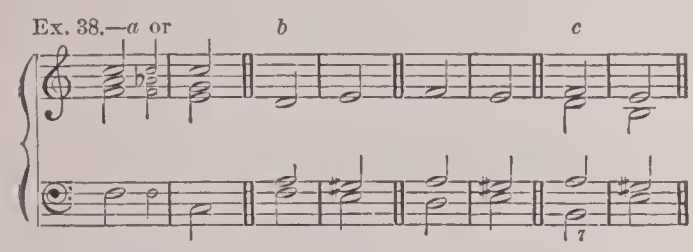
Almost all compositions end with this cadence, as its effect on the ear is final and satisfactory. It admits of numerous inversions (which will be understood without illustration by examples); but as these inversions are not conclusive, they are seldom used as terminations where there are more than two parts or voices. The *half* or *imperfect* cadence has various forms, all ending not with the tonic but the dominant harmony, and it is suitable only for such closes as are not final. See several forms of the half-cadence in Ex. 37.

Ex. 37.



The first of the two cadences which are shown in Ex. 38 is variously known as the plagal or the ecclesiastical; the second (at *b*), called the "Phrygian," is merely an incomplete form of the ordinary minor progression at *c*, with the fundamental note omitted:

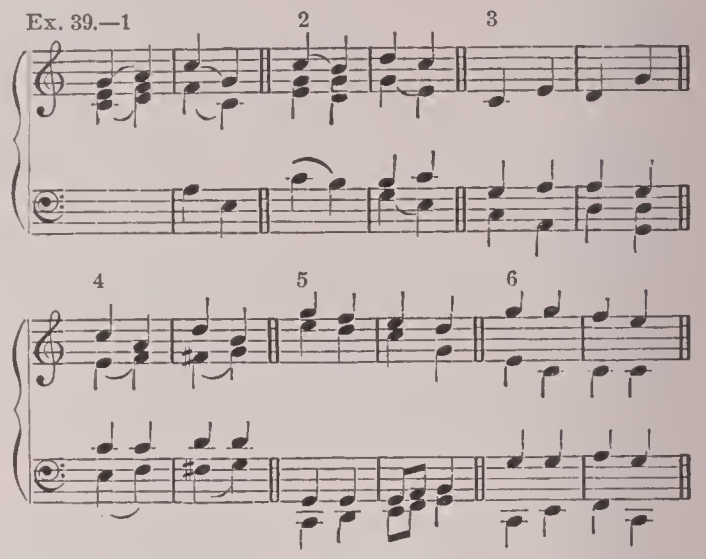
Ex. 38.—*a* or *b* *c*



Deceptive cadences are those in which the leading chord is not followed by that which it naturally suggests, but by another which is more or less foreign to the ear. See Ex. 31, in which each progression is essentially a cadence of this kind.

After this general view of chords and their inversions, suspensions and cadences, we come to their use and treatment in composition, concerning which we here refer the reader to some introductory and historical remarks in the article Harmony. Preliminary to all study of the use of chords is that of their *duration*, and the mode by which the time of any series of musical sounds is regulated and expressed. On this subject, however, some elementary details have been offered in the article Measure, and a more particular exposition will be found under the head of Time. On the kindred subject of Rhythm also, of which only a brief notice could here be taken for want of room, a more extended treatment is given under its proper caption. *Counterpoint*, or the harmonizing of a given melody, is the setting of note against note, formerly written in points. *Simple* counterpoint comprises all those compositions, whether plain or florid, in which the parts are not invertible, but fixed. In *double* counterpoint the parts are so constructed by special rules that two or more of them may be inverted, the higher part changing place with the lower. (See the latter part of the article Inversion.) In simple counterpoint the following general rules are to be observed: (1) Two perfect *fifths* in direct motion and succession, and in the same parts, are usually of bad effect, and should be avoided. (2) Two or more successive *octaves* in the same parts are inadmissible, except in special cases where it is desirable to strengthen the bass or make some idea particularly prominent. (3) As the third is the only discriminating term or element in triads by which we know whether they are major or minor, it should rarely be omitted. (4) Where two or more successive chords contain doubled intervals, care should be taken not to double the *third* when it is leading note to the next chord, as the result would be consecutive octaves. (5) The two higher and two lower parts in a composition should not be placed at an excessive or disproportionate distance from each other. (6) The same rule applies to passages in dispersed harmony, as the effect is thin and unsatisfactory when the parts are widely separated. Instances of violation of these rules are severally given in Ex. 39:

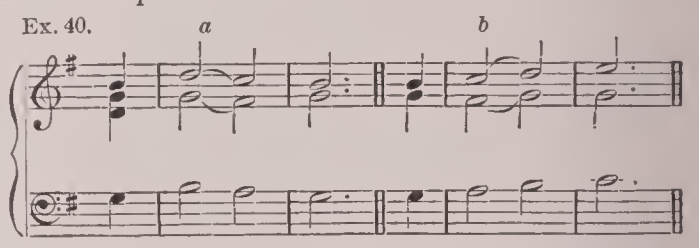
Ex. 39.—1 2 3



4 5 6

The rule respecting consecutive fifths is not violated when the first fifth is perfect and the second imperfect, as at *a* in Ex. 40. In modern music the contrary order frequently occurs, in which the imperfect fifth precedes the perfect, as at *b* in the example:

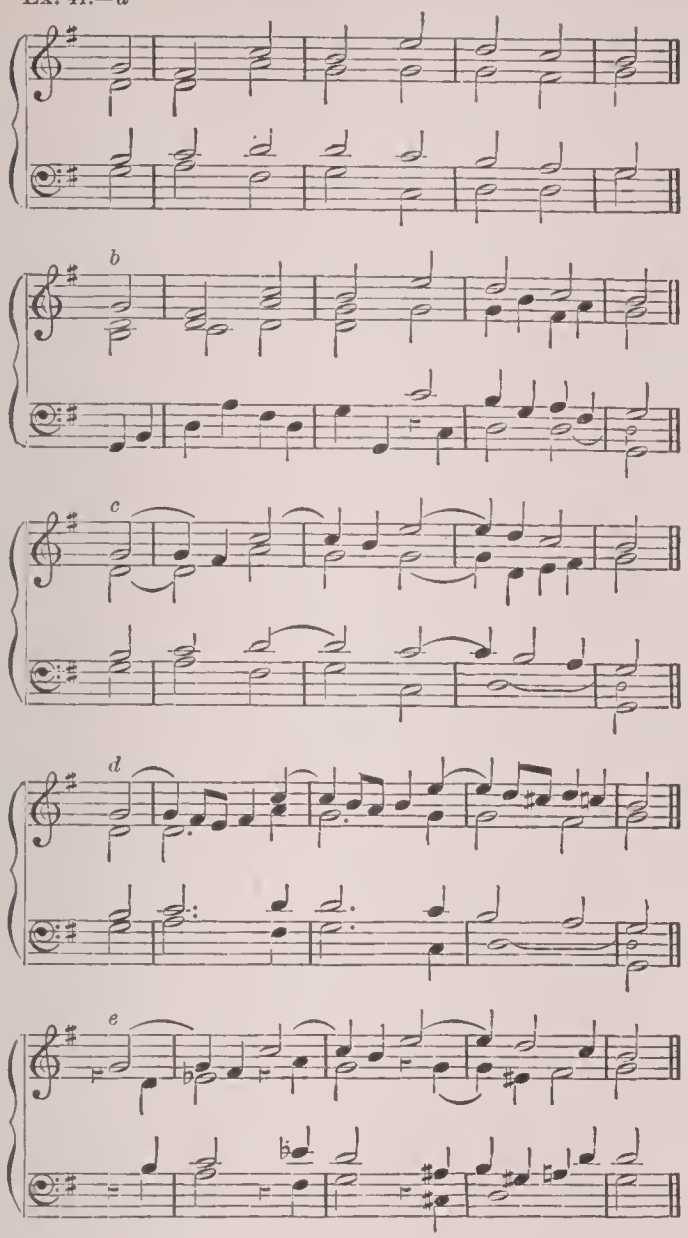
Ex. 40. *a* *b*



Successive fifths are not prohibited when the parts are in *contrary* motion, provided that the texture of the harmony is so woven as not to render them too prominent. In free composition the rule of the fifth is so far modified as to admit of numerous exceptions.

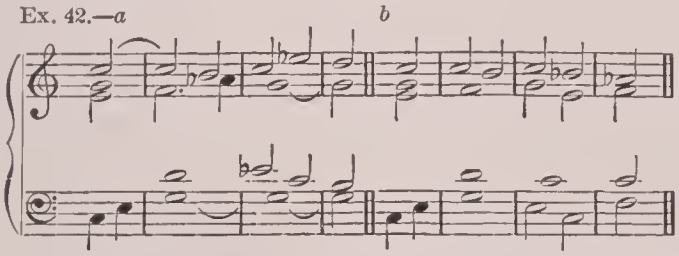
In two-part exercises every triad and chord of the seventh must necessarily be incomplete through the omission of one or more of their intervals or terms. In triads the third (or its inversion, the sixth) should be most frequently used, the fifth less freely, and the octave and unison only occasionally. When there are three parts each *triad*, as a general rule, should be complete; and of the *seventh*, the omitted interval may be the fifth, or less frequently the third or the root. In four parts each chord may appear complete in all its intervals. In triads one term will necessarily be *doubled*, either in the unison or the octave, and one of the terms may even be tripled or omitted, as shown already in Ex. 10 and its context. The third and seventh in the chord of the seventh, being its characteristic intervals, should not be doubled unless in exercises of five, six, or more parts, but the doublings should occur on the fundamental bass or the fifth. In harmonizing a plain theme in four parts each part should as much as possible have its own distinct quality, and more or less of a melodious progression. The simplest practical exercises are those having notes of equal length, confined to a single key, and consisting chiefly of triads and the principal chord of the seventh, with their inversions. A short theme thus treated is given at *a* in Example 41. (The example is merely elementary, for from such plain forms "simple counterpoint" extends to an area of almost unlimited expansion, freedom, and variety, including compositions which are oftentimes far more complex and ornate than ordinary exercises in *double counterpoint*.) The first step in the elaboration of the theme in the example given at *a* is shown at *b*, by the introduction of two notes against one; at *c* and *d* a further advance is made by suspensions of chords and other devices; and at *e* the theme receives additional ornament from chromatic harmony, syncopations, and variations of the time and movement of the parts:

Ex. 41.—*a*



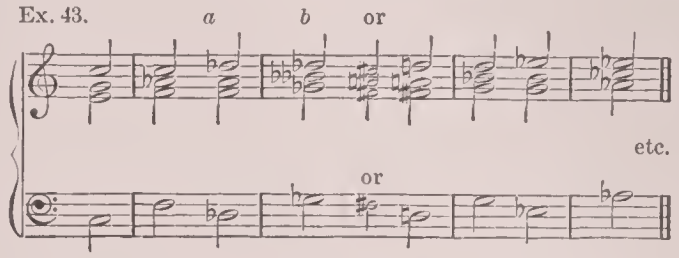
Though a piece of some length may be written in a single key, yet digressions into other keys, near or remote, are ordinarily essential to the beauty and interest of a composition. This passing from one key to another constitutes *modulation*; and it is generally effected by the introduction of the leading note or the minor seventh of the new key, the former generally requiring an accidental ♮, ♯, or ×, and the latter a ♮, ♭, or ♭♭. Instances of such changes of key or mode may be seen in Exs. 20 and 21. More strictly, however, a modulation occurs only when a regular cadence in some new key is made *at the close* of a phrase or period. Modulation is of three kinds—viz., *natural*, *abrupt*, and *enharmonic*. The first of these is illustrated in Ex. 41, and has already been considered in the article Modulation, which the reader should here consult. *Abrupt* modulations are so called because they proceed to foreign or unrelated keys or modes, and not on account of anything rough or strange in their effect. The simplest kind of abrupt modulation is

Ex. 42.—*a* *b*



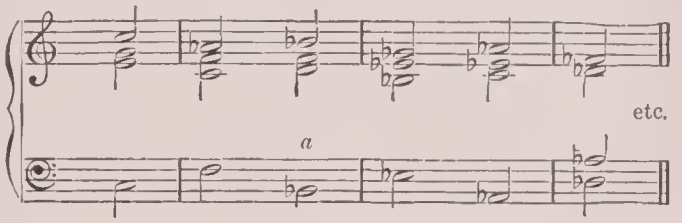
that consisting of a mere change of *mode*, as from major to minor, or *vice versa*, while the keynote remains the same. In Ex. 42, at *a*, see a modulation from C major to C minor, and at *b* a change from C major to F minor, where both mode and key are relinquished. The latter modulation will be found on analysis to consist essentially of the triads of C major and F minor, the first and last notes; and the progression is one which furnishes the key to many developments both curious and important in abrupt modulation. Some of these we shall briefly notice. For instance, the C major triad is the dominant chord to the F minor triad, the bass rising a fourth. From the latter triad we may then proceed by ordinary rule to the major triad of D♭, as at *a* in Ex. 43; which triad being treated as a dominant chord (like the former C) is followed at *b* by the minor triad of its fourth—viz., G♭ minor (otherwise F♯ minor); and by *repeating* this process continually we may proceed through the whole circle of the keys, as partly shown in the example:

Ex. 43. *a* *b* or



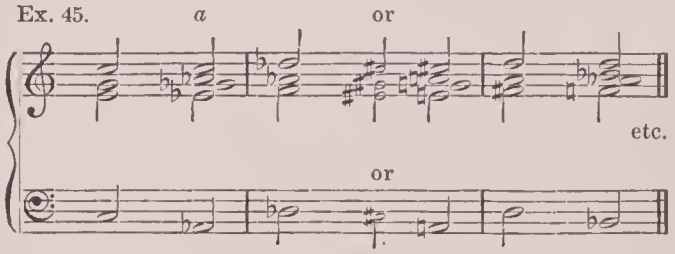
The progression from the second chord (F minor) may also be to the major triad of B♭, the bass descending a perfect fifth, as at *a* in Ex. 44, on which another chain of harmonies may be formed, thus:

Ex. 44.



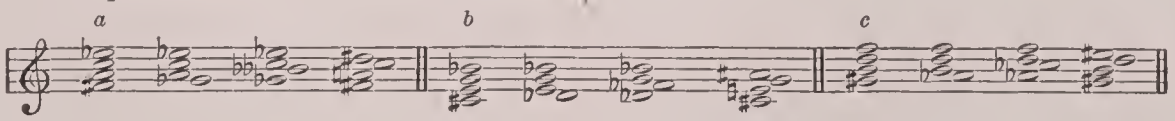
From these suggestions the student will be able to construct many other circular progressions or chains of cadences. In some cases the modulation seems to imply the omission of an intermediate note, instances of which are given in Ex. 22. In this class may be placed the very abrupt but useful progression at *a* in Ex. 45, where the upper note of the tonic harmony (octave of the root) is taken as a *new leading note* (with or without the seventh), and resolved in the usual manner. Of course, the process may be repeated indefinitely, as in the former examples:

Ex. 45. *a* or



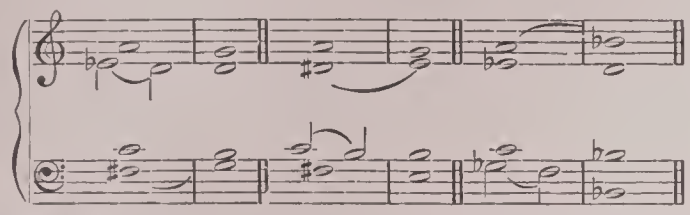
Modulation by *enharmonic changes* is chiefly effected by means of the chord of the diminished seventh. This chord consists of three minor thirds, i. e. a minor third, an imperfect fifth, and a diminished seventh. And as a minor third contains only three semitones, it follows that only three different diminished sevenths are possible, for, after building the chord on three successive grades of the chromatic scale, a fourth grade would produce simply a replication or inversion of the first. The peculiarity of this chord lies in a certain mysterious, dreamy, and equivocal quality which for the time is so entrancing as to involve all sense of key and mode in a sort of bewildering obscurity. Hence the use of this chord in rendering digressions into remote keys is both easy and graceful. Its enharmonic quality arises from the circumstance that each of its elements may be regarded and treated as two entirely different notes in intervals—viz., as sharp of the note below, or flat of the note above, or in both cases as natural instead of sharp or flat. Consequently, each of the three diminished sevenths may be written in four or more different ways, according to the key or scale to which they belong. This will be evident on an inspection of Ex. 46, where four various forms of each seventh are given at *a*, *b*, and *c* respectively.

Ex. 46. *a* *b* *c*



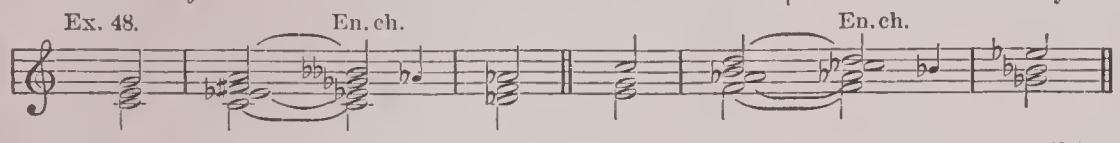
Two other points also are to be observed: 1st, that each of these forms contains a *leading note* into some particular key; and 2d, that any such form may become the principal (or dominant) *seventh of that key* by dropping another of its terms a semitone lower. (In illustration of this see Ex. 47,

Ex. 47.—*a* *b* *c*



which is an exercise on the first of the above sevenths, with the parts distributed.) At *a* the lower term (F♯) is the leading note, and by dropping the E♭ of the alto to D the chord becomes at once an inversion of the ordinary seventh on D, and resolves into the key of G (either major or minor). At *b* the alto, now written D♯, is the leading note, and the tenor being lowered a semitone, we have an inversion of the minor seventh on B, which resolves into the key of E. At *c* the upper part is leading note, and the F♯ of the bass (now become G♭ by enharmonic change) descends a semitone, forming the minor seventh on F, which resolves into the triad of B♭:

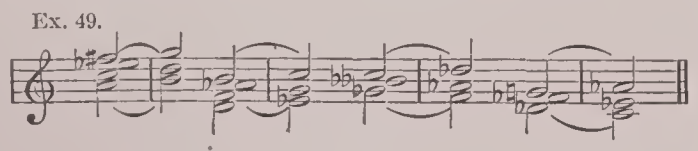
Ex. 48. En. ch. En. ch.



By this simple process we may readily pass from any key to any other (major or minor) without going through a tedious succession of intermediate chords or annoying the ear by a sudden plunge into a foreign scale. To become familiar with this species of modulation it is necessary to keep in mind the distinction between F♯ and G♭, C♯ and D♭, F and E♯, etc., as these two names or forms of expression indicate relations to two different keys. The actual *sound*, however, remains the same, and is in most cases equivocal till the progression decides its character. If, then, we wish to proceed from C major, for instance, to some other key, we select that particular diminished seventh which contains the *leading note* of such other key; and this will form the link connecting the two keys. Suppose the new key to be D♭ major or E♭ minor: of these, the leading notes will of course be C and D, and we accordingly select the diminished sevenths in which they are found. By interposing these between the tonic harmony of C and that of the new keys, the modulation is effected at once, because the middle term in each case is on one side related to C, and on the other (by enharmonic change) to D♭ or E♭. See Ex. 52.

Though in the examples which have been already given one of the intervals of the diminished seventh is dropped a semitone in order to make the ordinary minor seventh of the new key, yet this change is not really necessary, as this chord often proceeds *directly* to its resolution, as is shown in Ex. 49:

Ex. 49.



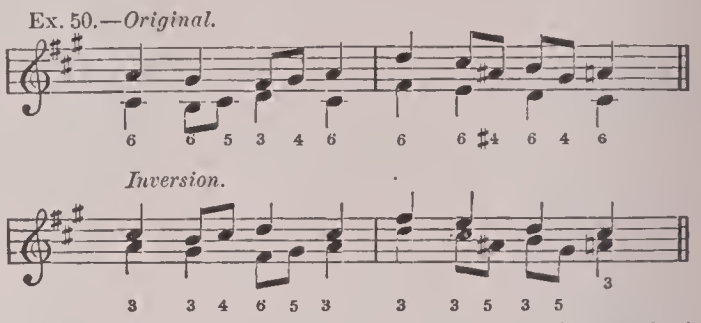
Frequently, also, two or more diminished sevenths occur in immediate succession before the modulation is effected. For a somewhat full treatment of other points more or less pertaining to the subject of simple counterpoint, see the articles Imitative Music, Mode, Scale, Sequence, and Transposition.

Double counterpoint is that species of composition in which the parts or voices are susceptible of *inversion*, the higher part thus becoming the lower, and *vice versa*. Of such species of composition there are several varieties—viz., counterpoint of the *octave*, when one of the parts is moved an octave higher or lower than its original place, while the other part retains its position; and counterpoint of the *tenth*, of the *twelfth*, etc., in which the inversion takes place at those distances respectively. Each of these varieties of counterpoint has special rules by which it is governed in addition to those governing "simple" counterpoint. The intervals of the original composition thus become different by reason of the inversion of the parts. For instance, in "counterpoint of the *octave*" the octave becomes a unison, the second a seventh, the third a sixth, etc., as shown in the following scheme:

Original, 8 7 6 5 4 3 2 1.
Inversion, 1 2 3 4 5 6 7 8.

This will also be evident on observing the notes and figures in Ex. 50, where the lower part becomes the higher by inversion:

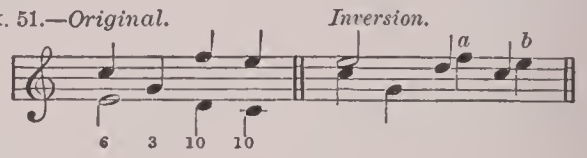
Ex. 50.—*Original.*



Inversion.

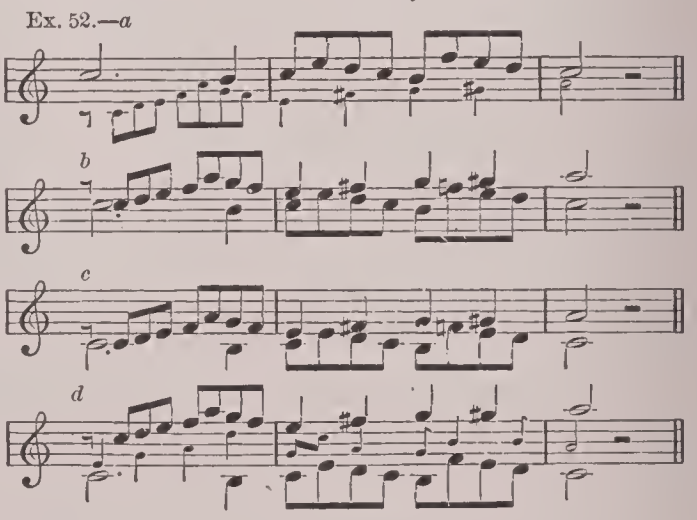
In counterpoint of the *octave* no greater interval than an octave is admissible between the two parts, as every note that exceeds an octave will remain uninverted. This fault will be noticed at *a* and *b* in Ex. 51, where two notes are unchanged in the inversion because they violate the rule. Two perfect fourths in succession are to be avoided, because in the inversion they become two fifths; but two fourths, of which the last is augmented, may be admitted. The two parts should also be various in quality of notes for the sake of distinction. By observing these rules many new and striking effects may be produced from a subject apparently insignificant. To illustrate this very

Ex. 51.—*Original.* *Inversion.*



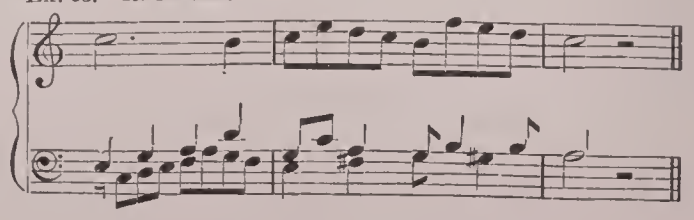
briefly we shall take the following simple theme, and treat it in counterpoint of the octave. In Ex. 52 see the theme at *a*, with an under part in small notes; at *b* is the first inversion, in which the lower part is moved an octave *upward*, thereby becoming the higher; at *c* and *d* are two other inversions, though the first is the only *real* one:

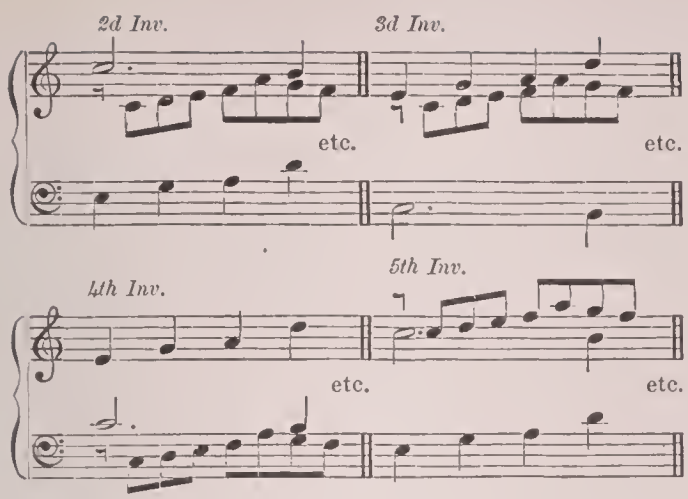
Ex. 52.—*a*



In the latter case, however, the effect is thin and unpleasant, owing to the great distance between the parts. And this very fault suggests another feature—viz., the introduction of a *third* part to fill up the vacant space; which new part we have inserted in small notes. This middle part is also constructed in such a manner as to be capable of inversion like the other parts, and thus several new and beautiful changes may be produced by carrying out the inversions. These inversions are five in number, of which we give the first entire, and the others with only a few notes to indicate the positions which the several parts will assume. See Ex. 53.

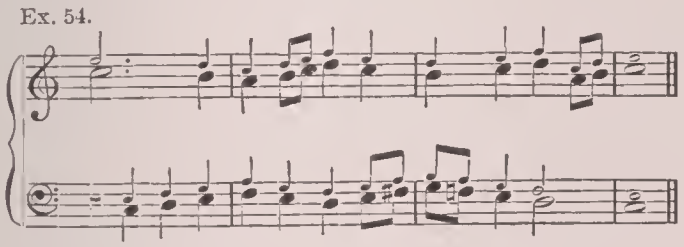
Ex. 53.—*1st Inversion.*





To afford room for inner parts the inverted part may be set at the distance of *two* octaves, as in the above example and also in the next following.—To a two-part counterpoint of the octave two other parts, consisting *entirely of thirds*, may be added by observing the following rules: (1) The original parts should always proceed by contrary or oblique motion; (2) only thirds, sixths, and octaves should be used on the essential or strong parts of the harmony; (3) if a leading note occurs in the lower part, and its third above in the higher, the latter must be resolved downward. We may then form two new parts by writing thirds *above* all the notes of the original parts, as in Ex. 54, where the added parts are given in small notes:

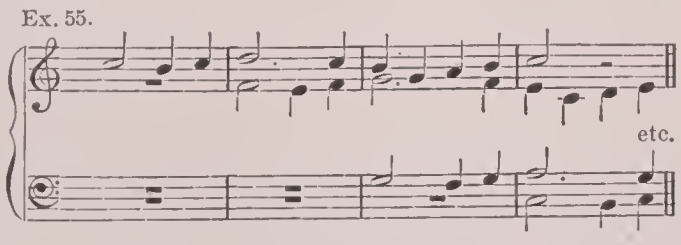
Ex. 54.



The rules for the other counterpoints are in like manner deduced, for the most part, from a comparison of the intervals in the composition before and after inversion. Thus, in counterpoint of the *tenth*, as thirds, fourths, sixths, and tenths become by inversion octaves, sevenths, fifths, and unisons, two of them in succession are not allowable, except in certain cases when such sevenths or fifths are not of the same quality. In counterpoint of the *twelfth*, successive fourths and sixths are forbidden except under similar limitations, as they produce ninths and sevenths in the inversion. To all these counterpoints two middle parts may be added, either as "free" or as parts capable of inversion; and when a composition has four parts of the latter construction, it may be inverted *twenty-three times* by merely arranging the four parts in correspondence with the changes which can be made with the numbers 1, 2, 3, 4—viz., 1, 3, 2, 4—2, 1, 3, 4, etc. Double counterpoint thus throws open a rich field of ideas which would never occur to a composer whose studies had been confined to the simpler departments of harmony.

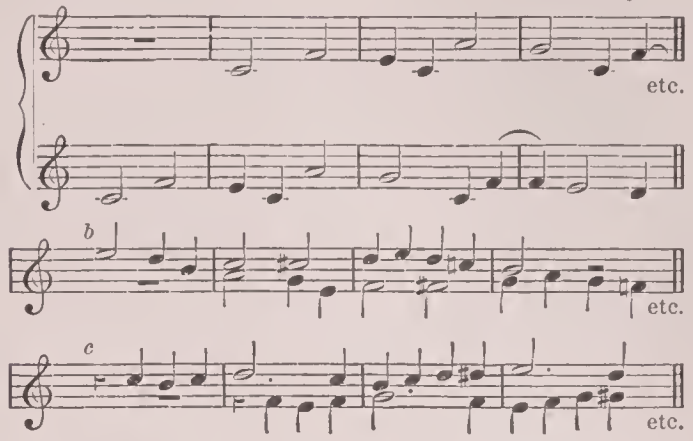
The subject of FUGUE, which comes next in order, has already received attention under its own proper head, and we shall close the present article with a few lines on the nature and structure of *canon*. A canon is a composition in which the several parts are substantially one and the same train of notes, one part beginning, and the others falling in successively at prescribed distances, as in Ex. 55.

Ex. 55.



The parts thus formed by mere imitation of the first may be exact repetitions in unison, or less exact by answering in the second, third, fifth, etc., of the original; but in all cases the answer should conform to the theme in motion and in length of notes. "The truest, easiest, and at the same time, strictest canons," says Albrechtsberger, "are those in the unison and in the octave; for only on these intervals can the answers correspond exactly as to all the half and whole tones, although those on the fifth and fourth may be made to correspond sufficiently well." In Ex. 56 see the openings

Ex. 56.—*a* *Kirnberger.*



of three two-part canons, in which at *a* the answer is in the unison, and *b* in the third below, and at *c* in the fifth below: Canons are said to be *finite* when provided with a proper termination or ordinary ending. On the contrary, an *infinite* canon is one in which there is no such conclusion, but a constant circular repetition, which is usually terminated by a signal agreed upon by the performers.

Among the multitude of works on musical science, embracing both the strict and free schools, the following may here be mentioned, all of which are accessible in the English language: Albrechtsberger, *Harmony, Counterpoint, and Fugue* (London and New York); the same by Cherubini; E. F. Richter, *Harmony, Counterpoint, and Fugue* (3 vols., sold separately); B. Jadasson, *Harmony and Counterpoint* (New York); Weitzman, *Theory of Harmony*, etc., edited by E. M. Bowman (New York). In matters of musical history, W. S. B. Mathews, *Popular History of Music* (Chicago); Sir George Grove, *Dictionary of Music and Musicians* (London and New York). In musical "form," Büssler's *Treatise*, translated and adapted by J. H. Cornell; W. S. B. Mathews, *Elements of Musical Form* (New York). In orchestration, Berlioz's *Treatise* (London); E. Prout, *Instrumentation* (London); Oscar Coon, *Harmony and Instrumentation* (New York), the last almost unique in matters concerning arrangements and scoring for small orchestras and brass bands. Revised by DUDLEY BUCK.

Musin, OVIDE: See the Appendix.

Musk [from O. Fr. *musc* < Lat. *mus'cus*, from Gr. *μόσχος*, from Pers. *musk*. Cf. Arab. *mushk*, musk]: a concrete, strong-smelling, brownish, inflammable substance extensively employed in medicine and in perfumery. It is obtained from the preputial sac of the MUSK-DEER (*q. v.*), and is brought to market from China, Russia, and Calcutta; the musk of the warmer regions is by far the best. On killing the animal, the musk-bag is carefully removed, so as to defend its precious contents from exposure to the air. When recently taken the musk is of so powerful an odor as to cause headache to those who inhale its overpowering fragranee. The affluence of perfume in musk is almost incredible, being apparently undiminished by lapse of time. The price of musk is very high, and it is in consequence excessively adulterated. Some similarly smelling animal products (as the perfume of the desman, etc.) are sold for it. The volatile oils of some plants, such as *Malva moschata* (*Malvaceæ*) and *Mimulus moschatus* (*Scrophulariaceæ*), are found to possess its odor and its medicinal qualities, which are strongly antispasmodic and stimulant. Artificial musk is obtained by treating rectified oil of amber with strong nitric acid. It is superior to much of the musk of commerce, but not equal to the genuine article. It has a limited use in medicine. The drug sambul or sumbul is also a fair musk substitute. Revised by H. A. HARE.

Musk-deer: a small deer (*Moschus moschiferus*) inhabiting the highlands of Central and Eastern Asia, and rarely found in summer below an elevation of 8,000 feet. The musk-deer is about 20 inches high at the shoulder, of a grayish brown, sometimes of a reddish tinge, sometimes mottled with lighter blotches. The hair is long and coarse. Antlers are lacking, but the male has a pair of long canine teeth in the upper jaw. This species is remarkable for the great development of the small side-hoofs, and differs from all other deer in having a gall-bladder. It is an aberrant member of the family *Cervidæ*, and is only distantly related to the little

chevrotains; for these, although often called pygmy musk-deer, belong to another family, the *Tragulidæ*. The flesh is esteemed, though that of the male is very rank and musky.

The musk-deer.

On account of the value of the musk, the animal, which furnishes the precious substance, is subjected to great persecution on the part of hunters, who annually destroy great numbers.

F. A. Lucas.

Muskegon: city (incorporated as a village in 1861, chartered as a city in 1870); capital of Muskegon co., Mich. (for location of county, see map of Michigan, ref. 6–H); on the Muskegon river, and the Chi. and W. Mich., the Gr. Rap. and Ind., and the Toledo, Sag. and Musk. railways; 38 miles N. W. of Grand Rapids, 120 miles by water N. E. of Chicago. The river here enlarges to a width of about 2 miles, and is locally known as Muskegon Lake. It has a water frontage of about 12 miles. The harbor, almost entirely landlocked and open all the year, is one of the best on Lake Michigan, and has regular steamboat communication with all the principal lake ports. The city has an area of about 12 sq. miles, of which 5 are water surface; is lighted with gas and electricity, and has a water plant on the Holly system, completed in 1891, and taking its supply from Lake Michigan; well-paved streets, and an improved sewerage plant. There are 24 churches, 17 public-school buildings, a central school, a high school, 6 kindergarten cottages, and 5 parochial schools, Hackley Public Library (founded in 1888) with over 20,000 volumes; soldiers' monument; public fountain; public park; a park of 58 acres between Lake Michigan and Muskegon Lake, on the west side of the city; 4 national banks with combined capital of $400,000, a State bank with capital of $50,000, and 2 daily and 2 weekly newspapers. The city has been noted for many years for the variety and extent of its manufactures, and particularly for its great lumber interests. The census returns of 1890 showed that 310 manufacturing establishments (representing 53 industries) reported. These had a combined capital of $11,443,967; employed 4,956 persons; paid $2,151,820 for wages and $5,540,042 for materials; and had products valued at $9,464,105. The principal industry, according to the amount of capital employed, was the manufacture of lumber and other mill products from logs or bolts, which had 29 establishments; employed $9,091,979 capital and 2,532 persons; paid $1,022,073 for wages and $3,257,473 for materials; and had products valued at $5,326,058. Next was the manufacture of planing-mill products, which had 9 establishments; employed $345,597 capital and 415 persons; paid $167,283 for wages and $382,694 for materials; and had products valued at $602,541. Then followed the manufacture of foundry and machine-shop products and of furniture. The aggregate shipments by water of lumber products in 1890 were 355,515,000 feet of lumber, 90,808,000 shingles, and 22,670,000 lath. In 1890–94 there were 12 new and large manufactories established in the city, and in the latter year the industrial establishments included iron and steel works, iron-works, boiler-works, about 20 saw and planing mills, furniture-factory, flour-mill, brewery, marble and granite works, and chemical-engine, revolving bookcase, patent earth-closet, library supplies, invalid-chair, portable-desk, army-cot, and brick and tile factories. Pop. (1880) 11,262; (1890) 22,702; (1900) 20,818.

Muskhogean (mŭsk-hō'-gĕe-ān) **Indians** [*Muskhogean* is from Algonquian for swamplanders, swamp-dwellers]: a linguistic stock composed of tribes formerly occupying almost the whole of Mississippi and Alabama and large portions of Georgia, Florida, and South Carolina; now the majority are settled in the Indian Territory. Various names have been proposed to designate this family: Choctaw-Muskoki, Muskhogie, Choktah, Tschahta, Mobilians, and others; but the Indian name of its most powerful and central portion, the Creek, is now adopted.

The tribes formed confederacies, but the political power exercised by these was not always coincident with their territorial extent, and only the Creek and Chikasa confederacy has ever been of decisive influence upon the destinies of the southern Indians. A subdivision of the various tribes of Muskhogean affiliation can be attempted upon a linguistic basis only. The following classification embodies present knowledge:

I. First branch, or Maskoki, comprises the Creek Indians, also called Maskoki, isti Maskoki, or Maskokalgi. They are subdivided into Upper Creek, on the Coosa and Tallapoosa rivers, and Lower Creek, on the Chattahoochee river and E. from there; they comprised also the Creek part of the Seminole and of the Yamasi.

II. Second branch, or Hitchiti towns. This southeastern division comprised towns on the lower Chattahoochee river speaking the Hitchiti dialect; also that portion of the Yamasi and Seminole Indians who had politically separated from the towns just mentioned.

III. Third or Apalache branch; historically known to have lived about St. Mark's river, Florida.

IV. Fourth or Alibamu branch; embraced the Alibamu and Koassati villages on Alabama river, in the vicinity of the present capital, Montgomery.

V. Fifth, Western or Choctaw branch. The Choctaw, living in Central and Southern Mississippi, were the principal people of this division. It branched off into the Chikasa, Choktchúma, and Mugulásha; and some other tribes on the Mississippi river were probably of Choctaw affinity.

Tribes of the Muskhogean Indians.—In the following alphabetic list of the principal tribes the topographic locations given are mostly those of their historic seats E. of the Mississippi river, in which they remained until 1830 to 1840. The larger portion of these tribes still exist in the Indian Territory, preserving the same names, and this may be said more especially of the Creek Indians.

Ábika or Apihka: a very ancient Upper Creek town on Coosa river. It was probably identical with the historical Kusa. Abikudshi, or Little Abika, is a colony of it.—Acolapissa, *Spies, Guardians*: a generic term for a class of Choctaw Indians on the Gulf coast. They are said to have inhabited seven villages.—Alibamu or Albámu: a people with a special dialect, settled in four villages W. of Montgomery, Ala. They live now scattered through the Creek Nation, one town being on the North Fork of the Canadian. There is a settlement of about 100 Alibamu in Polk co., Eastern Texas.—Apalachi: a town and "province" N. of St. Mark's Bay, Florida, the inhabitants of which spoke a Muskhogean dialect of their own. After being subjugated by the Spaniards about 1638, a portion of them removed in 1705 to Mobile Bay, and subsequently went to Louisiana.—Apalachucla: a Hitchiti town on lower Chattahoochee river, and a large center of population; it was called also Tálwa thláko, *Great town*. Under this name is a village in the Indian Territory.—Atasi, *War-club*: an Upper Creek town formerly on lower Tallapoosa river.—Attapulgas, *Dogwood thicket*: a Seminole settlement of Northern Florida.—Bayogoula, *White oak people*: a Choctaw tribe on the western bank of the Mississippi.

Chikasa or Chickasaw Indians: originally inhabiting seven palisaded towns in Pontotoc County, on a table-land in Northern Mississippi. They were a warrior tribe of political importance, stood at the head of a confederacy dwelling along Yazoo and Mississippi rivers, and were the constant antagonists of their congeners, the Choctaw, and of the French colonists. Their dialect differs considerably from the Choctaw lexically, but for oratorical purposes they make use of Choctaw.

Chikasawhay Indians, *Eaters of the bog-potato* (ahi): once on an affluent of Pascagoula river; also known as Ahi-pat

o'kla, the Choctaw term for *potato-eating people*.—Chiaha, *Where others live*: a Lower Creek town on Chattahoochee river; its language and that of its colony, Chiahudshi, is the Hitchiti dialect, though the name of the town itself is Cherokee.

Choctaw, more properly Cha'hta, of Central and Southern Mississippi. Many of them resided on table-lands of the interior, being more agricultural than warlike in character. A nickname of theirs is "Tubbies," apparently taken from their stout or tub-like exterior, but in fact recalling the frequent ending of their war-titles, abi, *killer*. Many Choctaw settled in Louisiana during the eighteenth and nineteenth centuries. Some of the principal subdivisions of the people were the Sixtowns, the Long House, Cusha, Boguechito, Heyowani, and Chikasawhay.

Choktchúma, *Red crabs*: a Choctaw tribe settled on the Yazoo river; mentioned as early as 1540 as Saquechuma, *a walled town*.

Creek Indians, the most centralized, warlike, and politically powerful of the southern tribes, lived in compactly built villages along the fertile bottom-lands of the Coosa, Tallapoosa, Chattahoochee, and Flint rivers. They advanced from the Northwest to Georgia and Florida, subjugating the populations they encountered. Their settlements were divided into two parties: the red towns, also called war or kipáya towns, and the white or peace towns, tálua míkagi, conservative communities. These were governed by civil magistrates, whereas the red towns were controlled by the warriors only, and both parties appear to have been equally strong in numbers. Among the ancient Creeks two forms of speech prevailed: the archaic or female language, now in use among old people only, and the modern or male language; they differ chiefly in verbal endings, not in lexic elements. Historically, the Creek, or parts of their nation, were known as Conshac (*reed-knives*), Coosa, Tallapoosa, Kawita, and Osotchi. The present appellation, "Maskoki," appears to be of comparatively late origin. Among the peoples incorporated into the Maskoki confederacy were the Yuchi, the Natchez, the Alibamu, and the Koassati, some Shawanos, the Nukfalalgi of Southern Georgia, and some Cherokee and Yamasi. The Táskigi and the Tukabatchi are said to have formerly spoken an alien language.

Heyowáni, abbreviated to Towáni: a Choctaw or Cha'hta town on Pascagoula river, once strongly fortified. After their removal to the West, these Indians had a village at Lamourie Bridge, Rapids parish, La.—Hickory Ground, or Odshiapófa: a Creek town on Coosa river, a mile below the falls.—Hillabi: an Upper Creek town between the Coosa and the Tallapoosa rivers.—Huthli-Wahli, *Sharing-out war*: an Upper Creek town on Tallapoosa river.—Huma, or Ouma, *The red ones*: a tribe once settled on the western bank of the Mississippi river, about 20 miles above the Red river junction. Probably of Cha'hta lineage.—Ka-iläi'dshi: an Upper Creek town in the "central" district, between the Coosa and Tallapoosa rivers, Alabama.—Kasi'hta, often spelled Cussetaw: a Lower Creek town on Chattahoochee river. This white town was considered to be, with Kawita, the oldest of the Creek towns on Chattahoochee river.—Kawita, often spelled Coweta, and Kawita Tallahassi: two Lower Creek towns on Chattahoochee river, the latter being a "capital" of the people in the earlier periods. Both were red towns, ruled by the warrior class.—Koassáti, or Coushatta: a tribe once settled near the confluence of the Coosa with the Tallapoosa river. Two townships in the Creek nation are now inhabited by them; about twenty-five live at Shepherd, San Jacinto co., Texas. They speak a dialect approximating nearest to Alibamu.—Muklasa: a Creek town on the southern shore of the lower Tallapoosa river, speaking Alibamu.—Oipat ókla, *Smaller people*: an ancient territorial division of the Cha'hta people, embodying the Cusha and other districts; called so to distinguish it from the Ukla falaya, *Long people*, whose villages extended along a considerable space in the shape of a square.—Okfuski, or Akfaski, *Confluence tongue*: a Creek town built on both sides of Tallapoosa river. It gave origin to seven branch villages.—Okóni: a Hitchiti-speaking town on Okoni river, Georgia, from which the Hitchiti towns claimed descent; abandoned about 1710. Okoni is also the name of a town on Chattahoochee river settled by immigration from the Okoni above.—Sáwokli, *Raccoon town*: a very ancient town of the Hitchiti connection on lower Chattahoochee river, Near by was a colony or branch of it, Sawokli-ū'dshi, *Little raccoon town*.

Seminole Indians of Florida and Georgia: chiefly known in history for the heroic struggle they underwent to oppose the cession of their territory and their removal to the West (1835–42). After the end of this struggle about 400 of these Indians remained in the south of the peninsula. The majority are in the Indian Territory, on a separate tract, and in 1890 numbered 2,539 persons. The tribal name is Creek, and means *separatists*, seceders from the main body of the Upper and especially the Lower Creeks; the proper Indian form is isti isimanóle, or isti Simanólalgi. The Seminoles appear as a distinct political body about 1750, and many authors used the name as synonymous with Lower Creeks. Creek immigrants and invaders, however, are mentioned on the coasts of the peninsula long before that date. The Hitchiti portion of this national conglomerate had a political center in Mikasuki, Northern Florida, and, together with the Creek ingredient, possessed an unenviable reputation among the other Creeks.

Sixtowns, English Towns, or Ukla hánnali: a Cha'hta territorial division still kept up in the Choctaw nation, Indian Territory. Their numbers were subsequently increased. They were located in Smith and Jasper cos., Miss., and were called as follows: Chinokabi, Okatallia, Kilis-tamaha, Talla town, Nashoweya, Bishkon.—Taski'gi, *Jumpers*: a Creek town formerly at the junction of Coosa and Tallapoosa rivers. A town named Tuskegee is now built E. from there.—Tukabátchi, below the falls of Tallapoosa river; the largest town of the Upper and Lower Creeks, and a capital of theirs as late as the end of the eighteenth century.—Wewoka, *Roaring waters*: an Upper Creek town E. of Coosa river.—Witumka, *Rumbling waters*: a town at the Cascade Falls of Coosa river, whose dialect was that of Koassati.—Yamacraw, the misspelled Hitchiti form of the name Yámasi: a small Lower Creek settlement on Savannah river, 4 miles above the city of Savannah. This fragment of a tribe is mainly known to us through its chief, Tomochichi (d. 1739); its name should be spelled Yamathla, or Yamathli.

Yámasi Indians, or Yamasalgi, *The peaceables*: a body of Indians, mostly of Creek descent, who early in the eighteenth century dwelt on both sides of the Savannah river. At first they sided with the English colonists, then passed over to the Spanish side, and finally were annihilated by Creek war-parties after they had retired into Florida. They may be regarded as the early precursors of the Seminoles.

General Characteristics.—The Muskhogean family is so extensive that it is difficult to give any somatological characteristics which will apply to all of its population. Prognathism is not frequent among them, and their complexion is rather dark cinnamon, with the southern olive tinge. Their general intelligence renders them highly susceptible to civilizing influences. All the tribes were well advanced in agriculture, which rendered them relatively independent of the uncertainties of the chase. The members of the two main branches of the stock, the Creek and the Choctaw, differ in stature, the latter being thick-set and heavy, while the former, with the Hitchiti, are more lithe and tall.

The Muskhogeans had extensive systems of totemic clans, which were organized into tribes. Each tribe occupied a distinct village. The clans of every village were organized into two groups, symbolized by the colors white and red. From the white clans the councilors and civil chiefs were selected, while the warriors came from the red clans. Between many of the tribes a reciprocal promotion existed; that is, the white clans, gathered in council, selected the chiefs of the red clan, while the red clans in council selected the chiefs of the white clan. They used the *Ilex cassine* for the preparation of the black drink, erected artificial mounds, in the earlier periods worshiped the sun, and believed in a deity sometimes called the "holder of life." Their fire-worship was connected with their adoration of the sun, and they had many animal-gods. The children belong to the clan of the mother, an antique custom which must have prevailed throughout the Gulf territories. The Muskhogean, as well as other eastern tribes, had town-squares, where an annual festival called a fast (púskita in Creek) was celebrated. No instances of cannibalism are recorded, but scalping was a common custom. Artificial flattening of the foreheads prevailed in the western tribes, other deformations of the skull among the eastern tribes. The reinterment of bodies, after the bones were cleaned from the adhering muscles and ligaments several months after death, is recorded, more especially for the western tribes of the stock.

History.—Historical knowledge of the Muskhogean tribes for the first two centuries after the Columbian discovery is

exceedingly meager. In the sixteenth century three Spanish expeditions passed through the territories held by their tribes—Hernando de Soto, 1539; Tristan de Luna, 1559; and Juan del Pardo, 1567. From their reports it appears that the majority of these tribes were then inhabiting the same tracts and spoke the same dialects as they did about the year 1800.

During the seventeenth century the Spanish colonists had several contests with the Creeks on Tallapoosa river and with the Alabama Indians, as may be gathered from Barcia's *Ensayo cronológico*, and the Apalachia Indians of St. Mark's river, Florida, were subjugated by the Spaniards about the middle of the century. French colonists settled near the mouth of the Mississippi river and English pioneers on the shores of the Atlantic. The French could never overcome the hostile feelings of the Chikasa and their confederates, and in several wars waged against them the Chikasa experienced severe losses, until they were obliged to cede their territories to Great Britain by the peace of 1763. Oglethorpe was the first to conclude treaties with the inland Creek, and the British henceforth established trading-posts in their country. The war against the Cherokee and attacks of some turbulent bands of Creek Indians alternated with intertribal quarrels. The great rebellion of the Creek Indians (1812–14) was instigated by the British and by Tecumseh, their Indian emissary, to imperil the U. S. by an attack from the southern side; but the Creek were reduced by a series of defeats, and after the annihilation of their warriors at the Horseshoe Bend of the Tallapoosa (Mar., 1814) they made peace on the condition of ceding much valuable territory. The urgent pressure of the white population finally caused the removal of all the southern tribes to what is now called Indian Territory. The Cherokee began to emigrate thither in 1819, and were followed by the Seminole and Creek (1836–40), and by the Choctaw and Chikasa (1840–44). Peace being secured to them, they have since acquired a considerable degree of wealth and mental culture.

Population.—According to the census of 1890, the number of pure-blood Indians in the Territory is as follows: Choctaw, 9,996; Chikasa, 3,464; Creek, 9,291; Seminole, 2,539.

Authorities.—Adair, *The History of the American Indians* (London, 1775); Romans, *A Concise Natural History of East and West Florida* (New York, 1775 and 1776); Jefferys, *History of the French Dominions in America* (London, 1760 and 1761); Bartram, *Travels through North and South Carolina, Georgia, etc.* (Philadelphia, 1791); Lawson, *The History of Carolina* (Raleigh, 1860); Le Page du Pratz, *Histoire de la Louisiane* (3 vols., Paris, 1758); Hawkins, *A Sketch of the Creek Country in 1798 and '99* (Savannah, 1848); Milfort, *Mémoire ou Coup d'œil Rapide sur mes Différens Voyages et mon Séjour dans la Nation Crëek* (Paris, 1802); Margry, *Découvertes et Établissements des Français dans l'Amérique Septentrionale* (6 vols., Paris, 1880, etc.); Claiborne, *History of Mississippi*, vol. i. (1881). See Indians of North America.

J. W. Powell.

Muskingum: the longest river wholly in Ohio; formed at Coshocton by the confluence of the Tuscarawas and the Walhonding rivers. Thence it flows generally S. E., 112 miles to the Ohio at Marietta. Zanesville is on its banks. The river is navigable by slackwater improvements 90 miles to Dresden, which is 130 feet higher than its mouth. Its valley is fertile and beautiful.

Muskmelon: See Melon.

Musko'ka: a lake, river, and county of Ontario, Canada; on the eastern side of Georgian Bay; but the name is loosely applied to the entire district from Severn river to Lake Nipissing, and northeastward to the Ottawa river. Thus defined it is about half as large as Maine, a tangle of forests, rivers, and lakes (of which last there are said to be 800 of considerable size). It was long practically uninhabited, but is now crossed by railways and dotted by summer hotels. The waters of the lake are deep, clear, and cool, and swarm with fish.

M. W. H.

Musk-ox: the sole member (*Ovibos moschatus*) of a peculiar sub-family (*Oviboviнæ*) of the ox family (*Bovidæ*); so named from the musky flavor of the bulls and old cows. It is about the size of a small heifer. The horns, which suggest on a small scale those of the African buffalo, are large at the base, in old males almost meeting on the forehead; they curve at first downward and outward, then upward and slightly forward. The body is heavy and legs short, but the coat of very long, thick, dark-brown hair makes the animal look still heavier. There is an undercoat of thick woolly fur, shed in summer. The musk-ox feeds on grass, lichens, and the twigs of pine and willow. This animal is at present confined to the extreme northern parts of the North American continent, where it ranges over the barren grounds to the N. of lat. 60°, roaming in summer to the islands within the Arctic Circle. During the glacial period its range must have been far more extensive, as its bones have been found in drift-gravel in the valley of the Avon at Bath, and elsewhere in England; while the remains of allied species, termed *Bootherium* by Leidy, have been found in the U. S.

Musk-ox.

Revised by F. A. Lucas.

Muskrat: a name applied in different countries to several rat-like mammals distinguished by musky exhalations. (1) In North America it is conferred on the *Fiber zibethicus* (by some called also *musquash*), a rodent of the family *Muridæ*, and the group which contains the field-mice. It is larger than most of the family, being some 15 inches in length, with a tail of 10 inches. It is aquatic, sometimes building houses like those of the beaver, and oftener burrowing in river-banks. It is abundant in many parts of North America. Its fur (the "river sable" of commerce) is extensively sold in Europe. The creature has a strong smell of musk. (2) In India the name is given to the *Crocidura myosurus*, a large rat-like shrew, which possesses and communicates to whatever it touches an intolerable and nearly indelible musk-like smell. (3) It is also applied to the European *Myogale moschata*, or desman, a representative of the family of *Talpidæ* or moles.

Musk-wood: the wood of *Guarea grandiflora* and *G. swartzii*, meliaceous trees of the West Indies, whose wood is finely redolent of musk. The name is also given to *Olearia argophylla*, a composite-flowered shrub of Tasmania, sometimes cultivated.

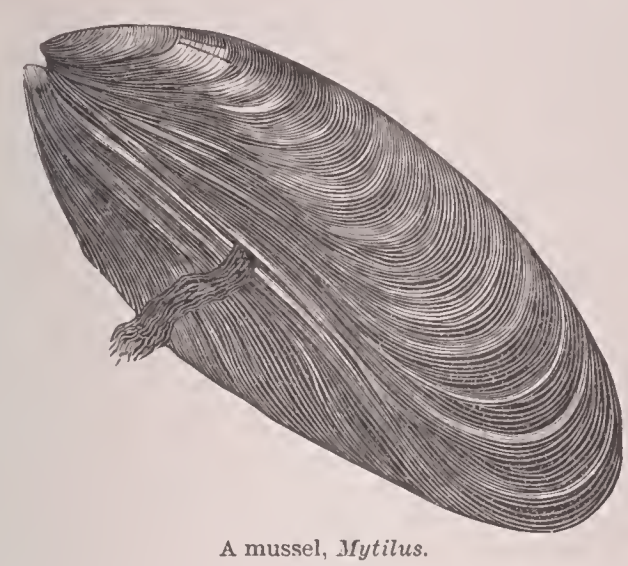
Muspratt, James Sheridan, Ph. D., M. D., F. R. S. E.: chemist; b. in Dublin, Mar. 8, 1821; was educated in Liverpool, where his father established a large manufactory of chemicals; traveled in Germany and France; studied chemistry at Andersonian University, Glasgow, in the laboratory of Prof. Graham, whom he afterward accompanied to London; became when sixteen years old chemist for a large manufactory of chemicals in Manchester; tried mercantile life in the U. S. without success; studied chemistry under Liebig 1843–45, graduating as Ph. D. at Giessen; made numerous discoveries, chiefly in organic chemistry, especially concerning the remarkable bodies produced from the sulphocyanides of ethyl and methyl; founded the Liverpool College of Chemistry, and became a professor there. Among his works are a valuable translation of Plattner on the blowpipe (1844); *Outlines of Qualitative Analysis* (1849); and a *Dictionary of Chemistry* (1854, *seq.*), which found a wide circulation in both England and the U. S., and was translated into German and French. D. at West Derby, England, Feb. 3, 1871.

Musquash: See Muskrat.

Mussafia, Adolf: philologist; b. at Spalato, Dalmatia, Jan. 15, 1834; studied at first medicine and then philology at Vienna, where he is Professor of Romance Philology at the university and member of the Academy of Sciences. He is one of the eminent scholars of the time in the Romance languages, particularly in text-criticism, old Italian dialects, and mediæval legends, and has contributed many articles and reviews to German, French, and Italian linguistic periodicals, many of his most valuable papers appearing in the publications of the Vienna Academy. Among his writings are *Italienische Sprachlehre* (1860); *Altfranzösische Gedichte aus venezianischen Handschriften* (1864); *Monumenti antichi di dialetti italiani* (1864); *Darstellung der altmailändischen Mundart* (1868); *Darstellung der romagnolischen Mundart* (1871); *Beitrag zur Kunde der norditalienischen Mundarten im XV. Jahrhundert* (1873); *Die catalanische metrische Version der sieben weisen Meister* (1876); *Studien zu den mittelalterlichen Marienlegenden* (i., 1886; ii., 1887; iii., 1889); *Zur Christophlegende* (i., 1893, etc.).

E. S. Sheldon.

Mussel [for etymology, see Muscle]: a name often popularly applied to many species of bivalve molluscs, but more properly restricted to the members of the family *Mytilidæ*, and with the qualification fresh-water mussel to the Unioni-



A mussel, *Mytilus*.

dæ (*q. v.*). The marine mussels have an elongated shell closed by a single muscle, and they have the ability to anchor themselves to any solid support by a cable of silken threads (byssus, shown in cut). Most of the species live in shallow water, and the common mussel (*Mytilus edulis*), common to the colder waters of Europe and America, is often eaten in the Old World. The severe sickness which sometimes follows its use may be the reason for its neglect in America. The fresh-water mussels are much different in structure, and are useless as a food-supply for man.

J. S. Kingsley.

Musset, mü'sā', Louis Charles Alfred, de: poet; b. in Paris, Dec. 11, 1810; son of M. de Musset-Pathay, editor of an esteemed edition of J. J. Rousseau. He was educated at the Collège Henri IV., and maintained a high level of merit. His father then wished him to study law, but he had a great repugnance for the routine of business, shared the romantic excitement that was then reaching its height in the world of letters and art, and was consumed by a vague literary ambition. He made a pretense of studying law and then tried medicine, but found both repellent, and for two or three years did little but frequent the romantic *cénacle*. In 1829 he became for a short time a clerk in a business house. In the beginning of 1830 he published his first volume of poems, *Contes d'Espagne et d'Italie*, which, with many features of romanticism, showed yet an independent personality. His independence became clearer in the next poems, forming the volume *Un spectacle dans un fauteuil* (1832). In 1833 he made the acquaintance of George Sand, and the liaison that followed, passing through the tempestuous passion of their journey to Italy (1834) and ending with a series of violent quarrels and reconciliations (1834–35), was the profoundest experience of his life, and left its traces on most of his works. The series of the Nights, his masterpieces—*Nuit de mai* (1835), *Nuit de décembre* (1835), *Nuit d'août* (1836), *Nuit d'octobre* (1837)—flowed directly from it, and the latter part of the prose story *Confessions d'un enfant du siècle* (1836) is the narrative of it. A first trial of the stage with the comedy *La nuit vénitienne* (1830) was a failure, and he ceased to write for representation; but he continued to use the dramatic form, and, free from all concern for the demands of popular taste, produced the historical tragedy *Lorenzaccio* (1834), and a series of slight but original *Comédies et Proverbes*, dialogues full of airy fancy and sprightly and delicate wit, with love for their constant theme: *Les caprices de Marianne* (1833); *Fantasio* (1834); *On ne badine pas avec l'amour* (1834); *Le chandelier* (1835); *La quenouille de Barbarine* (1835); *Il ne faut jurer de rien* (1836); *Un caprice* (1837); *Il faut qu'une porte soit ouverte ou fermée* (1845). He also wrote a few short stories of fresh and simple sentiment; the better known are *Frédéric et Bernerette* (1838); *Margot* (1838); *Croisilles* (1839); *Emmeline* (1842); *L'histoire d'un merle blanc* (1842); *Mimi Pinson* (1843); *Le secret de Javotte* (1844). In 1838 he was appointed librarian of the Department of the Interior. He lost this position some years later, and in 1855 was appointed librarian of the Department of Public Instruction. After 1840 he wrote very little. His course of life had wrecked his health, and he aggravated his condition by the use of stimulants. He was elected a member of the Academy in 1852. D. May 2, 1857. As a poet his power is essentially lyric. His range is narrow, but within it his power is such that he is ranked with Hugo and Lamartine as one of the first three French poets of the nineteenth century. See his *Biographie* by Paul de Musset (Paris, 1877; Eng. trans. by Miss H. W. Preston, Boston, 1887); Arvède Barine, *Alfred de Musset* (Paris, 1893). A. G. Canfield.

Mustang: a name applied to the small wild horses of Texas and to the ponies of the Indian tribes of the southwest of the U. S., which are of one and the same stock, descended from horses of Spanish importation. They associate in large troops, are caught for use by the reata or lasso, and are easily broken to the saddle, though it is often done in a very imperfect fashion. They are hardy and spirited, but often very fractious unless carefully handled.

Mustapha: name of four Ottoman sultans. Mustapha I. (1617, 1622–23), b. 1591; son of Mohammed III.; was an imbecile, twice deposed; d. 1623.—Mustapha II. (1695–1703), b. 1664; son of Mohammed IV., was an able, just, and kindly prince; under him was signed the disastrous treaty of Carlovitz, which sanctioned the first dismemberment of the Ottoman empire. D. 1704, one year after deposition.—Mustapha III. (1757–74), b. 1717; son of Achmet III., though intelligent and animated by high purposes, could neither carry out internal reforms nor retard the decline of the empire. D. 1774.—Mustapha IV. (1807–08), b. 1779, succeeded Selim III. An opponent of reform, he owed his promotion to the Janissaries, and was deposed and strangled the following year. E. A. Grosvenor.

Mustard [from O. Fr. *moustarde* > Fr. *moutarde*: Ital. *mostarda*, from Lat. *mus'tum*, must, unfermented grape-juice, with which mustard was mixed in preparing it for use]: the seed of a number of annual plants of the genus *Brassica* (formerly classed as Sinapis) in the natural order *Cruciferæ*. Black mustard is the seed of *Brassica nigra*, and white that of *B. alba*, native in all parts of Europe, and cultivated in gardens in the U. S. Black-mustard seeds are small, globular, of a deep-brown color externally and yellow within. The white are larger, and of a light color externally. Flour of mustard consists of a mixture of the two kinds of seeds, ground and sifted. As sold, it is generally adulterated with wheat flour and turmeric. Such adulteration is infallibly betrayed by the presence of starch-grains, which are absent in pure mustard. Mustard flour is a popular condiment, and was known to the ancients. It has also medicinal uses. The moistened flour applied to the skin is a powerful irritant and vesicant, and is much used as a counter-irritant to relieve internal pains and spasms. A tablespoonful diffused in a tumbler of water and swallowed acts as a prompt non-nauseating emetic, often convenient in cases of poisoning.

Mustard Family: a group of mostly herbaceous dicotyledons (*Cruciferæ*), with choripetalous, cross-shaped flowers having usually six stamens and a single superior bicarpellary ovary. About 1,500 species are known, mostly natives of the temperate regions of the globe. Most of the species possess a pungent juice, and indeed the members of this family may be recognized commonly by their mustard-like pungency. Among the well-known genera are *Brassica* (containing cabbage, turnip, and mustard), *Raphanus* (radish), *Cheiranthus* (wall-flower), *Hesperis* (rocket), *Iberis*, *Alyssum*, etc. Mustard, shepherd's-purse, peppergrass, and false flax are troublesome weeds. C. E. B.

Mustard Oil: a substance distilled from the ripe seeds of the black mustard (*Brassica nigra*) after the fixed oil has been expressed. It is not contained in the dry seed, but is formed after the addition of water. A soluble ferment, called myrosin, is contained in the seed together with a glucoside, myronate of potassium. When the ferment is dissolved in water it acts upon the glucoside, and decomposes it into glucose, mustard oil, and acid potassium sulphate, as represented in the equation:

$$\underset{\text{Potassium myronate.}}{KC_{10}H_{18}NS_2O_{10}} = \underset{\text{Glucose.}}{C_6H_{12}O_6} + \underset{\text{Mustard oil.}}{C_3H_5CNS} + KHSO_4.$$

The oil is extremely pungent, and when applied to the skin it produces a blister. Chemically, mustard oil is known as allyl isothiocyanate, and is a member of a class of substances several of which have been prepared by artificial methods and have properties similar to those of ordinary mustard oil. This also has been made artificially. Ira Remsen.

Mustel'idæ [Mod. Lat., named from *Muste'la*, the typical genus, from Lat. *mūstē'la*, weasel, a dimin. of *mus*; cf. O. Fr. *musteile*]: name of a family of mammals of the order *Feræ* or *Carnivora*, comprising many species, such as the weasels, skunks, badgers, otters, etc. The form is very variable according to the genus, in some, such as the small weasels, the trunk being very much elongated, and in others, such as the gluttons and badgers, being comparatively concentrated and robust; the teeth are adapted to a purely carnivorous diet, the molars of the upper jaw and the last premolar of the upper jaw being typically sectorial, or adapted for cutting. The true molars are reduced in number to one above and two (or, as in *Mellivora*, one) below. The skull exhibits many characters in common; the paroccipital process is closely applied to the auditory bulla; the mastoid process prominent, and projecting outward or backward behind the external auditory meatus; the carotid canal is distinct, and more or less in advance of the foramen lacerum posticum; the condyloid foramen is distinct from the latter; the glenoid foramen is generally well defined; the intestinal canal has no cæcum; the prostate gland is not salient, being contained in the thickened walls of the urethra; Cowper's glands are not developed; the os penis is large. The family in most of the characters thus referred to exhibits decided affinity with the bears, raccoons, and allied forms, and not at all with the cats and dogs, agreeing with the last simply in adaptation for carnivorous diet. It contains numerous species, which have been distributed among eight sub-families—viz., (1) *Mustelinæ*, including the genera *Mustela*—i. e. the large weasels; *Putorius*—i. e. the small weasels; *Gulictus*—i. e. the weasels of tropical America; and *Gulo*—i. e. the gluttons or carcajou; (2) *Melinæ*, with the genera *Meles* and *Arctonyx*, or Old World badgers; *Mydous*, or African teledu, and Taxidæ, or American badgers; (3) *Mellivorinæ*, with its single genus, *Mellivora*—i. e. the African and Indian ratels or honey-badgers; (4) *Mephitinæ*, or the American skunks, including the genera *Mephitis*, *Conepatus*, and *Spilogale*; (5) *Ictonychinæ*, with the South African genus *Ictonyx* or *Zorilla*; (6) *Helictidinæ*, with the Asiatic genus *Helictis*; (7) *Lutrinæ*, with the various genera of fresh-water otters of all parts of the world; and (8) *Enhydrinæ*, with the genus *Enhydris*, or the sea-otters of the North Pacific.

Mut: an Egyptian goddess; the second member of the Theban triad (Amon, Mut, and Khonsu), and wife of Amon. She symbolized Nature as the mother of all things. She is represented as a woman with a vulture head-dress, the uräus, and the double crown of Egypt, and with the life-sign in her right hand. C. R. G.

Mutata: See IMMUTATA.

Mutation: See UMLAUT.

Mutes [from Lat. *muta* plur., translation of Gr. ἄφωνα, sc. γράμματα, toneless; ἀ-, not + φωνή, tone. The Greek grammarians commonly divided the letters into φωνήεντα, vowels, and σύμφωνα, consonants, and the latter into ἡμίφωνα, half-toned (ζ, ξ, ψ, λ, μ, ν, ρ, σ), and ἄφωνα, toneless (β, γ, δ, κ, π, τ, θ, φ, χ)]: a traditional term of phonetics, for which modern science generally substitutes the term explosives or stops (Germ. *Verschlusslaute* or *Explosivlaute*). These sounds are the result of a check upon the breath or the breaking of a check. The commonest illustrations are *k*, *g*, *t*, *d*, *p*, *b*. See PHONETICS. BENJ. IDE WHEELER.

Mutsu Hito, moot'soō sh'tō: the reigning Mikado or Emperor of Japan; b. Nov. 3, 1852; ascended the throne Feb. 3, 1867. His administration is notable for the great reforms that have been introduced and the remarkable development of the empire. The official designation of his reign-period is Mei-ji (pronounced mā'jee').

Mutton-bird: a popular name, used in Australia and New Zealand, for the large petrels of the genus *Œstrelata*, particularly for *Œstrelata lessoni*.

Mut'tra: town of British India, in the Northwestern Provinces; on the banks of the Jumna (see map of N. India, ref. 5–E). It is built on high and hilly ground, with magnificent flights of steps, adorned with temples, leading down to the river, which is kept sacred by the Hindus, and annually attracts vast numbers of pilgrims. The enormous riches which the town formerly contained have been carried away by various conquerors, its fortifications have fallen into ruins, and nothing is left but the narrow, dirty streets, which swarm with so-called sacred apes, parrots, peacocks, and bulls. Pop. (1891) 61,195.

Mužáková, moōzh'ăăk-ov'ă, JOHANNA: Bohemian novelist, better known by her pseudonym SVĚTLÁ (*q. v.*).

Myc'ale [= Lat. = Gr. Μυκάλη]: the modern *Samsum*; the westernmost branch of Mt. Mesogis, in Lydia, Asia Minor, terminating in the promontory called Trogylium (now Cape Santa Maria). In the narrow channel between this promontory and the island of Samos the Persian fleet was defeated and destroyed by the Greeks in 479 B. C. It is probable that at the time of the battle there was a town—Mycale or Mycallessus—at the foot of the promontory, but no certain account of it is extant.

Myce'næ, or **Myce'ne** [= Lat. = Gr. Μυκῆναι, or Μυκήνη]: one of the oldest cities of Greece; situated on a rocky eminence in the plain of Argos, in the Peloponnesus. It was the residence of the Pelopidæ, and at the time of Agamemnon it was the principal city of Greece. In 468 B. C. it was totally destroyed, and it was never rebuilt, but the remains of it, the cyclopean walls, the gate of lions, and the treasury of Atreus, are among the grandest and most interesting antiquities in Greece. The ruins are near the little village of *Charvati*, 5 miles N. E. of Argos. The excavations of Schliemann in 1876 and of the Greek Archæological Society from 1886 to 1888 have added much to our knowledge of the importance of Mycenæ, for they brought vast treasures to light, and have opened up an entirely new chapter in the history of early art. See Schuchhardt, *Schliemann's Excavations* (London, 1891); Brunn, *Griechische Kunstgeschichte* (Munich, 1893); Overbeck, *Geschichte der Griechischen Plastik* (Leipzig, 1893); Collignon, *Histoire de la Sculpture Grecque* (Paris, 1892); Perrot and Chipiez, *Histoire de l'Art dans l'Antiquité, La Grèce Primitive, l'Art Mycénien* (Paris, 1893). See also Milchhoefer, *Die Anfänge der Kunst in Griechenland* (Leipzig, 1883); Loeschcke and Furtwaengler, *Mykenische Vasen* (Berlin, 1886); Steffen, *Karten von Mykenae* (Berlin, 1884). J. R. S. STERRETT.

Mycerinos (Egypt. *Menkara*): the Mechirinos of Diodorus; the sixth king of the fourth Egyptian dynasty; builder of the third largest pyramid at the S. W. of Gizeh. In 1837 Col. Vyse found his stone sarcophagus intact and also some pieces of the wooden coffin in his pyramid. The former was lost at sea off Gibraltar. The inscriptions of the latter show a definite form of the Egyptian belief in a future existence. His reputation for piety was enduring, and the thirtieth and sixty-fourth chapters of the RITUAL OF THE DEAD (*q. v.*) were said to have been discovered during his reign, being then already old. CHARLES R. GILLETT.

Mycetozoa: See SLIME MOULDS.

Mycoderm: See FERMENTATION.

Myeli'tis [Mod. Lat. *my'elon*, spinal marrow, spinal cord (from Gr. μυελόν, earlier μυελός, marrow) + suffix *-itis*, denoting a disease of the part to whose name it is added]: a common nervous disease. Formerly the term was applied also to diseases which are allied but now easily distinguishable from it in life and *post mortem*. Myelitis may affect limited or extensive portions of the cord, and we speak of localized and diffuse or disseminated myelitis. The gray matter of the cord alone may be involved (central myelitis), or only the cortical white substance may be affected. An interesting form is that in which a transverse section of the cord, of limited extent, upward and downward, is inflamed in consequence of angulation of the spinal column or pressure from some other cause. This is known as transverse myelitis.

The causes of myelitis are varied. Sometimes it results from exposure to cold or from over-exertion. At other times it seems to result from infectious diseases, from injury, or from intemperance. The appearance of the spinal cord varies widely in myelitis, in accordance with the rapidity of development. In very acute cases and in those in which the disease results from pressure on some part of the cord, the affected area is softened and pulpy. When the process is more gradual, reparative changes take place at the same time as degeneration, and the cord may be gray and tough. Microscopically, the nerve-fibers of the cord are found in a state of greater or less degeneration, and there is an evident attempt at repair by new growth of fibrous tissue, as in destructive diseases of other organs.

The symptoms manifested in myelitis vary somewhat with its rapidity of development and with the distribution of the inflammation. Generally mild disturbances of sensation are the initial indications of spinal irritation. Among these

sensory symptoms are such as the feeling of ants crawling over the skin, numbness of the feet, a woolly feeling in the skin, pricking sensations, heat, cold, and the like. Soon after this, or coincidently, power fails in the legs and tends to grow worse. Paralysis of the legs is known as paraplegia, and in the great majority of cases is due to myelitis. In exceptional instances the disease in the cord rises so high that the arms may be involved in the palsy, but more generally death takes place when the upper part of the spinal cord is diseased, before the distribution of the paralysis is defined. As the disease advances, some wasting of the legs is noted; sensation, in place of perversion, becomes benumbed, and there may be complete loss of feeling in the skin of the legs and body to the level of the disease. Finally, bed-sores are apt to develop, and serious disease of the urinary bladder and kidneys may result from inability to void the urine properly.

Myelitis is always a serious disease, very acute cases tending to early fatal termination, and only in its milder forms is treatment of much value in a curative sense. Much may be done to prevent unpleasant or dangerous complications, but complete recovery is rare even in mild cases. Absolute physical and mental rest may do much in the early stages to limit the disease. Careful diet and cleanliness are essential, especially the latter. Strict attention should be paid to the bed and to bathing the patient's back to prevent bedsores. Certain remedies, like ergot, may have value at the onset of the disease; and after it has become established, cool bathing, the use of electricity to the limbs, strychnia, and nitrate of silver are recommended. WILLIAM PEPPER.

Myer, ALBERT JAMES: See the Appendix.

Myer, ISAAC: See the Appendix.

Myers, FREDERIC WILLIAM HENRY: author; b. at Keswick, England, Feb. 6, 1843; was educated at Cheltenham College and Trinity College, Cambridge; was fellow of Trinity and classical lecturer 1865–68; published *St. Paul* (poem, 1867); *The Renewal of Youth, and other Poems* (1882); *Essays, Modern and Classical* (1883); *Science and a Future Life, with other Essays* (1893). He was collaborator in *Proceedings of the Society for Psychical Research* (1882 onward) and in *Phantoms of the Living* (1886).

Myliobat'idæ [Mod. Lat., named from *Mylio'batis*, the typical genus, liter., the millstone skate; Gr. *μυλίας*, millstone (deriv. of *μύλη*, mill) + *βατίς*, a flat fish, named from having teeth adapted for grinding]: a family of the class of selachians and order *Raiæ*, or rays; rather to be called *Aëtobatidæ*, as *Aëtobatis* is an older name for the genus often called *Myliobatis*. The disk formed by the union of the pectoral fins with the body is very broad, by reason of the lateral extension of the latter, and the tail is very long and attenuated; the dorsal fin is developed near its root, and behind it is one or a pair of spines serrated at their lateral edges; the pectoral fins are atrophied at the sides of the head, but at the extremity of the snout are developed as a pair of detached cephalic fins; the skin is smooth and destitute of spines; the head quite deep; the mouth inferior and transverse; the teeth have flat grinding surfaces, and are quadrangular or hexangular, and in one or several interlocking longitudinal rows. The family is divisible into two sub-families, the one with a median row of teeth, besides several lateral rows, which alternate and interlock with the adjoining ones, the other, with the teeth broad and in a single row, answering to the median row in the former. Several species are found on the coast of the U. S. On the eastern coast the *Rhinoptera bonasus* is sometimes called clam-cracker, sting-ray, and cow-nose ray: the *Aëtobatis fremenvillei*, sharp-nosed ray; and the *A. aquila* is in England known as eagle-ray. Revised by D. S. JORDAN.

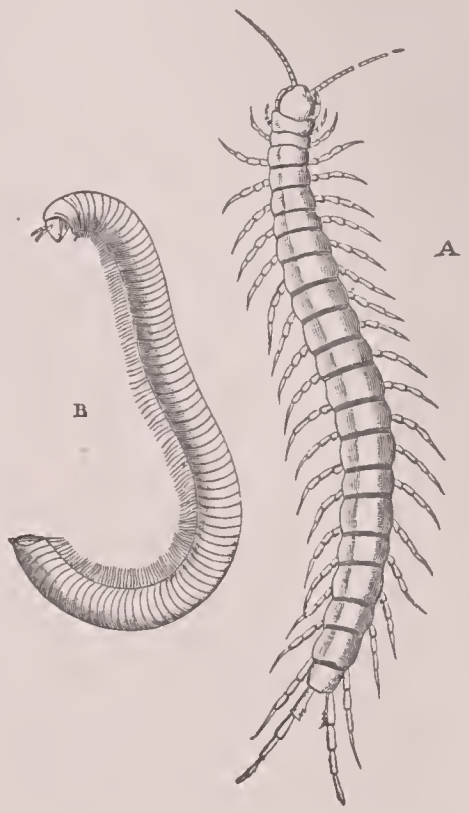
Mylit'ta (Gr. *Μύλιττα*): a goddess worshiped in Babylon, Assyria, and Persia; corresponding in some respects to the Greek Aphrodite Urania. She was the great cosmic principle, the great mother, who produced all life in conjunction with Bel (or Baal), her male counterpart. She was worshiped under a variety of names in Asia, and in Greece she was known now as Cybele and now as the Artemis (Diana) of Ephesus. J. R. S. STERRETT.

Myocardi'tis: See HEART DISEASE.

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

Myo'pia: short-sightedness due to excessive convexity of the cornea or to convergence of the visual axes of the eyes. The defect is remedied by concave glasses.

Myriap'oda [Gr. *μύριοι*, ten thousand + *πούς, ποδός*, foot]: a class of elongated animals with homonomously segmented bodies. Popularly they are known as centipedes, millipedes, galley-worms, and army-worms. In structure they show considerable similarity to the so-called Protracheata (*Peripatus*) and some of the annelid worms on the one hand, and to the Hexapoda (see ENTOMOLOGY) on the other. At one time they were classed with the Hexapoda under the term *Insecta*, or its equivalent *Antennata*, and at another as forming a distinct class by themselves. More recent studies have shown that half (Chilopoda) of the group have undoubted Hexapodan affinities, while the other half (Diplopoda) must stand by itself, as having no connection with the Hexapodan phylum. Heretofore the two groups have been kept together chiefly on account of the common character of a multisegmented and many-legged body. This, however, is overbalanced by the decided differences in the structure of the mouth-parts and in the position of the sexual organs, which can not be explained except by supposing an independent origin for the two groups. All previous endeavors to derive one group from the other have been based on an ignorance of the value of these differences, and on an exaggerated value of unimportant similarities or on those now readily explained without supposing the existence of a genetic relationship.



Myriapods: A, *Scolopendra* (Chilopod); B, *Iulus* (Diplopod).

In both groups the number of legs varies greatly. Thus among the Diplopoda *Pauropus* has 9 pairs, *Polyxenus* 15, the *Polydesmidæ* have 28 to 31, and the *Polyzonidæ* from 56 to 196 or more. Among the Chilopoda the number varies from 15 in the *Scutigeridæ* and *Lithobiidæ* to 21 and 23 in *Scolopendridæ* and to as many as 170 and more in one of the *Geophilidæ*. It is to be noted that only in the forms with comparatively few legs is the number constant for the species. In one of the common species of *Geophilus* (*G. bipuncticeps*) adults may be found with from 61 to 67 pairs of legs. There is a body segment for every pair of legs, although in the Diplopoda the upper half of the segment has become so modified that there are apparently two pairs of legs to a segment. Hence the name Diplopoda. In each ring either the dorsal portions of two segments have grown together, or one has covered two segments. Then this has grown downward, crowding the bases of the legs together until, in many instances, there is scarcely any sternal space between them. This explanation of the anomalous double-footed condition is based upon a comparison with the fused segments in certain Crustacea, and upon the development of the young Diplopod.

In the number and character of the mouth-parts real differences occur. While the number of oral appendages in the Chilopoda is three, which bear comparison with those of Hexapods (see ENTOMOLOGY), in the Diplopoda there are only two pairs, a pair of mandibles and a large plate-like lower lip (gnathochilarium), which, according to the embryological studies of Metschnikoff and others, is developed from a pair of primitive appendages. In the Chilopoda the first pair of legs become very much enlarged, and lie beneath the head as a pair of prehensorial jaws. In the terminal joint of these is a poison gland, which opens by a small pore near the tip of the terminal joint.

The internal anatomy in both groups is primitive in general character. The alimentary canal runs straight through the body without or with but slight differentiation

into regions such as are readily observed in the Hexapoda. The Malpighian tubules are two in number in all excepting the one genus *Scutigera*, in which there are four. The nervous system consists of a long chain of ganglia, one to each pair of legs, and a sub- and a supra-œsophageal ganglion. In the Diplopoda the two strands composing the chain are completely fused, and the ganglionic swellings are very slight. The respiratory system in the Chilopoda may be very complex from the interlacing and anastomosing of the tracheal branches. In the Diplopoda no such branching occurs; the tracheæ arise from the spiracles near the base of the leg and run into the body as simple tubes. To this *Glomeris* offers the only exception, but even here the branching is very simple. Though apparently ventral in the Diplopoda, the spiracles in both groups are on the side of the body, excepting in the genus *Scutigera*, where there is a row of spiracles in the median dorsal line. In this genus the internal structure also of the respiratory apparatus differs from that of the others. The spiracle opens into a small chamber from which radiate small tracheæ branching dichotomously and ending bluntly in the tissue surrounding the heart. There are seven of these organs, each situated on the posterior margin of a dorsal shield. In other forms of the Chilopod group the spiracles may be on every segment except the last two, as in the *Geophilidæ*, or on approximately every other one. Thus in the *Scolopendridæ* and the genus *Lithobius* they are found on segments 3, 5, 8, 10, 12, etc., while in the genus *Henicops* the arrangement is the same, with the addition of a pair on the first segment. The reproductive system of the Diplopoda is in marked contrast with that of the Chilopoda. In the latter the ovaries and testes lie above the intestine. The two oviducts pass along the sides of the intestine, unite under it, and open by a single opening in the penultimate segment. In the Diplopoda the genital glands lie underneath the intestine, and open by two short ducts in the third body segment or between the second and third pairs of legs. In both groups so-called salivary glands occur. In the Chilopoda these are short and racemose; in the Diplopoda they consist of two pairs of elongated simple tubes. These are so fused together as to appear like two elongated threads, one on either side of the intestine, comparable to the spinning glands of Lepidopterous larvæ, or to the slime-glands of *Peripatus*. Protective dermal or repugnatorial glands occur in both groups. On the majority of the rings in the Diplopoda there is a pair of repugnatorial pores, secreting a fluid with the odor of crushed almonds, due to the presence of hydrocyanic acid. In the *Geophilidæ* numerous pores are gathered into areas on each sternum. Besides these small pores there may be large ones on the coxæ of the penultimate segment, or on the anal segment. In the *Lithobiidæ* they occur on the under side of the coxæ of the last four pairs of legs. In some cases, as in one of the *Polydesmidæ* and several of the *Geophilidæ*, the animals are phosphorescent. In the former family the phosphorescence is plainly due to the action of the repugnatorial glands, but in the *Geophilidæ* observers differ as to whether it is produced by the ventral pores or in the intestinal region. Sensory organs are more or less developed. The eyes, where present, consist of simple ocelli, in numbers ranging from a single pair in one of the *Lithobiidæ* to very many in *Scutigera*. In *Scutigera* the ocelli are so numerous as to form a compound eye, comparable with that of Hexapods. The *Polydesmidæ* and some others among the Diplopoda, and the *Geophilidæ* and some of the *Scolopendridæ* among the Chilopoda, are without eyes. At the end of the terminal joint of the antenna of Diplopods are several two-jointed processes that are undoubtedly tactile in function, and may also be used as organs of smell. In *Sphærotherium*, of the same group, a stridulating apparatus occurs. This argues the presence of auditory organs.

The eggs of the animals are laid in the ground, usually in nests. In the case of *Lithobius* they are laid singly. Sometimes the eggs and newly hatched young are guarded by the mother, as was observed with *Geophilus ferruginosus* by Fabre and others, and with *Scolopocryptops* by Wood. *Scolopendra* is said to be ovoviviparous. The eggs undergo total segmentation, and during development show similarities to the eggs of *Peripatus* and to those of Hexapoda. Very much yet remains to be learned in regard to the early stages of growth. The Diplopod young escapes from the egg with few body segments and only three pairs of legs, a fact that has been regarded as proving their affinities with the Hexapoda, and as showing them to be the antecedents of the Chilopoda. The larva undergoes a series of moultings, more segments and more legs being added with each moult until the adult condition is reached. Among the Chilopoda there are two distinct divisions to be noted. In one, the *Epimorpha*, the young hatch from the egg with the adult number of segments and legs, while in the other, the *Anormorpha*, the young have at first only seven pairs of completely developed legs and three pairs of leg buds. With successive moultings new segments and new legs are added until the adult number of fifteen is reached.

The distribution of the Myriapoda is worldwide, a fact that indicates an early origin. The Chilopoda are not, however, found earlier than the Tertiary period, unless the Protosygnatha of Scudder be admitted as a primitive Chilopod, which is extremely doubtful. On the other hand, the Archipolypoda, apparently the precursors of the Diplopods, are found as far back as Devonian times. Of the Protosygnatha, the only form, *Paleocampa anthrax*, found by Meek and Morthen in the carboniferous formation at Mason Creek, Illinois, has ten body segments and two rows of spreading fascicles of needle-like spines. These give it the appearance of a caterpillar, and as such it has been described. If it is at all related to the Myriapods, it is more likely to *Polyxenus* of the Diplopoda than to any of the Chilopoda. Concerning the relationships of the Archipolypoda there is less doubt. The *Euphorberidæ*, occurring in the same beds as *Paleocampa*, are peculiar from the large spines on the back and sides, and for certain openings occurring in each segment between the bases of the legs. The former occur in some of the Diplopoda, but the meaning of the latter is an unsolved problem. Chief among works on Myriapoda are Latzel's *Die Myriapoden der Oesterreichisch-Ungarischen Monarchie*, containing a full bibliography, and the embryological works of Metschnikoff, Sograff, and Heatheote. For American forms, see Bollman's *Myriapods of America* (1893). F. C. Kenyon.

Myris'tica, or **Nutmeg**: the kernel of the seed of a tree about 30 feet in height, closely resembling the orange-tree; a native of the Banda islands and some neighboring islands. Its scientific name is *Myristica fragrans*. It does not flower until the eighth or ninth year, but after this time it bears flowers and fruit together constantly, and continues to do so for many years. In order to insure early fruitfulness a branch of the female tree is grafted into all the young plants when about two years old. Sometimes as much as three crops are gathered annually. Mace is the inside covering of the nutmeg. Upward of 1,500,000 lb. of nutmegs are imported into the U. S. yearly. Nutmeg is used in medicine as a nervous sedative, and mace is sometimes employed as its substitute. H. A. Hare.

Myrmeleon: See Ant-lion.

Myrmid'ones (in Gr. Μυρμιδόνες): the followers of Achilles in the campaign against Troy. They came originally from Ægina, and received their name from μύρμηκες, ants, because Zeus, at the request of Æaeus during a plague, changed all the ants of the island into men, and thus peopled it. Peleus led them into Thessaly, where they settled.

Myrob'alan [viâ Fr. from Lat. *myroba'lanum*, from Gr. μυροβάλανος; μύρον, unguent, fragrant juice + βάλανος, acorn]: a drug formerly much used in medicine as an astringent, and now used by tanners, dyers, and ink-makers for the tannic acid it contains. Myrobalans, sometimes called white galls, are the fruit of East Indian trees (*Terminalia bellirica* and *T. chebula*, of the order *Combretaceæ*), of a euphorbiaceous plant (*Phyllanthus emblica*), and of other trees of tropical regions.

My'ron (in Gr. Μύρων): a sculptor; b. at Eleutheræ, in Attica, who flourished about 460 B. C. He was a pupil of Ageladas, as were Phidias and Polyclitus. He worked almost exclusively in bronze, in which he cast a great number of statues both of gods, men, and animals. Among his statues of gods his Hecate (in wood), two Apollos, a Dionysus, a group consisting of Zeus, Athene, and Heracles, and a group of Athene and Marsyas were celebrated. Several imitations of the last group are known—on Athenian coins, on an Attic vase now in Berlin, and on a marble relief now in Athens. An admirable copy in marble of the Marsyas of this group is now in the Lateran Museum in Rome. (See von Sybel, *Athene und Marsyas* (Marburg, 1879); Hirschfeld, *Athene und Marsyas* (Berlin, 1872).) Of his statues of mortals that of the runner *Ladas* and the *Discobolos* were most celebrated. The best account of Myron and his works is found in Collignon's, *Histoire de la Sculpture Grecque* (Paris, 1892). J. R. S. S.

Myrosin: See Fermentation.

Myrrh [readapted to Latin orthography < O. Eng. *myrra*, from Lat. *myr'rha* = Gr. *μύρρα*, from Arab. *murr*, myrrh, liter.. bitter]: the concrete juice of one or more trees, among them a small tree (*Commiphora myrrha*) growing in Arabia. Myrrh is exported from the East Indies in the form of reddish-brown, brittle, resinous lumps, of a fragrant odor and bitter, aromatic taste. Its principal constituents are a gum and a resin. (See Gum Resins.) Myrrh has been known from the earliest ages, being used as a constituent of incenses, perfumes, and salves. Taken internally, myrrh resembles other aerid resinous substances in tending to correct a feeble, relaxed condition of the mucous membranes, and in small doses promotes digestion and quickens the action of the heart. It is very little used as an internal medicine in the U. S. Locally, an emulsion of myrrh makes an agreeable mouth-wash for spongy gums and sore throat and dressing for indolent ulcers. Edward Curtis.

Myrta'ceæ [Mod. Lat., named from *Myr'tus*, the typical genus = Lat. *myr'tus* = Gr. *μύρτος*, from Pers. *mūrd*, myrtle. Cf. Myrrh]: an important natural family of dicotyledonous trees and shrubs, of tropical and warm temperate regions, with the entire leaves dotted with pellucid glands, containing an aromatic oil, no stipules, mostly numerous stamens, and an inferior compound ovary surmounted by a single style. Nine species, belonging to the genera *Calyptranthes*, *Eugenia*, and *Psidium* occur in the extreme Southern U. S. A peculiar portion of the family, embracing a majority of the species, is Australian, conspicuous among which is the genus Eucalyptus (*q. v.*). Within the tropics the fleshy or berry-fruited genera prevail. The family is important for its useful products, such as Cloves and Allspice, Guavas and Eugenia, Cajuput Oil, and Brazil-nuts (*qq. v.*). Besides the common myrtle, callistemous and several Australian shrubs and small trees are cultivated for ornament.

Myrtle [from O. Fr. *mirtil*, dimin. of *myrte* < Lat. *myr'tus*, myrtle. See Myrtaceæ]: popular name of trees and shrubs, mostly tropical and evergreen, belonging to the genus *Myrtus*. None are indigenous to North America. The common European myrtle (*Myrtus communis*) is a fine aromatic shrub whose berries yield a pleasant cordial. The leaves produce an aromatic oil, and water distilled with the flowers is the agreeable perfume known in France as *eau d'ange*. Several tropical species are cultivated. The name is popularly but incorrectly extended to other evergreen shrubs. For Dutch myrtle, see Gale.

Mys'ia (in Gr. Μυσία): a province of Asia Minor, bordering N. on the Hellespont and Propontis, W. on the Ægean Sea, S. by Lydia, E. by Phrygia and Bithynia. It was subdivided into five territories—Lesser Mysia, Greater Mysia, Troas, Æolis, and Teuthrania. Among its mountains was Ida; among its rivers, the Scamander, Simois, and Granicus; among its cities Troy. J. R. S. S.

Mysore, mī-sōr': an independent state of India under British protectorate; between lat. 11° 35′ and 15° N., and between lon. 74° 45′ and 78° 45′ E.; bounded on all sides by the territory of the Presidency of Madras. Area, 30,886 sq. miles. Pop. (1901) 5,538,482. It is an elevated table-land, rich in gold mines and salt, and producing, besides the common Indian grains, pepper, cardamoms, cinnamon, and coffee; water is often very scarce, and the country is infested with tigers and leopards. The reigning family is Hindu.

Mysore: the capital of the principality of Mysore; in lat. 12° 19′ N. and lon. 76° 42′ E.; at an elevation of 2,330 feet above the sea; 10 miles S. W. of Seringapatam, the former capital (see map of S. India, ref. 6–D). It is fortified, and contains the palace of the rajah and the residence of the British governor. Its splendid aqueduct has now fallen into ruins, and great trouble is often caused by lack of drinking-water. Carpets are manufactured here. Pop. (1891) 74,048.

Mysteries (in Gr. Μυστήρια): the secret worships of various gods, to which one might be admitted only after having passed certain purifying initiatory trials or degrees that varied in number in different Mysteries. In addition to what was universally known about any god, there were also certain secret facts and tenets of such a character that they might be divulged to the initiated alone. The character of these tenets varied according to the god honored in the Mysteries, but they can only be guessed at, inasmuch as everything connected with the Mysteries was kept secret. A clew to the general character of Mysteries is given by Plato (*Rep.* 2,378), who tells us that whatever is vicious, immoral, or disgraceful in the stories about the gods ought either to be buried in silence or else be told only in Mysteries, from which the mob must be excluded by making the sacrifice of a huge and unprocurable victim the condition of initiation. The Mysteries had their origin in the worship of the powers of nature, as seen in the contrasts of spring and winter, seed-time and harvest, the budding of new life from the rotting of the seed. Life springing from death in nature were contrasts in which the devout saw a bit of the history of the human soul. The myth of Persephone embodied the principle of life succeeding death, so that Mysteries were naturally held in honor of Demeter and her daughter. Just as new life sprang from the death of the seed, so new life must also spring from the death of the human body, and hence the doctrines of the immortality of the soul and of retribution after death were added at an early time to the doctrines taught in the Mysteries. Mysteries were held in honor of Demeter and Persephone at Eleusis, of the Cabiri in Samothrace, of Zeus in Crete, and at many places in honor of Dionysus, Cybele, Hecate, Aphrodite, Mithras, Orpheus, Isis, Zagreus, and Sabazius. Specialized information will be found under Eleusinia. See also Stengel, *Griechische Kultusalterthümer* (Munich, 1890); Strube, *Studien über den Bilderkreis von Eleusis* (Leipzig, 1872); Förster, *Der Raub und die Rückkehr der Persephone* (Stuttgart, 1874); Haggenmacher, *Die Eleusinischen Mysterien* (Basel, 1880); Nebe, *De mysteriorum Eleusiniorum tempore* (Halle, 1886); Rubensohn, *Die Mysterienheiligthümer in Eleusis und Samothrake* (Berlin, 1892); Gardner's article *Eleusis and the Mysteries* in his *New Chapters in Greek History* (London, 1892).

J. R. S. Sterrett.

Mysteries: See Miracle-plays.

Mysticism [from Gr. *μυστικός*, secret, mystic, deriv. of *μύστης*, one initiated, deriv. of *μύειν*, close (the lips or eyes); cf. *μυστήριον*, secret rite, mystery]: a term covering different notions (1) in ceremonial worship, (2) in religion, and (3) in philosophy.

(1) In worship, mysticism denotes the performance of certain rites or mysteries symbolizing and, at the same time, tending to establish certain ineffable relations between God (or the gods) and man. It is common to nearly all forms of worship save the most spiritual, is closely connected with theurgy and Magic (*q. v.*), and frequently produces enthusiasm or Ecstasy (*q. v.*) in the worshiper. In Greece, this mysticism, which is later than Homer, was confined, for the most part, to the worship of the gods of the earth and the underworld (*θεοὶ χθόνιοι*). Consult Iamblichus, *De Mysteriis*; Lobeck, *Aglaophamus*; Seemann, *Die Götter und Heroen der Griechen*, pp. 425, *sqq.*; Hatch, *Hibbert Lectures for 1888*, lect. x.; Robertson Smith, *Religion of the Semites*, lect. x.; Lenormant, *Chaldæan Magic* (London, 1877).

(2) Religious mysticism grows out *of* the enthusiastic or ecstatic element in ceremonial worship, and occurs in many religions. It is an attempt to enter into direct communion or union with the divine through (*a*) some abnormal psychical condition or (*b*) some faculty of the mind other than reason. It therefore assumes many different forms.

(*a*) The requisite abnormal condition may be produced by various causes, by drugs (homa-juice, hashish, wine, etc.), self-hypnotism, asceticism, mental alienation, hysteria, obsession, (?) etc. To such causes as these we must attribute the frenzy of the Corybantes and Bacchanals, the "inspiration" of the Pythia (*q. v.*) and oracle-givers generally, the dreams of the Sufis (*q. v.*), the performances of magians, dervishes, and yogis, very many of the phenomena of mediæval Christian and Moslem mysticism and modern Spiritualism, etc. Upon all these light is being thrown by psychiatry and psychical research. Consult Cicero, *De Divinatione*; Myers, *Greek Oracles* in *Hellenica*; Baumgart, *Ælius Aristides*; Görres, *Christliche Mystik* (5 vols.); Gobineau, *Les Religions et les Philosophies de l'Asie Centrale*, chap. iv.; Fitzgerald, *The Rubáiyát of Omar Khayyám*; Preger, *Die deutsche Mystik*, vol. i., pp. 13–141.

(*b*) The faculties, other than the reason, by which men have sought to come into possession of the divine are (*α*) feeling, (*β*) the supernatural sense. (*α*) Some persons, like Max Müller (*Lectures on the Origin and Growth of Religion*. p. 37), hold that we actually feel the Infinite with our bodily senses; but generally the theopathic sense is held to be a kind of emotion, *volupté*, or passive love (*Minne*), imparting blessedness (supposed to be a consciousness of God), but no definite conception. This mysticism, which usually

leads to QUIETISM (*q.v.*), belongs almost exclusively to Christianity and to monasticism. It seems to have originated in the allegorical interpretation of the Song of Solomon, begun by the Jewish doctors, and continued among Christians from the days of Origen onward. Indeed, Origen may be called the founder of this species of mysticism (see Bigg, *The Christian Platonists of Alexandria*, p. 188, *seq.*), which appears in every age of the Church after him, assuming sometimes revolting forms, sometimes, when combined with the higher mysticism, forms of great purity and beauty, as, e. g., in Bernard of Clairvaux's eighty-six sermons on the Song of Solomon. It forms a large element in the mysticism not only of Bernard, but also of all the greater mystics—e. g. Francis of Assisi, Hugo and Richard of St. Victor, Joachim of Floris, Eckhart, Suso, Thomas Aquinas, Bonaventura, Dante, de Gerson, Catherine of Siena, Thomas a Kempis, Angelus Silesius, Molinos, Fénelon, Madame Guyon, etc. Consult the works of these, also of Preger and Görres, *ut sup.*) The forms of mysticism thus far named may all be regarded as more or less material, morbid, and false. We now approach the spiritual, healthy, and true form, that which has its origin in the supernatural sense. (*β*) It is difficult to define this sense otherwise than by saying that it is the faculty which relates us to the spiritual world, as our bodily senses relate us to the material world, and enables us to recognize God as the Father of Spirits. It has been called by many other names, e. g. inspiration (Job xxxii. 8), Word of God, Word (first by Heraclitus), faith (first by Parmenides), synderesis (*συντήρησις*, first by Jerome, in commenting on Ezekiel i.), spiritual sense, theory (Aristotle, *Metaph.*, xi., 7), practical reason (Kant), wisdom (Tennyson, *In Memoriam*, cxiv.; cf. xcv.), etc. It is, as it were, the convergence and apex (*apex mentis*, Bonaventura) of all the faculties of the soul, including perception, will, love, or, in Paul's language, faith, hope, love. When strongly marked, it makes the prophet or the religious genius, and all such are necessarily mystics—Zoroaster, Moses and the Hebrew *nebi'im*, Jesus (supremely), Mohammed (slightly—the Buddha not at all), Heraclitus, Æschylus, Socrates (with his *dæmon*), the Christian apostles, several of the Neo-Platonists, Christian and heathen, Augustine, the great mystics of the Middle Age (see under *a*), Luther, and many more. Indeed all persons for whom religion is a matter of personal experience, something more than an ethical code, an historical belief, or a system of observances, are mystics. Mysticism of this kind is the very essence of religion, the spring of all healthy, rational, human energy. Consult the *Gâthas* of Zoroaster, in *Sacred Books of the East*, vol. xxxi.; the Bible, the Fathers of the Church; Lane-Poole, *The Speeches and Table-talk of Mohammed*; the works named under (*a*); Spicker, *Die Ursachen des Verfalls der Philosophie in alter und neuer Zeit*; Brother Azarias, *The Culture of the Spiritual Sense*, in *Phases of Thought and Criticism*; Vaughan, *Hours with the Mystics*; Rosmini, *Antropologia Soprannaturale* and *Teosofia*; Gioberti, *Teorica del Soprannaturale.*

(3) Philosophic mysticism seeks either (*a*) to grasp the divine by means of the reason (dialectic), or else (*b*) to draw out in terms of the reason the data of the faculty by which it is grasped. The former is pantheistic or panlogistic, the latter theistic. (*a*) Pantheistic mysticism, proceeding by abstraction, reaches at last the universal predicate, Being, which it then assumes to be the real ground of the universe, God, and, reversing the process of abstraction, tries to deduce the universe from him. It involves a complete confusion of the ideal with the real, of human thinking with the process of existence, and always finds its goal in darkness, self-annihilation, *nirvana.* Since abstract Being is equal to naught, and as *ex nihilo nihil fit*, no other logical result is possible. Of this sort is all Brahmanic, Buddhistic, Neo-Platonic, Moslem, Jewish, and much Christian mysticism. It finds its classical expression in the philosophy of Hegel, which is rightly called Panlogism. In the western world, this kind of mysticism seems to owe its origin to Parmenides, who identified being and thinking (*τὸ γὰρ αὐτὸ νοεῖν ἐστίν τε καὶ εἶναι*), and placed being in a transcendental world. He was followed by Plato, whose whole doctrine of ideas is a species of intellectual mysticism, from which even Aristotle is not altogether free. (See *Metaph., ut sup.*) The germs sown by these thinkers developed, under the influence of Oriental religions (Mazdeism, Judaism, etc.), into the mysticism which we find in Philonism and Neo-Pythagoreanism, and, partly under the influence of Christianity, into Neo-Platonism and the Gnosticism of Clement and Origen, the former of whom has some claim to be considered the originator of Neo-Platonism. (See Bigg, *Christian Platonists of Alexandria*, p. 64.) A later union of Christianity with Neo-Platonism gave birth to the works erroneously attributed to Dionysius Areopagita, the convert of Paul. These works were written by a Neo-Platonic Christian about A. D. 400, and became known to the Latin Church through the translation of Scotus Erigena in the ninth century. They completed the union of Hellenism with Christianity, and furnished the type of mediæval theology and piety. From that time pure pantheistic mysticism ceased, until it was revived in the systems of Bruno, Spinoza, and Hegel. (Consult Brahmanic *Upanishads* and Buddhistic *Suttas*, in *Sacred Books of the East*; Mohini, translation of *Bhagavad-Gîta*; Max Müller, *History of Sanskrit Literature*, chap. ii.; Dieterici, *Philosophie der Araber*, vol. i., pp. 164, *sqq.*; Syed Ameer-Ali, *Life and Teachings of Mohammed*, chap. xix.; the *Cabbala*; the fragments of Parmenides, in *Journal of Spec. Phil.*, vol. iv.; the *Republic* and *Timæus* of Plato; Aristotle, *Metaph.*, book xi., in *Jour. of Spec. Phil.*, vol. xxii.; the works of Clement of Alexandria, Origen, Plotinus, Porphyry, Iamblichus, Proclus, Dionysius Areopagita; Westcott, *Religious Thought of the West*, pp. 142, 194, *sqq.*; Bruno's philosophic works; Spinoza, *Ethica*; Hegel, *Logik*, *Naturphilosophie*, *Philosophie des Geistes.* Cf. Frothingham, *Stephen Bar Sudaili, the Syrian Mystic, and the Book of Hierotheos* (Leyden, 1886); *Der Neoplatonismus*, in Harnack, *D. G.*, i., 719, *seq.*). (*b*) Theistic philosophic mysticism is almost peculiar to Christianity, and dates from (the pseudo-) Dionysius (see above) and Augustine. It was in part due to the same cause as monasticism, and is closely connected with it. That cause was the secularization of the Church, which forced the more profoundly religious and reflective spirits to withdraw from the practical world and seek satisfaction in speculation. The monks were a church within the Church. The speculations of Dionysius and Augustine, continued through Maximus Confessor, Joannes Damascenus, Scotus Erigena, and others, finally celebrated a glorious resurrection in Bernard of Clairvaux. Bernard is the perfect type of the theistic mystic—God-intoxicated, yet keenly alive to the personality of God; practical in the best sense, yet living above the world. In him catholic piety ("Mysticism is catholic piety, in so far as this is not obedience to the Church," Harnack, *Dogmengesch.*, iii., 375) reached its highest expression, imparting a freedom which makes him interpret the records of revelation and the dogmas of the Church in terms of his own supernatural consciousness, and a power which enables him to dictate even to the head of the Church (see his *De Consideratione*); but he had no followers, except, perhaps, Dante—who knew so well the exceptional character of his mysticism as to place him in heaven, far above all other mystics, and make him his own last guide—and Savonarola. The mysticism of those who usually count as his successors, Richard and Hugo of St. Victor, Albertus Magnus, Thomas Aquinas, and Bonaventura, is, in reality, different, inasmuch as it subordinates the personal consciousness to the letter of Scripture and dogma. Their mysticism is co-ordinated with SCHOLASTICISM (*q. v.*), which in its earlier shapes rests upon Platonism and Neo-Platonism (pseudo-Dionysius), in its later upon Aristotelianism. It constantly tends, therefore, to abstract formalism and pantheism in thought, and slavery, not sonship, in practice. Its highest aim is the "superlucent darkness" of Dionysius. Indeed it was hard for mysticism to maintain itself on the height to which it rose in Bernard. Being composed of three elements, intelligence, love, will, it required that these should be completely and harmoniously blended in the "spark of synderesis" which unites man to God. And this can happen but rarely. Intellect in excess leads to pantheism, Neo-Platonism, and panlogism; love in excess, to QUIETISM (*q. v.*) and morbid sentimental pietism; will in excess, to antinomianism and contempt for morality. All these excesses are to be met with in the mysticism of the Middle Ages. German mysticism, in hysterical and theopathic forms, began in the twelfth century, and was professed mostly by nuns. (See Preger, bk. i.) The higher orthodox mysticism was inculcated by Albertus Magnus (see Bach, *Des Alb. Mag. Verhältniss zu der Erkenntnisslehre der Griechen, Lateiner, Araber und Juden*, pp. 182–212), who was followed by David of Augsburg, Berthold of Regensburg, and Dietrich of Freiburg; but the founder of what is known specifically as "Deutsche Mystik" was Meister Eckhart (see ECKHART, MEISTER), whose system, as

might be expected, was a compound of theopathy and THEOSOPHY (*q. v.*). It is, to a large extent, a return to Neo-Platonism, but contains a dialectic element due to Aristotle, and a love element (*Minne*) due to Bernard and the German temperament. It comes, in its results, very close to Buddhism (see Neumann, *Die innere Verwandtschaft buddhistischer und christlicher Lehren. Zwei buddh. Suttas und ein Tractat Meister Eckharts*, 1891), and is distinctly pantheistic; also in principle, though not in intention, anti-catholic. It endeavors, by a dialectic process, to penetrate the nature of God, One and Three, and through a process of love to bring the individual soul into union with him; but the dialectic reaches only an abstraction, and the love, being pathological, is destitute of moral force. The immediate knowledge of God which Eckhart claimed for the individual soul through its spark of synderesis (*Fünkchen*) formed the fundamental principle of the Protestant Reformation; and this was recognized by Luther, whose fondness for Tauler and the "Deutsche Theologie" is well known. There is a sense in which it may be said that the Reformation grew out of mysticism. The speculative mysticism originating with Eckhart may be called High German mysticism. Of somewhat later date is the Low German practical mysticism, whose founder was Johannes Ruysbroek. His pupil, Geert de Groot, was the founder of the society known as the Brothers of Common Life, whose most famous members were Thomas a Kempis, author of the *Imitation of Christ*, and Nicholas of Kues, one of the greatest of speculative mystics. (See Kettlewell, *Thomas a Kempis and the Brothers of Common Life.*) Contemporary with the later German mystics were de Gerson in France, and Catherine of Siena, and Savonarola (burned 1498) in Italy. After the Reformation there were two classes of mystics, one protestant, resting on the Gospel, the other, catholic, resting upon dogma. To the former belonged Luther, Casper Schwenckfeld, Sebastian Franck, Valentine Weigel, and Jacob Böhme; to the latter, Philip Neri, Sta. Theresa, Loyola, Francis of Sales, John of the Cross, Paracelsus, Campanella, and Giordano Bruno, in the last three of whom the modern scientific element predominated. Since the date of Bruno's death (1600), though there have been many noble Christian mystics—Angelus Silesius, Poiret, Malebranche, Madame Guyon, Fénelon, Cardinal Gerdil, Jacobi, Schleiermacher, Klopstock, Novalis, Gioberti, Thomas Taylor, Jones Very, etc.—there has hardly been any new movement except that initiated by SWEDENBORG (*q. v.*). Orthodox mysticism found a wonderful example and systematizer in Rosmini (1797–1855), who may be called the last of the Christian mystics. A return to purely intellectual mysticism, divorced from religion, was made by Spinoza from Judaism, by Giordano Bruno from Catholicism, by Hegel from Protestantism. Along with the last ought perhaps to be named Schelling, Krause, and Baader. Consult the works of the mystics above named, especially Bonaventura's *Itinerarium Mentis in Deum*, translated in *Jour. of Spec. Phil.*, vol. xxi.; also Thomas a Vallgornera, *Mystica Theologia Divi Thomæ*, 2 vols.; Pfeiffer, *Die deutschen Mystiker des XIV^ten^ Jahrhunderts*; F. Juvenalis, *Solis Intelligentiæ Lumen Indeficiens seu Immediatum, Dei et Entis Summi Internum Magisterium* (ed. F. d'Envieu, Paris, 1878); Stöckl, *Philosophie des Mittelalters*; Erdmann's and Ueberweg's histories of philosophy (the latter contains an excellent bibliography); Harnack, *Dogmengeschichte*; Müller, *Kirchengeschichte*; Schaff, *History of the Christian Church*, and the literature there cited; Storrs, *Bernard of Clairvaux*. THOMAS DAVIDSON.

Mytho: See COCHIN-CHINA (*French*).

Mythology [Gr. *μῦθος*, word, story, legend + *λόγος*, discourse, reason]: the science dealing with that body of poetic and quasi-scientific tradition which gathers about the religious belief of a race; or, the body of myths themselves. The notion of mythology should be sharply distinguished from the notion of religion; and the myth, though it must be connected with religion, should be distinguished from the cult or round of ceremonies employed in actual worship. We distinguish between the worship of a god and the story of a god. Nor, again, should we confound the myth with the creed or religious philosophy of a primitive race, although the myth may often embody the result of such speculation. A race which has reasoned out no creed, no rude system of religious belief, may nevertheless have myths, as it may have a cult. The cult is a matter of daily habit, a round of ceremonies to insure certain benefits or avert certain evils; the creed is primitive thought; but a myth is the offspring of observation and unconscious fancy. Primarily, it attributes will and passion to the objects and processes of nature; yet this statement, correct so far as it goes, does not give a complete definition of the myth, but leaves out of account certain other factors with which we shall presently reckon.

History of the Science.—Myths have been found in every part of the world, and the study of them upon a historical and philological basis has resulted in the science of comparative mythology; but while this is a modern affair, attempts to explain the myths are as old as history. Even while they were current articles of faith, the rationalist began to oppose the believer. Criticism of this type fell into two classes. On the one hand, myths were explained by men like Anaxagoras and Heraclitus as allegory, as symbolical of some fact or truth. On the other hand, Euhemerus (about 316 B. C.) declared that a myth was nothing more than a fact covered with parasitic growth of supernatural fancies—that, e. g. Demeter was simply a woman who had introduced the art of baking bread. This interpretation of myths was a favorite among the early Christian writers, and finds a modern champion in Herbert Spencer (*Principles of Sociology*), who regards the myth as corrupted tradition of a dead and deified ancestor, complicated by the confusion of metaphorical statement. The opposite line of theory, which treats the myth as allegory and symbol, reached its ultimate absurdity in Bacon's *Wisdom of the Ancients*, where sundry classical myths are interpreted as bearing within them the most subtle lessons of morality and statecraft.

To treat myths as symbol and allegory, or as distorted fact, was the general drift of criticism down to modern times, when the rise of two great sciences, comparative philology and anthropology, developed two corresponding theories of the myth. The enormous gains made for our knowledge of the past by the comparison of related languages led certain scholars, notably Prof. Max Müller, to base the study of myths upon the study of words, particularly the names of gods and heroes. As the scholar had followed a group of related words to a supposed primitive Aryan word, so he resolved a group of related myths into a primitive Aryan myth. Although this method was foreshadowed by Jacob Grimm, it could be realized only by a student of Oriental languages; and Max Müller must be reckoned as founder of the science. His particular school came to regard the bulk of Aryan myths as sun-myths, while German advocates of the same general theory preferred the storm-cloud; but all of them were agreed in regard to the primitive Aryan myth, and in regard to the philological method of research. As to the origin of a myth, they taught that the literal words in which man spoke of natural processes were abstracted from these processes, were confounded with other words, and so came to represent divinities; hence the myth of a god and a deed, from the original statement about a natural object and a process (*Disease of Language*). "Mythology," says Müller, "is only a dialect, an ancient form of language."

To study words, then, seemed and seems to these critics the proper key of mythology. On the other hand, anthropologists regard a myth as no chance of speech, but as inevitable product of the human mind in certain stages of culture, and explain it by analysis of the physical and social environment. Edward B. Tylor has given an admirable summary of this doctrine in the chapters on mythology and on animism in his *Primitive Culture*; while Andrew Lang has brought the myth into closer relations to customs and folk-lore generally.

General Principles.—While we accept as prime factor in the myth that instinct of primitive man to see will and passion behind the processes of nature, just as will and passion are behind human deeds, it is necessary to note certain restrictions upon this doctrine. First, we must admit with Mannhardt the influence "of poetical and literary production as an essential factor in the formation of mythology." From this consideration, again, we derive another—the need of a stricter chronology. In 1861 W. Schwartz called attention to the distinction between the origin and the development of a myth, and showed that a rude and brutal race will make a rude and brutal myth. Prof. E. H. Meyer places, therefore, "a pandemonium before the pantheon"—first demons, a horde of petty spirits of the dead, mere ancestor-worship; then gods and a system of gods. Thirdly, we must allow extensive distribution

and borrowing of myths from race to race, a fact which spoils many a pretty theory of the older comparative mythologists. Fourthly, we admit as a factor in early myths not merely unbridled fancy, but unbridled curiosity as well, the rude scientific instinct which seeks to account for a strange fact or even a strange name. (See Tylor, *Early History of Mankind*, chap. xi.) We can, however, allow little weight to Scherer's claim for "entertainment" as the main factor in myth-making. Fear had more to do with the early myths than any phase of pleasure. Finally, we must admit that the world within, the realm of dreams and visions, had almost as great an influence on the making of myths as the world without. The nightly visitant, combined with ancestor-worship, could give rise to a demonic myth; and the feigned wanderings of the dreamer himself, not to speak of the connection easily made between mysterious beasts, such as the snake that glided suddenly from the neighborhood of a sleeping man, and the independent spirit, could also produce a plenty of such rude myths as we still meet in folk-lore—e. g. the common story of the soul leaving its body in shape of snake or mouse. Nevertheless, while the tendency of modern criticism to divest myths of their old majestic character, to bid us look if we would study origins, not at the stately figures of Olympus, but at the "cruel, puerile, and obscene" stories of the primitive savage, has both critical sanity and historic truth, the process can easily go too far. It goes too far when it concedes to primitive man an interest in the world within and denies him an interest in the world without. The sense of a vague personality in storm and fire he surely knew. The beauty of sunset, of sparkling ocean, was of little interest to him; but the thunderbolt ("*it* thunders," we still say), the whirlwind, whatever natural process came with overwhelming terror into his life, must have had personality for him, a cult of fear and sacrifice, and a myth.

It seems best to divide myths into those of the savage and those of semi-civilized races, the lower and the higher mythology, remembering that traces of the former will always be found in the latter. In savage myths little distinction is made between subjective and objective impressions; hence the strange medley of man, beast, and inorganic nature, all thrown together on one plane of mythic fancy. In the developed myth subjective impressions count for little; there is system, with a certain air of probability, and the ordering touch of literary instinct. Indeed, many a so-called myth is simply a bit of primitive science, a desire to give rational answers to curiosity.

Savage Myths.—Along with the fantastic, monstrous, and brutal stories of the savage we find distinct traces of element-myths. Evidence is at hand that even rudest tribes have doubted the stars were fire, and have regarded them as personal agents. Certain Africans were sure that the wind was a man, or at the least a bird. What we do not find, however, in this stage of culture is any system of myths, any cosmogony, that goes beyond an individual story. What has passed for such a system often turns out to be a missionary's account of creation translated into terms of savage thought; while the genuine myth goes no further than a makeshift, like the tortoise which holds the world upon its back—a myth found in North America as well as in India—or like the countless tales of sun and moon, eclipse, tempest, and earthquake. Moreover, the myth embodied primitive history, and supported that claim for divinity with which a race regarded its founder. Hence the heromyth, the story of the great head of the race, as culmination of the system of ancestor-worship; hence, too, the allied myth of the culture-hero, the being who brought the race its arts of life, its primitive civilization. It is not only a Cadmus who plays this part; our native myth is full of such characters. (Brinton, *American Hero-myths*, Philadelphia, 1882.) Finally, among the lower myths, though not necessarily savage, are the tales of serviceable household spirits, familiar demons, and all other survivals from the days of ancestor-worship.

Higher Myths.—Here, to use Meyer's phrase, we have the pantheon developed out of the pandemonium. Dignity succeeds silliness; system takes the place of confusion; and such brutal or absurd elements as tradition has preserved are veiled, or belittled, or even explained away. Stories of the gods reveal only by implication the elements with which these had been identified—Zeus for the sky, or Apollo for the sun. Such myths belong distinctly to the realm of poetry, sacred, to be sure, but none the less poetry. They tend more and more to the personal, the romantic, the literary. They combine with heroic legend to form the great epics, and stand in the forefront of every national poetry. Ethical conceptions cross and sometimes control the old traditions of wayward and inexplicable power in the divinity in question. Compare, for example, a Vedic hymn with a Vedic myth. At worst, the old brutalities are transformed into romance, just as love and war are used to disguise brutality and lust. Cycles of myths are told of one god or hero. In the old Persian religion we note a distinct superiority of the ethical and philosophical over the mythical; in Hellenic myths, again, poetical rather than ethical considerations have conquered. The elements of these different myths have been mingled and confused to a degree that makes the "interpretation" of them so supremely difficult, or so supremely easy. Besides the perplexing question of borrowing and distribution, we are everywhere confronted by the difficulty of sundering the myth-maker from the poet pure and simple. If we once drop the clew of religion, the test of belief by definite worshipers in the god in question, and belief to a reasonable extent in the myth itself, we are not only lost in the maze of poetry, and must accept the *Faerie Queene* or even Burns's *John Barleycorn* as a part of mythology, but we have no criterion for separating the myth from the heroic legend. Though the cord which bound the myth to some sort of religious worship may have been both long and loose, there must have been such a cord, or we are not dealing with a myth.

Bibliography.—Of the countless works on mythology, general and special, we note: K. O. Müller, *Prolegomena zu einer wissenschaftlichen Mythologie* (1825), the first really scientific treatise on the subject; Max Müller, *Oxford Essays* (1856); A. Kuhn, *Die Herabkunft des Feuers*, etc. (1859); M. Bréal, *Mélanges de Mythologie et de Linguistique* (Paris, 1877), especially essay on *Hercule et Cacus*, originally published 1863; Tylor, *Primitive Culture*, chapters on *Mythology* and *Animism*, probably the best modern treatment of the subject; Andrew Lang, article *Mythology* in the *Encyclopædia Britannica*, *Custom and Myth*, and *Myth, Ritual, and Religion*; E. H. Meyer, *Indogermanische Mythen* (2 vols., 1883–87); H. Spencer, *Principles of Sociology*. These represent each a definite school; for general summaries regarding the science may be noted: O. Pfleiderer, *Religionsphilosophie auf geschichtlicher Grundlage* (Berlin, 1878); Otto Gruppe, *Die Griechischen Culte und Mythen in ihren Beziehungen zu den Orientalischen Religionen* (vol. i., Leipzig, 1887); and Chantepie de la Saussaye, *Lehrbuch der Religionsgeschichte* (2 vols., Freiburg, 1887–89).

Francis B. Gummere.

Mytile'ne (in Gr. Μυτιλήνη): the most important city of Lesbos, situated on the eastern side of the island (see map of Greece, ref. 15–M). It was celebrated in antiquity as a seat of literature and art, being the birthplace of the poets Alcæus and Sappho, the historians Hellanicus, Chares, and Theophanes, the statesman Pittacus, the philosopher Cratippus, the rhetoricians Lesbonax, Polemo, and Diophanes. The city played an important *rôle* in every period of Greek history. It is still the chief city of Lesbos. See Conze, *Reise auf der Insel Lesbos* (Hanover, 1865); Archontopoulos, Λέσβος (Canea, 1866); Koldewey, *Die antiken Baureste der Insel Lesbos* (Berlin, 1890); Cichorius, *Rom und Mytilene* (Leipzig, 1888). The name is also applied to the island. See Lesbos.

J. R. S. Sterrett.

Mytil'idæ: See Mussel.

Myxomyce'tes and **Mycetozo'a**: See Slime-moulds.

Myzos'toma [Mod. Lat., from Gr. μύζειν, suck + στόμα, mouth]: name of a genus of peculiar parasitic animals of uncertain affinities. Myzostoma has a disk-like body, about a sixth of an inch in length, around the margin of which are a number of warts or longer processes, while on the under surface there are five pairs of hooked feet, and in front a tubular protrusible proboscis. About seventy species are known, all marine, and all living upon crinoids. By some they are regarded as having affinities with the parasitic mites, while others, with more reason, place them among the worms (Chætopoda). The species are described by von Graff in part xxvii. of the zoölogy of the Challenger expedition. The best account of the structure is by Nansen (Bergen, 1887).

J. S. Kingsley.

N

: the fourteenth letter of the English alphabet.

Form.—Its form is derived through the Roman alphabet from the Greek Ν, Ϻ, or Ϻ, corresponding to the Phœnician or Canaanitic 𐤍.

Name.—The English name *en* represents the Latin name *en*, which was a substitute for the Greek name *nū*, after the manner of *em*, *el*, *er*, *es*, instead of *mū*, *lambda*, *rhō*, *sigma*. The Greek name *nū* represents the Phœnician *nūn*, fish, probably suggested by the form of the letter, possibly also by the proximity in the alphabetical series of *mēm*, water, provided the arrangement itself is not due to the signification of the names rather than the sounds of the letters.

Sound.—Its sound is a dental or alveolar nasal. The passage of air through the mouth is checked by pressing the forward rim of the tongue against the roots of the upper teeth or against the teeth themselves (in English the former), and voiced breath passes out through the nasal cavity opened by depressing the soft palate. The sound of *n* is differentiated from that of the other nasals, *m*, *ng*, solely by the different shape and size of the oral resonance-chamber. In the case of *m*, this is formed by closure of the lips, in that of *ng* by contact of the body or back of the tongue with the palate. The sound of *n* is to that of *d* as *m* is to *b* or *ng* is to *g*. It may serve as a vowel, as in *maiden*, *forgotten*, *even*, where the preceding unaccented vowel has been silenced. The letter is silent after *m* in the same syllable, as in *hymn*, *autumn*, *solemn*, also after *l* in *kiln*. After an accented vowel before a guttural it has generally the sound of the guttural (palatal) nasal *ng*, as in *longer*, *anger*, *uncle*, *congress*, *conquer*, *ink*, *thank*, *anxious*; but when coupled with *g* in the same syllable it unites with it to express the guttural nasal, and *g* has no separate sound; thus *song*, *singer*, *tongue*, *wing*, with which contrast *lon-ger*, *fin-ger*.

Source.—The sound has in general been faithfully preserved as representative of Teutonic and Indo-European *n* in the native Teutonic element, and of Latin *n* in the Romance element; cf. *night*: Goth. *nahts*: Lat. *nox*: Skr. *nákti-*; *chin*: Goth. *kinnus*: Gr. *γένυς*; *reign* < M. Eng. *regne* from Lat. *regnum*. Teuton. *n* is lost in O. Eng. before *s* and *þ*; cf. Eng. *goose* < O. Eng. *gōs*: Germ. *gans*; Eng. *tooth*: Germ. *zahn*; Eng. *other*: Germ. *ander*; Eng. *mouth*: Germ. *mund*.

Value as Symbol.—N = (in chemistry) nitrogen; also, noon, north, Norse; as a mediæval numeral, a symbol for 90. Na = Sodium (*Natrium*). See Abbreviations.

Benj. Ide Wheeler.

Nablus′, Nabulus, or **Napolose**: town of Palestine; the ancient Shechem or Sychem, capital of Samaria, probably the same as the Sychar of the New Testament (see map of Palestine, ref. 8–D). The city, which had fallen into decay, was rebuilt by Vespasian and called Neapolis, whence the name Nablus is derived. It is 32 miles N. of Jerusalem, on the watershed of a narrow valley, not more than 600 feet wide, between Gerizim and Ebal. This was Abraham's first camping-ground in the country. Here Joseph was buried, and here Joshua delivered his last address to the Israelites. It was one of the cities of refuge. Its situation is marvelously beautiful. There is no greener or more fertile spot in Palestine. It carries on a lucrative trade in cotton and oil, and manufactures coarse cloth and soap, sending large quantities of the latter to Egypt and the East. Among its 9,000 inhabitants are a few Jews, Samaritans, and Christians, but the majority are Mussulmans. At the eastern end of the valley, 1½ miles distant, is Jacob's well.

E. A. Grosvenor.

Nabob [from Hind. *nawāb*, from Arab. *nawāb*, formal plur. of *nāīb*, vicegerent, governor]: under the Moguls in India, a viceroy or governor of a province. The title afterward came to indicate merely high rank without office. In process of time many of the nabobs became virtually independent monarchs. It was the mutual jealousy of the nabobs that made India the comparatively easy prize of British adventurers.

Nabonas′sar, Era of: an era employed in the Chaldæan and Alexandrian Greek chronology. By Berosus it was reckoned from the accession of King Nabonassar to the Babylonian throne, which took place Feb. 26, 747 B. C., as shown by astronomical records.

Nachees: See Siouan Indians.

Nachtigal, naa*ḥ*′ti-gāal, Gustav: physician and explorer; b. at Eichstedt, Prussian Saxony, Feb. 23, 1834; studied medicine at Berlin, and practiced for some time at Cologne; entered the service of the Bey of Tunis in 1863, and went in 1869 to Kuka to convey presents from the King of Prussia to Sheikh Omar of Bornu. On Feb. 18, 1869, he started from Tripoli, and reached on Mar. 27 Murzuk, where he stopped till Apr. 18, 1870, exploring the country of the Tibbus in the meantime, and arrived at Kuka July 6. He returned by Waday and Darfur, and reached Cairo in Nov., 1874, having explored the countries belonging to Baghirmi. The results of his explorations he communicated in 1874 in Petermann's *Mittheilungen* and the London *Geographical Magazine*. In 1879 he published *Sahara and the Soudan: Results of Six Years' Wanderings in Africa*, and in 1882 he was appointed German consul at Tunis. In 1884 he was sent to the west coast of Africa charged with effecting the annexation to Germany of the Cameroons, Lüderitzland, and other territory. D. on shipboard on his return to Germany, Apr. 19, 1885. Revised by M. W. Harrington.

Nacogdoches, năk-ō-dō′chez: city; capital of Nacogdoches co., Tex. (for location of county, see map of Texas, ref. 3–J); on the Houston, E. and W. Tex. Railway; 53 miles N. E. of Crockett. It is in an agricultural and cotton-growing region, contains 8 churches, 5 secret-society lodges, a college, a national bank with capital of $50,000, a private bank, and 3 weekly newspapers, and has several manufactories and over 100 business concerns. Pop. (1880) 333; (1890) 1,138; (1900) 1,827.

Editor of "Star-News."

Nadal, Ehrman Syme: author; b. at Lewisburg, W. Va., Feb. 13, 1843; graduated at Yale in 1864; was secretary of legation at London in 1870–71, and again from 1877–84; has lectured, engaged in journalism, and written for the magazines. Among his books are *Impressions of London Social Life* (London, 1875); *Essays at Home and Elsewhere* (1882); and *Zweiback, or Notes of a Professional Exile* (1887).

H. A. B.

Nadaud, năă′dō′, Gustave: song-writer; b. at Roubaix, France, Feb. 20, 1820. After completing his studies at the Collège Rollin at Paris (1834–38), he found employment in a business-house at Roubaix. In 1840 he removed with his parents to Paris, and embarked in business as a cloth-merchant. The success of some songs which he had composed, set to music, and sung for the entertainment of friends led him in 1849 to give up his business for song-writing, and in that year he published a small collection which was greatly enlarged in successive editions (1852–62–70, etc.). At first his songs celebrated conventional subjects, but afterward entered the field of political satire or became the vehicle of a gay and easy-going conception of life. D. Apr. 28, 1893. His works comprise also the words and music of several parlor operettas, collected in two volumes: *Opérettes* (7th ed. 1867) and *Théâtre de fantaisie* (1879); a novel, *Une Idylle* (1861); *Solfège poétique et musical* (1886); *Miettes poétiques* (1888); *Nouvelles chansons à dire ou à chanter* (1889). His most famous poem is "Carcassonne," many times translated.

Na′dir Shah, or **Kuli Khan**: Shah of Persia; b. near Kelat, in the province of Khorassan, Persia, in 1688; became while still a young man the leader of a gang of robbers, by whose aid he captured and held several towns and fortified places in Khorassan; espoused the cause of Tamasp, the legitimate ruler of Persia, against the Afghan invaders; was appointed commander-in-chief of Tamasp in 1727; defeated the Afghans repeatedly, and succeeded finally in driving them entirely out of the country in 1730. Tamasp now made him governor of the provinces of Khorassan, Mazanderan, Seistan, and Kerman, and he assumed

the name of Tamasp Kuli (Tamasp's slave), to which the shah added the title of khan. In 1731 he fought against the Turks and defeated them, and when in 1732, during his absence on a campaign against the Afghans, Tamasp was defeated by the Turks and concluded a dishonorable peace with them, ceding several provinces, Kuli Khan deposed him, and raised his son, Abbas III., a child, to the throne. The war with the Turks was renewed and carried on with great success, and when Abbas III. died in 1736 Kuli Khan was crowned Shah of Persia under the name of Nadir Shah. His reign was very brilliant in military undertakings, especially his expedition into Hindustan. He defeated the Great Mogul, captured Delhi, and carried away to Persia an enormous booty. He restored to Persia her old boundaries from the time of the Sassanides, but in course of time he became greedy, suspicious, and a merciless tyrant; whole cities were put to the sword. He was assassinated June 20, 1747. His *Life* was written in Persian by Mirza Mohammed Mahadi Khan, and translated into French by Sir William Jones (1770). See H. Maynard, *Nadir Shah* (1885).

Næ'vius, Gnæus: author; b. in Campania about 264 B. C.; served in the first Punic war, and became famous as a writer of comedies and tragedies. He belonged to the plebeian party, attacked the nobility with great virulence, was driven into exile, and died in Utica, Africa, about 199 B. C. A few short fragments of his epic poem (in Saturnians) on the Punic war, and of his dramas, are still extant, and were collected by Klussmann (Jena, 1843). See also the fragments of the *Bellum Pœnicum* in L. Müller's edition of Ennius, pp. 157–170 (St. Petersburg, 1884), and for the dramatic fragments L. Müller's *Liv. Andronici et Cn. Nævi fabularum reliquiæ* (Berlin, 1885), or O. Ribbeck, *Scænicæ Rom. Poesis Frag.* (Leipzig, 1871). M. Warren.

Næ'vus [Lat.], or **Birthmark**: a discolored spot (also called *mother's mark* and *port-wine stain*) on the skin of a human being, usually characterized by the presence of numerous enlarged blood-vessels (more especially venous), and popularly believed to be the result of some ungratified longing on the part of the mother during gestation. Some nævi disappear spontaneously; others remain unchanged; still others grow rapidly, and sometimes inflame and slough. They may be treated by cold and pressure, by vaccination of the spot, by cautery, by excision, by ligation, or by other obliterative methods. Small nævi have been treated successfully by electrolysis. Revised by William Pepper.

Nagasaki, nă̆a-gă̆a-saa'kĕĕ: a city and important seaport in the S. W. of Japan, on the island of Kiushiu, for a long time the only Japanese port of entry for foreign vessels; situated along the eastern shore of one of the finest landlocked harbors in the world (see map of Japan, ref. 7–A). After Japan was closed to foreign intercourse in 1637, when the Spaniards and Portuguese were finally expelled, the Dutch and the Chinese were still allowed to carry on trade under severe restrictions, the small, flat, artificial island of Deshima, at the head of the harbor, being set apart for the Dutch factory; only one European ship arrived yearly from Batavia. The present foreign settlement has a water frontage of 700–800 yards; foreign population (exclusive of Asiatics), 332. Across the bay is a handsomely equipped imperial dockyard. Most of the foreign trade of Nagasaki has been transferred to Kobe, but the mines of Takashima still make it an important coaling station. The town is noted for its tortoise-shell bric-à-brac, and for its Imari and Arita porcelain. The most important articles of export, next to coal, are dried fish, rice and other grains, camphor; of import, sugar, raw cotton, rails and machinery, kerosene oil. The total entries for 1892 amounted to 733 vessels, aggregating 897,274 tons. Pop. 31,380. J. M. Dixon.

Nagel, naa'gel, Albrecht Eduard, M. D.: ophthalmologist; b. at Dantzic, Germany, June 14, 1833; was educated in his native city, but studied medicine at Königsberg and Berlin; began practice at Dantzic in 1856; became privat docent at Tübingen in 1864; extraordinary professor in 1867; ordinary professor of ophthalmology in 1874. His principal works are *Das Sehen mit zwei Augen* (Leipzig, (1861); *Refractions- und Accommodations-Anomalien des Auges* (Tübingen, 1866); *Behandlung der Amaurosen und Amblyopien mit Strychnin* (1871); *Die Anomalien der Refraction und Accommodation des Auges* (1880); *Die Vorbildung zum medicinischen Studium* (1890). He has also written much for scientific periodicals; since 1870 has edited and contributed to the *Jahresbericht über die Leistungen und Fortschritte im Gebiete der Ophthalmologie*; and since 1880 has edited the *Mittheilungen aus der ophthalmiatrischen Klinik in Tübingen.*

Nägelsbach, nā'gels-bă̆ă̆kh, Karl Friedrich: classical scholar; b. near Nuremberg, Mar. 28, 1806; became professor in the University of Erlangen in 1842; d. Apr. 21, 1859. He is famous as the author of the *Lateinische Stilistik für Deutsche* (1846; 8th ed. by Iwan Müller, 1890). Other works are *Die homerische Theologie in ihrem Zusammenhang dargestellt* (1861; 2d ed. by G. Autenrieth); *Die nachhomerische Theologie des griechischen Volksglaubens bis auf Alexander* (1857); *Æschylus's Agamemnon*, with introduction, translation, and commentary, ed. by Fr. List, 1863. Cf. L. Doederlein, *Oeffentliche Reden* (1860), pp. 239 ff. A. G.

Nagoya, naang'ō-yă̆a: city of central Japan; situated close to the bay of Owari, on the main route and railway between the two capitals (see map of Japan, ref. 6–D). It was formerly the seat of the powerful daimios of Owari, who were closely allied to the Tokugawa ruling house, and whose magnificent castle, now used as a military station, still remains intact. Nagoya is the capital of the prefecture of Aichi. The town and district are celebrated for the manufacture of fans, cloisonné ware, porcelain of the "egg-shell," "frosted," and other delicate varieties, and silks. The people are devoted Buddhists, and the local temples are fine. Pop. (1892) 179,174. J. M. Dixon.

Nagpur', or **Nagpore**: town of British India; capital of the province of Berar or Nagpur; situated in lat. 21° 9′ N., lon. 79° 11′ E., 430 miles E. N. E. of Bombay, with which it is connected by railway (see map of S. India, ref. 2–E). It is 7 miles in circumference and consists mostly of mud huts. The ground on which it stands is swampy and unhealthful. Its manufactures of cotton cloths, coarse and fine chintzes, woolens, silks, and brocades are important. In 1740 it became the seat of an independent Mahratta prince; in 1853 it was incorporated with the British dominions. Pop. (1891) 117,014.

Naharro, Bartolomé de Torres: poet; b. toward the end of the fifteenth century at Torres, near Badajoz, Spain. After being a captive in Algiers, he visited Rome (after 1513) for the purpose of obtaining the favor of Pope Leo X. Obliged to leave Rome, owing to a satire on the vices of the papal court, he lived for a time at Naples, under the protection of Fabricio Colonna. He is said to have died in poverty. His works were first published by himself at Naples (1517) under the title *Propaladia*, and dedicated to Ferrante d'Avalos, husband of the famous Vittoria Colonna. They consist of satires, epistles, ballads, and particularly eight plays, called by the author *Comedias*. These latter were the first attempt in Spanish to adopt something of the form and manner of the classical and the Italian drama. Though fluent and amusing, they are often extremely coarse and never remarkably interesting. The openness of the attacks on the clergy in them led the Inquisition to prohibit them, and the later editions were expurgated. The first Spanish edition appeared at Seville in 1520, and was followed by many others, both there and elsewhere. Four of the comedies are printed in Böhl von Faber's *Teatro Español* (Hamburg, 1832). In spite of his roughness, Naharro was much admired and imitated in Spain during the sixteenth century. A. R. Marsh.

Nahr-el-Asi: See Orontes.

Nahr-el-Mukatta: See Kishon.

Nahuatl Antiquities: See Central American Antiquities.

Na'hum [= Heb. *Nahūm*, liter., consolation]: one of the twelve minor prophets. He is called an Elkoshite, but no place called Elkosh is now known. Jerome identified it with a town of Galilee; Ewald and others with *Alkush*, on the east bank of the Tigris, about 2 miles N. of Mosul, where "Nahum's tomb" is still shown, but Layard pronounces the structure to be comparatively modern; and there is no notice of Nahum in connection with this place earlier than the sixteenth century. Nahum prophesies after Sennacherib's invasion (700 B. C.) and before the destruction of Nineveh (625 B. C., Rawlinson, or 606, Oppert and Lenormant). His Hebrew is of the most classical style.

Na'iades: the Lamarckian name for the fresh-water mussels forming the family of the Unionidæ (*q. v.*).

Naiads [from Lat. *Nai'ades* = Gr. Ναϊάδες, Naiads]: the nymphs of fountains, streams, and lakes, as distinguished from the Oceanids and the Nereids. Their special appella-

tions vary according to circumstances, *Crenææ*, *Potamēides*, *Limnades*, etc. See Nymphs.

Nails [O. Eng. *nægel* : O. H. Germ. *nagal* > Mod. Germ. *nagel*, nail (in both senses); Gr. ὄνυξ, claw, hoof, nail : Lat. *unguis* : Sanskr. *nakhá-*]: the plates of horny epidermis which in man grow upon the dorsal aspect of the distal phalanges of fingers and toes. They are the homologues of the hoofs and claws of the lower animals. They consist each of a free extremity, of which both sides are exposed; of a body, having one side exposed; and of a matrix or root, of which both sides are concealed in the skin. At the base of the nail appears a crescent-shaped patch of lighter color than the rest, called lunula or albedo. As the result of sickness small spots of whitish color are formed at the root of the nail, and by observing their progress in the growth toward the tip it may often be estimated how long before the observation an illness occurred. After fractures and some nervous diseases the nails cease to grow temporarily.

Nails: slender pins or pieces of metal, usually tapering and having a head, used for fastening pieces of wood or metal together, or, when driven into any material, for hanging articles on. Nails are classified by the U. S. Patent-office as cut, wrought, horseshoe, shoe, barbed, composition, button, carpet, coffin, sheathing, galvanized, harness, leather-work, picture, siding, slating, trunk, upholstery, weather-tiling, and screw-nails. Of these, the cut, wrought, and horseshoe nails are by far the most important. In the beginning of the nineteenth century nails were ordinarily manufactured by hand-forging, usually by women and children, the degradation of the nailmakers forming one of the saddest phases of English industrial life. The application of machinery to the fabrication of all the more important varieties of nails originated and developed chiefly in the U. S. This was a natural result of the universal use of wood for buildings, fences, etc. The first cut nails are said to have been made in New England late in the eighteenth century by cutting the blanks from a piece of sheet metal and heading them with a hand-hammer while held in a vise. In 1810 a machine invented in the U. S. cut nails at the rate of 100 per minute. The rough surface of a cut nail where no clinching is required adds about 20 per cent. to the holding power. For uses requiring clinching a tapering hand-forged nail, termed the "German wrought," was used until about 1860, when manufacturers began to anneal common cut nails, giving them a bending quality; and these soon practically drove the others from the market. The importance attached to nail manufacture in the U. S. may be inferred from the fact that previous to 1874 upward of 300 patents were issued for improvements in making cut and forged nails, of which twenty-three were granted before the beginning of the nineteenth century. These embraced the germinal ideas of the present machinery for *cutting* nails, while an earlier English patent, that of William Finch, of Staffordshire, comprised the use of tilt-hammers, the rapid and forcible striking of which enabled several nails to be made from the rod with one heat, whereas by hand the rod required to be reheated previous to the forging of each nail.

In the manufacture of cut nails the iron or steel, as the case may be, is first rolled into plates having a thickness corresponding to that of the nail to be made, measured from one flat side to the other, and a width somewhat greater than the length of the finished nail. When the nails are to be annealed for clinching, the length of the plate is transverse to the grain of the iron, in order that the grain may be lengthwise of the finished nail to insure greater flexibility in clinching. The plate is then placed in a feeding device, which moves it forward to dies or cutters, which cut a tapering blank from the end of the plate. This blank is then gripped by holding-jaws, which clamp it firmly while a punch or header abuts against the widest end of the blank and upsets a sufficient portion of the metal to form the head. In order to secure the tapering form of the blank without waste of material, the plate is turned laterally, so that its end is at a slight angle to the cutting devices or dies, first in one direction and then in the other, the head of each alternate nail being formed at that lateral edge of the plate opposite that at which the head of the previous nail was made. In some cases the same result has been secured by giving the lateral movement to the cutting dies while the plate is made to travel in a straight line. In one machine the plate is made of a width sufficient to permit blanks for a number of nails to be cut simultaneously from its end. In this apparatus rotating cutting dies, instead of vibrating or reciprocating ones, are used to sever the blanks from the plate, and the nails by this machine are made with chisel-shaped points.

In the manufacture of horseshoe nails, the nail-rod, heated at one end for about a foot in length, has its free or outer end steadied by the hand of an attendant, but is gripped near its inner end by an intermittent feeding-device which feeds it inward to the hammering mechanism. This latter comprises a fixed anvil, the face of which corresponds to the contour of one of the flat sides of the nail, and which has at one edge a fixed die arranged vertically at right angles to its face, and corresponding in its form to one of the curved lateral edges of the nail. At the opposite side of the anvil is a moving die having a face the same shape as that of the anvil, but attached to one end of a rocking lever, the opposite arm of which is connected by a universal joint, a rod, and strap with an eccentric on a rock-shaft provided transversely above the parts just noticed. On this shaft, immediately over the anvil, is a disk upon the periphery of which is arranged a roller, which serves the purposes of a striker. As the nail-rod is fed inward, with its heated extremity upon the anvil, the rotation of the striker impinges longitudinally upon the heated end of the rod, striking a "drawing" blow, which of course elongates the metal. As soon as the striker, carried away by the continued rotation of the disk, has been brought out of contact with the metal, the moving die moves inward, compressing the flattened part to bring its lateral surfaces to the shape required in the edges of the nail. This done, the striker strikes again, to be followed by another action of the dies, until after sixteen blows of the striker the nail is complete so far as the hammering is concerned; but the process of shaping does not end here. The "point" of the nail at this stage is an eighth of an inch wide, and is rough and jagged. The nail is, moreover, three-fourths of an inch longer than when finished. To complete the work, a little device, termed a "poker," bends the point or tip sidewise until one edge intercepts (at a proper place along the length) an imaginary line drawn axially through the nail. This done, a cutter at the opposite side traverses a path corresponding to the curvature just given by the bending to the edge just previously referred to, and cuts off the surplus metal from the tip. A slight retrograde motion of the rod permits a suitable cutting device to sever the finished nail therefrom.

The wire nail consists essentially of a cylindrical piece of wire of suitable length, with one end properly sharpened and the other upset to form a head. A good wire nail has great holding-power. A succession of new machines and mechanical operations tends constantly to increase the output and improve the quality of this variety of nails. In the production of cut nails steel has, in a measure, taken the place of iron. This is due to the cheapening of a suitable quality of steel, and to its greater strength and toughness. Notwithstanding the long period during which the machine-manufacture of cut nails has been carried on, improvements and changes in machinery are constantly made.

Of the minor varieties of nails may be mentioned garden nails, made of cast iron and frequently toughened by annealing; screw-nails, made with flat shanks, to which a spiral twist, from a half to a full turn, is given; and barbed nails, notched or provided with notches or with spurs to increase their hold on the wood. Shoe-nails are headless tapering nails cut, the smaller sizes, from sheet zinc, the larger from iron. Ornamental nails, such as are used for pictures, coffins, etc., are made with wrought shanks and porcelain or stamped sheet-metal heads, the latter attached by being screwed upon the shanks or by soldering with soft metal.

James A. Whitney.

Nain [= Gr. Ναΐν = Heb. *Nā'ĭn*, liter., pasture]: a poor little village in Galilee, 6 miles S. E. of Nazareth, mentioned only in the New Testament (Luke vii.) as the place where our Lord raised the widow's son from the dead (see map of Palestine, ref. 6–D). It was then a walled town, with a cemetery some ten minutes' walk to the E. It is beautifully situated, and now contains a few mud and stone houses occupied by Moslems.

Nain: mission station of the Moravian Brothers, on the east coast of Labrador, in lat. 56° 30′ N.; politically a part of Newfoundland. The climate is severe: the mean temperature for summer is 48° F.; for winter, −7° F.; for the year, 25° F. Pop. about 300, consisting of Christianized Esquimaux.

M. W. H.

Nairne, Lady Carolina Oliphant, Baroness: poet; b. at Gask, Perthshire, Scotland, July 16, 1766; was called in her youth the Flower of Strathcarn, from her great beauty; married in 1806 Capt. W. Murray Nairne, afterward Lord Nairne; belonged to a prominent Jacobite family; wrote *The Laird o' Cockpen*, *The Land o' the Leal*, and other popular Scotch ballads, the authorship of which was kept secret until shortly before her death, which occurred at Gask, Oct. 27, 1845. See her *Memoir and Complete Lyrical Compositions*, by Charles Rogers (1869).

Nairnshire: county of Scotland; bordering on the Moray Firth, Elginshire, and Inverness-shire. Area, 169 sq. miles. The surface generally ascends from a fertile and well-wooded tract near the coast, until at Carn Glas, on the southern boundary, it attains 2,162 feet. Most of the ground is covered with forest, and less than a fifth of the entire area is under cultivation. more attention being paid to stock than crops. Pop. (1901) 9,291. Capital, Nairn, at the mouth of the river Nairn, with a good harbor, protected by a breakwater. Pop. (1891) 4,651, chiefly engaged in herring-fishing. Near by is the village of Cawdor, with the castle of the same name, in which, according to tradition, Macbeth murdered Duncan; the present building, however, is not older than the fifteenth century.

Najac, Émile, Comte de: dramatic writer; b. at Lorient, Morbihan, France, Dec. 14, 1828. After studying law he obtained a post in the ministry of the Interior, but later gave this up for a purely literary career. For a whole generation he has produced, alone and in collaboration with others, a stream of comedies, farces, operettas, etc. Among these may be mentioned *La poule et ses poussins* (1861); *Les oiseaux en cage* (1863); *La dernière poupée* (1875); *Théâtre des gens du monde* (1872); *Madame est servie* (1874); with Scribe, *La fille de trente ans* (1859); with Sardou, the comic opera *Les noces de Fernande* (music by Deffès, 1878); and the comedy *Divorçons* (1880). A. R. M.

Nakhimov, năăk-hee'mov, Akim Nikolaevich: satirical poet; b. in 1782, on his father's estate in the government of Kharkov, Russia; was educated in Moscow, and at the University of Kharkov; but during the latter part of his life remained most of the time at his home in the country. In his leisure moments he wrote poems, of which the best known is his *Satirical Elegy* (1809), called forth by a new law on the education of officials. D. in 1815. The seventh edition of his complete works appeared in 1852, in the collection of Smirdin. A. C. C.

Nakhitchevan': town of European Russia; on the Don, 30 miles from its mouth; founded in 1780 by an Armenian colony (see map of Russia, ref. 10–E). It is the seat of the Armenian Patriarch of Russia; has some manufactures of cotton and silk, and an extensive trade. Pop. (1889) 17,347.

Nakoo: See Gavial.

Namaland, Great, or **Namaqualand**: the southern part of the German possessions in Southwest Africa; bounded N. by Damaraland, E. by the Kalihari Desert and British Bechuanaland, S. by Cape Colony, and W. by the Atlantic. It is the chief home of the remnant of the uncivilized portion of the Nama or Hottentot people, and forms the southern extremity of the semi-arid lands of Southwest Africa. The characteristic features are sandy, undulating plains, hills, and mountains dividing the coast lands from the depression of the Kalihari, bitter salt springs, dry river-beds, and a few long, narrow, verdant valleys, where the missionary and chief native settlements are found. The region is less valuable in its prospects of mining and agricultural development than the German possessions adjoining it on the north. C. C. Adams.

Namangan: a town and fortress of Ferghana, Russian Turkestan; on the upper Syr-Daria; lat. 41° N., lon. 71° 40′ E.; 50 miles N. E. of Khokan. It is the chief commercial city of the upper valley of the river, and transacts a large business in sheep, wool, hides, yarn, and fruit. Rafts are extensively used to convey the merchandise down the river. Pop. (1897) 61,906. M. W. H.

Namaquas: See Hottentots.

Namatia'nus, Rutilius Claudius: a Latin poet of the fifth century, who wrote in elegiac verse an account of his return from Rome to Gaul (*de reditu suo*) in two books (of which nearly the whole of the second is lost), interesting for the description of places and the personal allusions, and very correct in form. The writer was a Stoic, and despised both the Christians and the Jews. See edition of L. Mueller (Leipzig, 1870) and Baehrens, *Poet. Lat. Minores*, vol. v., pp. 4–30 (Leipzig, 1883). M. Warren.

Namaycush, or **Mackinaw Trout**: one of the largest of the fresh-water *Salmonidæ*. Its scientific name is *Salvelinus* or *Cristivomer namaycush*. It inhabits the upper lakes of the St. Lawrence basin and the lakes westward to British Columbia and Alaska. It is caught with the spear mostly. Specimens of 120 lb. weight are reported, but it does not often exceed 50. The flesh is good, but not of first quality. It is also called longe, togue, and Great Lake trout.

Namdinh: city of Tonquin, Indo-China; 50 miles S. E. of Hanoi, 3 miles from the Song-koi or Red river, and 20 miles from the coast; lat. 20° 25′ N., lon. 106° 8′ E. It is the residence of a French political agent, a center for the Annamite French consular service, and contains magazines of military stores. It is a center of a rich portion of the Song-koi delta, and has an active commerce in rice, cotton, silk, indigo, salt, and wood-carvings. The exports go chiefly to the southern provinces of China. Pop. 50,000.

Name [O. Eng. *nama*: O. H. Germ. *namo* (> Mod. Germ. *name*): Goth. *namō*; cf. Sanskr. *nāman-*: Gr. *ὄνομα*: Lat. *nomen*, name]: the word or words by which a person, place, or thing, or a family or class of persons or things is designated. Among savages, with whom general social relations and history are in an undeveloped condition, a single appellation derived from some association is enough for the name of a person. He who kills a wolf under striking circumstances is called Wolf, and the man who dreams of an eagle is named Eagle. Among certain tribes in North America the animal-spirit peculiar to each Indian is the first creature which appears to him in a dream after fasting and seclusion, and this, his *totem*, gives him a name. The first distinction recognized is that of proper and common names, or that of the individual as distinguished from the family and tribe. As there is something reserved and sacred often attached to the former, there was often a mystery associated with it; and, as Schoolcraft observes, "An Indian will tell his specific name with great reluctance, but his generic or family name he will declare with pride."

Scripture Names.—The early Hebrews gave an infant a name as soon as it was born, from some striking accident relative to it. It thus became commemorative of the history of the family. When Eve bore her first son she said, "I have *gotten* a man from the Lord," whence he was called Cain, meaning "gotten" or acquired. Noah signifies "comfort" (Gen. v. 29). The vigor and intelligence shown in our Scripture names were remarkable. They greatly influenced Hebrew literature, and are the finest of antiquity. Those of the women were derived from character and circumstance: e. g. Adah or Ada, "ornament"; Leah, "weary"; Deborah, "a bee." The names of the patriarchs generally had a mystical meaning. Elijah and Joel are composed of two names of God; Josaphat and Saphatias indicate the judgment of God; Johanan or John of Hanania, his mercy; Nathaniel, Elnathan, Jonathan, and Nathania, all mean "the gift of God," as *Devadatta* was Sanskrit, and as *Theodore*, Greek.

Arabia and Turkey.—Among the Arabs and Turks names are few and simple. As Mohammed said, "Give your sons the names of prophets," the result has been an interminable repetition of Mohammed, Mahmud, Hamet, or Achmet; of Ibrahim (Abraham), Moussa (Moses), Suleiman (Solomon), Dauoud (David), and Aïssa (Jesus). Then come the names of their heroes, such as Osman, Ali, Omar. In a third category are the names beginning with Abd, a "servant," as Abd-el-Kader, "servant of the All-Powerful," Abd-Allah, "servant of God." To these follow names ending in *din*, "religion," as Salah-ed-Din (Saladin), "restorer of religion." Some names consist of these elements composed, as Hamet-el-Abd, "Mohammed the servant," and others are merely adjectives, as Saïd, "happy or fortunate," Hassan, "handsome," Hussein, "powerful," Reshid, "just judge," Mustapha, "elected of God." To indicate men more accurately, surnames are often added—e. g. El Kebir, "the great"; words of relationship—e. g. Abu or Bu, "father," Abu-Nebas, "the father of the race." Among the feminine names are Lulu, a "pearl," Zarifa, "beauty." Girls are also called after the wives or female relatives of the Prophet. Men sometimes take as surnames appellations relating to their country, birthplace, origin, family, sect, trade, or occupation.

Greece.—The Greeks in the time of Aristotle gave a child its name on the seventh day after birth. It was afterward

given on the tenth day. It was derived from some quality, such as piety, a great event, a striking personal quality, a happy presage; from some virtue or physical advantage, from friendship, or by chance. The grandson took his name from his grandfather or the nephew from his uncle, and to prevent confusion another name, such as the father's, was added, or else one derived from the calling of the bearer, from his birthplace, or a nickname. The father's name was, with a slight change, also given to one child, e. g. Chryseis, "daughter of Chryses." In later times names of people were taken from the gods, e. g. Apollodorus, "gift of Apollo." Though denied by many writers, it is evident that something like a generic name was applied to many families: e. g. the Heraclidæ, the Cecropidæ, the Atridæ, the Alcmeonidæ. Many of the Greek names were very beautiful—e. g. Aphrodite, "foam of the sea"; Artemas (m.), "perfect," Artemisia (f.), "perfect"; Diana, "bright as day": Diomede, "dear to Jupiter"; Zenobia (f.), "life," from Zeno, the lord of life; Spiridion, "breath of the gods"; Isidore (m.), Isidora (f.), "gift of Isis"; Heliodorus, "gift of the sun"; Zeno, "life" (the lord of); Zoë, "life"; Amaranth, "unfading flower."

Rome.—The Romans, like ourselves, had a family name, called the *nomen gentilitium*, generally ending in *ius*, *eius*, or *aius*. This, derived from the gens, "clan or tribe," was the *nomen* or name proper. As the clan was divided into families, there was also the hereditary *cognomen*, while the *prænomen* distinguished the individual. Sometimes, by way of further distinction, a second cognomen, called the *agnomen*, was borne. This was often an honorable title derived from some great exploit. The *prænomina* or "Christian names," so to speak, were not more than thirty in number, whence the constant repetition of Marcus, Decimus, Florus, Gaius, etc. Romans often took their names from their order of birth, as Primus, Secundus, Tertius ("first," "second," "third"), and cognomens were derived from the months in which they were born or from some personal peculiarity; from being a twin or a posthumous child; from a city, river, or country. The daughter's name was the feminine form of that of the father—e. g. Julia from Julius, Octavia from Octavius. To distinguish the individual, she also received another name grown hereditary in the family, as Julia *Agrippina*; but the surname was often fanciful, as *Felicula*, "little cat" or "puss." Nicknames were common. After marriage a Roman lady bore the name of her husband in feminine form, whence it was usual to say at marriage, "Where you are Gaius, I will be Gaia." Many Roman names were from Etruscan or other old Italian sources; some were from the most trifling or undignified personal peculiarities or occupations. With the Northern invaders came chiefs proud of their own ancient Gothic names and families; that of Theodoric gloried in the recollection of Amal, whence Amalaric, Amalafride, Amalaberg. With Christianity came names from the Bible, but the old heathen family appellations "died hard." St. John Chrysostom in the fourth century complained of this obstinacy, as did St. Gregory in the sixth century. Such were the names Wolf, and those founded on Ans or As, indicative of a god; e. g. Anselm, Esmond, Oscar or Elf, Hildebrand, "war-sword," Bertha, "the bright goddess" (Albert, Bertram), Gertrudis, etc. All of these were sources of pride, owing to age and associations.

English Names.—The entire history of Indo-European names is that of a growth from a condition like that of the Arab and Indian to the one now prevalent among us. Those of the Anglo-Saxons were imposed, says Sharon Turner, as with us, in their infancy, by their parents. They were frequently compound words, rather expressive of caprice than of appropriate meaning. The following are specimens: Æthelwulf, "the noble wolf"; Æthel or Ethel, Adel, and Adeline, meaning "noble"; Bertwulf or Bertolf, "illustrious wolf"; Eadwulf, "the prosperous wolf"; Æthelwyn, "noble joy"; Eadric, "happy and rich"; Ælfred, an "elf (i. e. shrewd) in council"; Sigeric, "victorious and rich"; Æthelred, "noble in speech" (German, *Rede*); Eadmund or Edmund, "prosperous patron"; Eadwin, "prosperous in battle"; Dunstan, "mountain-stone"; Ethelbald, "noble and bold"; Eadward, "prosperous guardian"; Ethelstan, "noble rock" (or stone); Ethelbert, "noble and illustrious." These names partially remain to-day. Many Anglo-Saxon names were wild and strange; e. g. Beanhelm, "helmet of the nobles"; Eardwulf, "wolf of the earth or province"; Werburg, "hedge of the city"; Sigfred, "peace of victory"; Beonheat, "the soaring bee"; Beagstan, "bracelet stone"; Wulfheah (wolf-high), "tall wolf"; Beornoth, "noble's oath"; Wine, "the dear one," which often forms a part of many names; Sæfreth, "freedom of the sea"; Ceolmund, "protecting ship." Female names were not less fanciful. Thus Dudda, meaning the "family stem," was a father who had three daughters—Deorwyn, "dear to man" or "dear love," Deorswythe, "very dear," and Golde, "golden." A father, Æthelwyn ("noble joy"), had four sons—Æthelwold, "noble governor," Alfwold, "ruling elf," Athelsin, "always noble," and Æthelwyn. It is not settled whether the Anglo-Saxons always used surnames. Many certainly had appellations added to their original names. Thus there was Wulfsic se blaca, or "the pole," and Thurceles hwitan, or "the white." These were, however, among the Saxons, as for many centuries later in England, derived from many causes, as from the place of residence—e. g. Ælfric at Bertune; or from the father, as Elfgare Ælfan suna, "Elfgare, son of Ælfan," or, more shortly, Wulfrig Madding, Badenoth Beotting. Office, trade, or possession often bestowed a name, as Leofwine ealdorman ("alderman"), Sweigen scyldwirtha ("the shield-bearer"), Ægelifrig munuc ("monk"). In the course of time, though very rarely among the Anglo-Saxons, these became family names, and as such still exist. Among women's names are Ethelswytha, "very noble"; Selethrytha, "a good threatener" (Anglo-Saxon ladies appear to have excelled as scolds); Editha, "the blessed gift"; Elfhilda, "elf of battle"; Beage, "bracelet"; Ethelfritha, "noble and powerful"; Adeleva, "noble wife"; Heaburga, "high tower" (a tall lady); Adelfleda, "noble pregnancy"; Elfgiva, "elf favor"; Edgiva, "happy gift"; Ethelgiva, "noble gift"; Wynfreda, Winifrede, "peace of man"; Ethelhilda, "noble war-goddess"; Elfthrythe, "threatening as an elf." Saxon is the stock on which the English and American names of the present day are formed. Next to these come the Norman, but it must be remembered that both were in a great degree founded on a common Teutonic origin. Though the Anglo-Saxons very rarely employed a regular system of family nomenclature similar to our own, they attempted to show relationship by the use of similar personal names. Thus in one family we find Wigmund, Wig-helm, Wig-laf, Wih- (or Wig-) stan, and the nineteen descendants of Alfred had their names beginning with *Ead* ("prosperous"). The termination *-ing*, as in Brening, Dering, Whiting, means a descendant, or "born of." Surnames were not common before the eleventh century, though they were used, hereditarily, occasionally both by lords and common men. Among the oldest of these family names were the names Liniet (Linney), Grimkelson, Dubbe, Tuk (or Tuckey), Pineebek, and Gamelson. The ingress of the Normans introduced the use of Scripture names. During three centuries after the Conquest people of rank began to assume first some surname of place or characteristic, and then one of family. The younger branches of a family often laid aside the father's name and took one from the place where they lived, and thus (in Cheshire) in three descents as many surnames are found in the same family. Several brothers often assume different surnames. Hence it is difficult to trace the pedigree of any family beyond the thirteenth century. The roll of Battle Abbey, containing the names of those who fought at the Conquest, gives the cream of the Norman aristocracy, so that a biographer of Chaucer declared that all names to be found in it ennobled their descendants. (For different versions of this roll, see Lower. *Patronymica Britannica.*) The Normans introduced the title *de* ("of" or "from") as indicating the names of their estates; e. g. Le Sire de Vitry, Paennel du Monstier-Hubert. The mingling of Norman with English names soon formed a sad chaos, many callings, places, and nicknames being translated into French and thence Anglicized, while the confusion was worse confounded by the Latinization of others. *At*, meaning the same as *de*, or indicating residence, enters into many English names; e. g. Athill, Atwood. In Norman names many old Norse words became French. Thus *ey* or *ö*, "island," became *eu* (Cantaleu); *flôt*, a river, *fleur* (e. g. Harfleur); *bo* or *by*, an "island," *bœuf* (Paimbœuf); *garth* became *gard* (Epegard), etc.

Celtic names were originally formed on the same principles as the Saxon, the affix *Mac*, denoting "son," being usually assumed in Scotland, as was *O'* ("grandson") among the Irish, and *Ap* with the Welsh. The head of a clan in Scotland is spoken of as *The*—e. g. The Macgregor—and he is addressed by the name alone, without an article.

The entire clan usually bore the chief's name. Among Celtic names are Angus, "firm"; Fingal, "strongest of the strong"; Brian, "chief"; Fergus, "strong arm or man"; Arthur, "a bear"; Griffith, "a dragon"; Hugh, "mighty, indomitable"; Murdoch, "great chief"; Owen (John), "a lamb"; Dugald, "black-haired"; Rowena, "the white-necked" (?); Brenna, Brenda, "raven-haired"; Cordelia, "token of the flowing"; Morgiana, "lady of the sea."

There are in Great Britain nearly 50,000 surnames, derived from every conceivable source, such as animals, offices, saints, traders' signs, virtues, and even from oaths and salutations, such as Bigot, from "by God"; Pardoe, from "par Dieu"; Godsall, from "God's soul"; Olyfader, from "Holy Father"; and Belcher, from "*belchère*." The commonest name is Smith; the next in order Jones, Taylor, Williams, Brown, Davies, Thomas, Robinson. Of the second class as to number are Baker, Clark, Cooper, Davis, Edwards, Evans, Green, Hall, Harris, Harrison, and others, in apparently the same proportion as in America.

In Wales there are districts in which family surnames are not yet known, and there are places all over Great Britain in which nicknames or sobriquets like those of the Middle Ages are in general use. It has been frequently asserted that French names introduced at the Conquest may be known by such prefixes as *de*, *du*, *des*, *de la*, *saint*, or by the suffixes *font*, *ers*, *faut*, *beau*, *age*, *mont*, *ard*, *aux-bois*, *ly*, *eux*, *et*, *val*, *court*, *lay*, *fort*, *ot*, *champ*, and *ville*; but this is far from being the case, since very soon after the Conquest these terms came into such general use as to make distinctions almost impossible. The Norman term *fitz* is commonly believed to signify illegitimate descent, but this was by no means invariably the case, the word itself meaning simply *fils*, or "son."

In many European countries the husband adds his wife's name to his own, and in Spain, if the mother is of better family than the father, the children take her family appellation. In inheriting Scotch estates it is a very common condition that a certain name shall be taken with the property.

Ancient Egypt.—Among the ancient Egyptians the king ordinarily had two names—one a prænomen or solar title, assumed at coronation (as Men-Cheper-Rā, the prænomen of Thotmes III., or Cheper-Ka-Rā, that of Usertasen I. of the twelfth dynasty), and a family name. In writing these were included in ovals or cartouches. Individuals had often two names, but the Egyptians generally used only one. Egyptian proper names, however, present great variety of structure, some being apparently very simple and not always possessed of particular significance, while others present more or less complete sentences. The latter usually have a divine name as a component part, and are capable of a more or less exact translation.

China and Korea.—The Chinese have at least two names: one a "sing" or family name, which is invariably placed first in both speech and writing, and a "ming" or personal or given name, corresponding to the Christian name of Western nations. There were originally only 100 family names, but now there are 438, of which thirty are dissyllabic, as Sze-ma, Ow-yang, etc. The others are all monosyllabic. The little book called *Peh-Kia-Sing*, or Hundred Family Names, which contains lists of these characters, is the most popular book in China, and as it covers nearly every sound in the language it affords to the unlearned a convenient list of phonetics for correspondence and account-keeping. These names are usually the names of common objects such as *Lung*, "dragon"; *Lang*, "wolf"; *Ma*, "hemp"; *Li* (pronounced lee), "a plum"; *Lin*, "forest"; *Liu*, "willow"; *Ts'ŭn*, "inch"; *Hwang*, "yellow"; *Luy*, "thunder"; *Wang*, "prince." The surnames Li, Wang, and Chang are as common in China as Smith, Brown, and Jones are among English-speaking peoples. Persons having the same surname can not intermarry.

The *ming*, or given name, is usually in two syllables, and invariably follows the sing or surname, as Li Hung-chang (the famous viceroy and grand secretary), Tsêng Kwo-fan. It is therefore improper to speak of Mr. Ch'ang or of Mr. Hung-chang; Mr. Li and Mr. Tsêng are correct. The surname never varies, but the ming may. At birth a boy receives a "milk-name"; when he goes to school he receives a "book-name"; when he marries he takes a "great name"; when he takes his degree or enters upon office he assumes an "official name"; while in the ancestral temple he is known by his posthumous name. When a woman marries she assumes her husband's surname, and retains her own surname as her given name. All Buddhist monks are surnamed Shih (the first syllable of Shih-kia- or Sakya-muni); hence no one ever asks a Buddhist his sing or surname. The dissyllabic names which are often seen over the doors of Chinese business houses are simply the "style" adopted by the individual or firm doing business there, and not the names of individuals.

Emperors are never known or spoken of by their own names. On the accession to the throne a *nien-hao*, or year-name, is chosen, and this designates not the ruler, but his reign-period. K'ang-hi is thus not the name of the second emperor of the Manchu dynasty, but merely the style of his reign. The eighth emperor of the present dynasty was named Mien Tsai, and his reign-period Tung-Chi. The present reign-period, which began with 1875, is called Kwang-sü, or "Glorious Succession." In history emperors are known by their posthumous or temple names.

Korean usage is the same as that of China.

Japan.—Japanese surnames are of two kinds: (1) the *Kabane*, or clan name (e. g. Minamoto, Fujiwara, etc.), and (2) the *uji*, or family name, originally names of localities, e. g. Takahashi, "High-bridge"; Yamamoto, "Mountain-foot"; Matsumura, "Pine-tree-village"; Nagasaki, "Long-point." Given (or "Christian") names are also of two kinds: (1) common name, usually ending in -tarō for the eldest son, -jirō for the second, -saburō for the third, and so on; (2) the true name, which until recent times was used only on solemn occasions. As in China, the family name invariably precedes the given name, e. g. Nagasaki Gentarō. As in China, the mikados are known in history by their posthumous or temple names. The personal name of the present emperor is *Mutsu-hito*, "Benevolent Man," and his reign-period is *Mei-Chi*, "Enlightened Rule." Women are generally named after some flower or other natural object, preceded by O, "honorable," as O Hana, "Flower"; O Take, "Bamboo"; O Kiku, "Chrysanthemum"; O Haru, "Spring."

Place-names.—The study of the names of places is hardly less important than that of persons. From the earliest times men have retained the names of towns, hills, or rivers given by earlier races, so that it often happens, as in the case of the Picts, that all that is known of their language and origin is embraced in these terms. Again, in migrating to other lands the old place-names have always been transferred to new localities, in illustration of which the reader may consult *India in Greece, or Truth in Mythology*, by Edward Pococke (1852), a work in which the author has endeavored to prove that Aryan-Indian names were taken to the West. In like manner the Celt, the Saxon, the Pict, Romans, and Normans left their language in such words as *tam*, *tav*, or *clwyd*, meaning "river or water," whence the Thames, Tavy, and Clyde (Celt.); in *burg*, "a hill," and *bricg*, "bridge" (Saxon); in *Penval*, "the head of the wall" (Pictish); in *castrum*, "a camp," whence *-caster* (Roman). In *The Norman People* (London, 1874) it is shown that 124 common English names of places are also to be found in Scandinavia, and in such a way that they evidently originated there. See Steenstrup, *History of the Normans*, especially part iii.

Among the many books on the subject of names the reader may refer with advantage to *The History of Christian Names*, by Miss Yonge; also, *English Surnames*, by Beardsley (2d ed. 1875); and *Names and their Meaning*, by Leopold Wagner (1892). For (East) Indian names, see *Journal of the Royal Asiatic Society* (Jan., 1889, p. 159).

Revised by R. Lilley.

Names, Law of: For centuries the common law has assumed, if it has not required, the full legal name of a natural person to consist of a Christian or given name and of a surname or patronymic. A middle name or initial is generally deemed no part of the legal name, and hence unimportant. According to the older authorities a total mistake in the Christian name was fatal to all legal instruments, whether pleadings, grants, or obligations; "and the reason is, because it is repugnant to the rules of the Christian religion that there should be a Christian without a name of baptism, or that such person should have two Christian names, since our Church allows no rebaptizing. The mistake of the surname does not vitiate, because there is no repugnancy that a person should have different surnames." (Bacon's *Abridgment*; title, *Misnomer and Addition*, B.) The first of the above rules is no longer law. It is now well settled, both in Britain and in the U. S., that a person can change any part or the whole of his name with-

out penalty or punishment of any kind, unless the change is resorted to for the purpose of defrauding another. If he enters into a contract in a particular name he may be sued in that name, whatever his true name may be. So if he makes or receives a grant in an assumed name, his identity may be established by extrinsic evidence; and his marriage under an assumed name is valid. If negotiable paper is made payable to a person by a mistaken name, he may indorse it in such name, and thereby pass title and bind himself as indorser. "All that the law looks at is the identity of the individual, and when that is clearly established the act will be binding upon him and others." (*Petition of John Snook*, 2 Hilton's *Reports*; N. Y. Common Pleas 566.) Upon marriage the legal surname of the wife becomes that of her husband; yet she may continue to employ her maiden name in business transactions without subjecting herself to moral or legal censure. (*Bell* vs. *Sun Printing Co.*, 42 N. Y. Superior Court Reports 567.) The legal right to name a child is in the father. His promise to give the child a particular name has been held a valuable consideration for a note of the promiser. *Wolford* vs. *Powers*, 85 Ind. 294.

An act of Parliament changing a person's name is permissive and not compulsory; he may retain his original name. In many of the U. S. the constitutions forbid local or special laws changing the names of persons, and provision is made for the alteration of names by a judicial proceeding. (Stimson's *American Statute Law*, §§ 395, 432.) Statutes have been enacted authorizing the use of a deceased person's name by his successors in business, upon their acquiring the right to use it from his personal representatives, and filing and publishing the required certificate. (See N. Y. Laws of 1880, ch. 561, and Laws of 1881, ch. 389.) English common law does not secure to an individual such a right of property in his name or in the name of his real estate as to enable him to prevent the assumption of such name by another, unless the name thus assumed has become a TRADE-MARK (*q. v.*) or business name, and is employed to deceive the public or to defraud the person who made it valuable. See McAdam on *Individual, Corporate, and Firm Names* (New York, 1894). F. M. BURDICK.

Namur, Fr. pron. naă'mür': province of Belgium, on the French frontier; intersected by the Meuse. Area, 1,414 sq. miles. It consists of large, densely wooded hills, offshoots of the Ardennes, and rich in coal, iron, copper, lead, sulphur, alum, marble, and slate; and beautiful and exceedingly fertile valleys, yielding fine pastures and large crops of wheat, oats, hops, and flax. Besides agriculture and mining, a large manufacturing business is carried on, especially in paper, hardware, and cutlery. Pop. (1891) 336,543, mostly French-speaking Walloons.

Namur: capital of the province of Namur, Belgium; at the confluence of the Sambre and the Meuse; 35 miles by rail S. E. of Brussels (see map of Holland and Belgium, ref. 11–F). It has an elegant cathedral and many good educational institutions, large breweries, and celebrated manufactures of cutlery and leather. It was formerly a very strong fortress; was taken by Louis XIV. in 1692, and retaken by William III. in 1695. Joseph II. demolished the fortifications, and, although they were restored in 1817 during the union with the Netherlands, they were demolished again in 1866, with the exception of the citadel. Pop. (1891) 30,674.

Nanaimo, naă-nī'mō: port and town of Vancouver island, British Columbia; situated on the east coast, 60 miles N. N. W. of Victoria. It is a station on the railway from Victoria to Menzies Bay; and has a good harbor, although closed by ice in winter. Excellent coal is obtained in the immediate neighborhood and at Departure Bay, 3 miles north. Pop. about 3,000. M. W. H.

Nanaimos: See SALISHAN INDIANS.

Nanak: See SIKHS.

Nana Sahib, naa'naă-saa'hib (the title of *Dhundu Punt* or *Panth*): a leader of the Sepoy mutiny; b. about 1820; was adopted by Bajee Rao, Peishwa of Poona, and became his heir, but was not regarded as such by the British Government, which refused to continue the pension paid to his adopted father. Though embittered by this the Nana continued outwardly friendly to the British and won their confidence, but on the outbreak of the mutiny turned traitor and placing himself at the head of a body of rebels attacked Cawnpore. The British surrendered on condition that they should be sent down the Ganges to a place of safety, but they had hardly embarked when they were fired upon from the shore and almost all the men on board were killed. The women and children were taken to Cawnpore, and on the day before the arrival of Havelock to their aid were butchered by order of the Nana and their bodies thrown into a well. Notwithstanding the repeated efforts of the British to capture the author of the crime, he never fell into their hands though several times defeated by them in battle. Of his subsequent career nothing is known. F. M. COLBY.

Nancy, naăn'see': capital of the department of Meurthe-et-Moselle, France; on the left bank of the Meurthe; 220 miles by rail E. of Paris (see map of France, ref. 3–H). It is beautifully situated at the foot of a range of wooded and vine-clad hills. Besides its suburbs, it consists of the old and the new town, the latter with many broad and straight streets lined with magnificent houses. and many public squares adorned with fountains and gardens. It owes much of its beauty to Stanislaus Leczinsky, ex-King of Poland, who resided here from 1735 to 1766, and whose statue is in the Place Royale. It is the seat of a bishopric, and has a university, a celebrated school of medicine and pharmacy, a lyceum, a library of 40,000 volumes, several scientific societies, and many other excellent educational institutions, and large museums and collections both for scientific and artistic purposes. It is an important center for research in the field of hypnotism. It has manufactures of cotton and woolen goods, hosiery, hats, and brass, and its embroideries in all kinds of stuffs are celebrated. It was the capital of the former duchy of Lorraine, and in its immediate vicinity was fought the battle between Charles the Bold of Burgundy and René II. of Lorraine, in which the former was defeated and killed Jan. 5, 1477. At the death of Stanislaus, who held the country after the Peace of Vienna in 1735, Nancy was incorporated with France (1766). It has grown much in importance since the German annexation of Alsace-Lorraine. Pop. (1891) 87,-110; (1896) 96,306. Revised by S. A. TORRANCE.

Nan'du, or **American Ostrich**: the South American ostrich, or Rhea. See RHEIDÆ.

Nan'ek: founder of the important modern sect of the Sikhs of the Punjaub; b. at Talwendy, near Lahore, in 1469; son of Kalu of the Kshatriya caste; showed an early tendency to mysticism; associated with the fakirs; studied the religious books both of the Brahmans and of the Mohammedans; distributed his property to the poor; visited Mecca and Medina, and wandered through India in quest of a "vision of truth," which he ultimately attained, and thenceforth propagated a new religion with great success, being presented to the Emperor Baber in 1527. Nanek taught the unity of God, insisted upon faith in God and love to man, rejected monasticism, and instituted a very simple form of worship, which has since been considerably overlaid by the innovations of his successors. The object of Nanek was a reconciliation of Buddhism with Mohammedanism, and he embodied his doctrine in a book entitled *Adi Granth*, now the Bible of the Sikhs. D. at Kirtipur, on the banks of the Ravi river, in 1539. His tomb has been swept away by the river, but the locality is still a place of pilgrimage.

Nankeen' [named from *Nanking* in China, the original place of manufacture]: a durable cotton cloth of a buff-yellow color. It is made in Asia from a variety of cotton whose fiber is of this color (the *Gossypium herbaceum*). Artificially colored nankeens are made from ordinary cotton, and have nearly superseded the real article.

Nanking, or (less correctly) **Nankin** (literally, southern capital): the name by which *Kiang-ning-foo*, capital of the province of Kiang-su, is popularly known in China and among foreigners. It is situated on the south bank of the Yang-tse, 194 geographical miles W. of Shanghai, and 44 above the river-port of Chin-kiang; lat. 32° 2′ N., lon. 118° 49′ E. (see map of China, ref. 5–K). Its walls, which are 30 feet thick at the base and 70 feet high in some places, have a circuit of about 20 miles. The inclosed area, however, contains many open spaces and much waste ground. The inhabited part lies toward the west side, and is 3 miles from the river. The site is very unhealthful for Europeans, and even for natives of other parts of the empire. It is the seat of the viceroy or governor-general of the group of provinces known as Kiang-nan, and was formerly a city of much magnificence and importance. It was one of the chief literary centers, and was noted (as it still is to some extent) for its manufactures of satin, crape, nankeen, paper, porcelain, and

artificial flowers. It is now the seat of an arsenal conducted, under foreign superintendence, on the most advanced scientific principles.

The present city dates from the year 1368, when Chû-yuen-chang, a temple servant, at the head of a native army overturned the Mongol dynasty, whose capital was at Peking (the northern capital), and founded the Ming dynasty, which was in turn superseded in 1643 by the Manchus. He made it his capital (hence the name southern capital). Here outside the south gate stood the famous Porcelain Tower, or pagoda, which the third emperor of the Ming dynasty erected in honor of his mother in 1413, two years after the removal of the capital to Peking. It was 261 feet high, octagonal in ground plan, and consisted of nine stories, each provided with a gallery and a projecting roof, from the corners of which bells were suspended. Its outer walls were encased with white porcelain tiles. On Mar. 19, 1859, the city was taken by the Tai-pings, and was held by them until July 19, 1864, when it was captured by Gen. Gordon, and the rebellion came to an end. During their occupancy the palaces and other public buildings erected in the early days of the Ming dynasty, including the Porcelain Tower, were completely destroyed. The arsenal now stands on the site of this tower, and was partly built with its bricks.

At Nanking, Aug. 29, 1842, Great Britain concluded the treaty which opened five ports to foreign residence and trade. In the treaty concluded by the French in 1858 Nanking is mentioned as a treaty-port, but it has never been opened. Population probably less than 250,000. R. Lilley.

Nan'sen, Fridjof, Ph. D.: Arctic explorer; b. near Christiania, Norway, Oct. 10, 1861; entered the University of Christiania 1880; left in 1882 for an expedition in a sealing-ship to Arctic latitudes; was appointed on his return in 1882 curator in the Natural History Museum at Bergen; started May, 1888, on his celebrated journey to Greenland, in which he crossed the continent, returning May, 1889; became curator of the Museum of Comparative Anatomy at the University of Christiania; is the author of *The First Crossing of Greenland*, *Eskimo Life*, and numerous scientific papers. The Norwegian Storthing having voted 200,000 kroners for a new expedition to the north pole under Nansen's direction, he set out from Christiania June 24, 1893, in a specially constructed vessel of 170 tons, the Fram (Forward), manned with a dozen men and equipped with provisions and fuel for five years. His plan was to utilize the current which he believed sweeps from Bering Strait and the vicinity of the New Siberian Islands (*q. v.*) across the pole toward Greenland. By Sept. 22 he was shut in by the ice and began his northward drift. On Mar. 14, 1895, when in lat. 83° 59′, he with Lieut. Johansen left the ship and proceeded toward the pole with dog-sledges. On Apr. 8, when in lat. 86° 14′ N. and lon. 95° E. (2° 50′ nearer the pole than any previous explorer), they discovered that the ice-pack on which they were traveling was slowly drifting southward, and determined to make for Franz Josef Land, which they reached Aug. 26; spent the winter there (lat. 81° 13′ N.), living on bear and walrus, and in the spring of 1896 set out to reach Spitzbergen over the ice. On the way they fell in with members of the Jackson-Harmsworth expedition, and in August returned to Norway in their supply vessel, the Windward. On Aug. 21 the Fram also arrived safe and sound at Hammerfest (*q. v.*), and reported that, continuing to drift with the ice, she reached lat. 85° 57′ on Nov. 15, 1895, and found open water in lat. 83° 14′ N. and lon. 14° E. No land had been sighted N. of 82°. In 1897 Nansen made a lecturing tour in Great Britain. See *Fridtiof Nansen* (1896) and his *Farthest North* (1897). R. Lilley.

Nantel, Guillaume Alphonse: See the Appendix.

Nantes (Fr. pron. nänt; anc. *Condivin'cum*, or *Namne'tes*): city of France; capital of the department of Loire-Inférieure: situated on the right bank of the Loire, 35 miles from its mouth, at the influx of the Erdre and the Sèvre-Nantaise; 248 miles by rail S. W. of Paris (see map of France, ref. 5–C). The quays, boulevards, and promenades along the Erdre are elegant, and the city is regular and handsome. The most remarkable architectural monuments are the cathedral, built in the fifteenth century, with its towers hardly rising above the roof, containing the splendid monuments of Queen Anne, of Francis II., the last Duke of Bretagne, and his wife, Margaret of Foix; the castle, begun in 938, in which Henry IV. signed the Edict of Nantes (*q. v.*) Apr. 13, 1598, and in which many of the French kings resided temporarily; the bourse, a modern building, and one of the finest of its kind in France; and the post-office, built in 1884. The city has a lyceum, a school of navigation, several commercial and industrial schools, a library of 50,000 volumes, a botanical garden, a museum of antiquities, and an art-gallery. The principal branch of the industry of Nantes is ship-building and the production of all articles necessary to the outfit of a vessel—anchors, cables, cordage, sailcloth, biscuits, preserved meat, etc. The city itself possessed in 1889 330 ships, of 54,500 tons burden; the total shipping for the year amounted to 296,000 tons; the value of imports was $10,000,000 and of exports $2,750,000. Sugar-refining and the manufacture of linen and cotton fabrics, calicoes, flannels, musical, mathematical, and optical instruments, chemicals, leather, brandy, etc., are also extensively carried on. The harbor, formed by an arm of the Loire, can accommodate 200 vessels, and a ship-canal constructed in 1891 between Nantes and St.-Nazaire has made it possible for large vessels, which were formerly compelled to load and unload at the mouth of the river, to reach the harbor. Pop. (1891) 122,750; (1896) 123,902.

Nanticoke: borough; Luzerne co., Pa. (for location of county, see map of Pennsylvania, ref. 3–H); on the Susquehanna river, and the Cent. of N. J., the Penn., and the Del. Lack. and W. railways; 8 miles S. W. of Wilkesbarre, the county-seat. It contains a planing-mill, drill-factory, several coal mines, and 2 daily and 2 weekly newspapers. West Nanticoke is in Plymouth township, on the opposite side of the river, and has large coal-mining interests. Pop. of Nanticoke (1890) 10,044; (1900) 12,116. Editor of "News."

Nanticokes: See Algonquian Indians.

Nantucket: town; capital of Nantucket co., Mass. (for location, see map of Massachusetts, ref. 6–J); on Nantucket island, and the Nantucket Railroad; 28 miles S. of the Cape Cod peninsula. It is a noted summer resort; has steamboat connection with New Bedford (53 miles N. W. by water), Wood's Hole, and Martha's Vineyard; and contains a national bank with capital of $100,000, a savings-bank with deposits of over $453,000, 2 libraries (Admiral Sir Isaac Coffin's Lancasterian School, founded 1827, and the Athenæum, founded 1836) containing over 10,000 volumes, and 2 weekly newspapers. The town formerly had large whale-fishery interests, but is now principally engaged in the cod-fishery and the coasting trade. Pop. (1880) 3,727; (1890) 3,268; (1900) 3,006. Editor of "Inquirer and Mirror."

Nantucket Island: an island in the Atlantic Ocean: about 30 miles S. of Barnstable co., Mass. With the small islands of Tucanuck, Muskeset, and the Gravel islands it forms the county of Nantucket, which has an area of about 60 sq. miles. Nantucket island is of a triangular shape, about 15 miles long, and from 3 to 4 miles wide. The soil is sandy. Pop. (1890) 3,268; (1900) 3,006.

Napa, naa'pa: city; capital of Napa co., Cal. (for location of county, see map of California, ref. 6–C); at the head of tide-water on the Napa river, and on the S. Pac. Railroad; 46 miles N. E. of San Francisco, 65 miles S. W. of Sacramento. It is in an agricultural, horticultural, and wine-growing region, in a valley noted for its beautiful scenery and equable climate. It contains 4 public and 2 private schools, Oak Mound School (non-sectarian, opened 1872), Napa College (Methodist Episcopal, opened 1886), 2 libraries (free public, founded 1885, and Napa College) containing over 9,000 volumes, 2 State banks with combined capital of $500,000, a private bank, and 3 daily and 3 weekly newspapers. The State asylum for the insane, completed in 1875 at a cost of over $1,000,000, is located here. The manufactures include cream of tartar, wine, planing-mill products, tanned leather, and gloves. Pop. (1880) 3,731; (1890) 4,395; (1900) 4,036. Editor of "Register."

Napata: the capital of the Ethiopian kingdom which grew to power between 900 and 700 B. C. It was located at the present Gebel Barkal (18° 30′ N. lat.), somewhat below the fourth cataract of the Nile. The region was conquered by the Egyptians of the twelfth dynasty and was long governed as a province. During the Hyksos period its history is unknown, but under the eighteenth dynasty it was again conquered, and a temple to Amon-Ra was erected at Napata by Amenophis III. Intimate relations with Egypt continued through the Ramesside period. Somewhat later Napata became the capital of an "orthodox" priestly Egyptian kingdom, possibly founded by the successors of Her-Hor (*q. v.*) when the Libyans gained the rule in Egypt under the twenty-second dynasty (about 930 B. C.). Subsequently the

relative strength of Egypt and the kingdom of Napata gradually changed, and 200 years later Pianchi made a warlike incursion into Egypt, conquering the whole land, and establishing the Ethiopian dynasty. After the Greek period the history of Napata is not clear, its monuments being largely in a hieroglyphic character which has defied successful decipherment. It continued, however, down to the Roman times, with a change of the capital to Meroë (*q. v.*) C. R. Gillett.

Naperville: city; Du Page co., Ill. (for location, see map of Illinois, ref. 2–G); on the Du Page river, and the Chi., Burl. and Quincy Railroad; 9 miles E. of Aurora, 30 miles W. S. W. of Chicago. It is the seat of Northwestern College, for both sexes (Evangelical Association, opened in 1861), which in 1890–91 had 21 professors and instructors and 280 students. The principal industries are agriculture, stone-quarrying, and manufacturing. There are a national bank with capital of $50,000, two private banks, and a weekly and a monthly periodical. Pop. (1890) 2,216; (1900) 2,629.

Naphtali [= Heb. *Naphtālī*, liter., my wrestling]: the sixth son of Jacob, by Bilhah, the handmaid of Rachel. The tribe of Naphtali numbered 53,400 fighting men before Sinai, and 45,400 at the entrance into the promised country. It was settled in Northern Galilee from the foot of Anti-Lebanon to Lake Genesareth; Kedesh was its principal town.

Naphtha [= Lat. = Gr. *νάφθα*, from Arab. *nafth*]: a name applied to certain natural and artificial volatile fluids with little or no color.

In Persia the word was used to designate the most volatile forms of liquid bitumen that are intermediate between petroleum and natural gas. As the use of the word extended into Europe, where the substances to which it was first applied were unknown, it was used to designate petroleums—hence we have "the naphtha of Amiano" and Rangoon naphtha, the latter of which was nearly maltha in consistence. When wood was distilled for the production of pyroligneous acid, the volatile liquid that first passed over, and from which by refining methylic alcohol is obtained, was called wood-naphtha. When coal-tar was distilled, the volatile liquid that first passed over, from which benzole and its homologues are derived, was called coal-tar naphtha. Still later, when American petroleum was distilled, the volatile liquid that first passed over, that was not suitable for illuminating oil, was called naphtha, and later petroleum-naphtha. This crude naphtha was later redistilled and the distillate subdivided into A, B, and C naphthas, having different specific gravities, and used for different purposes. At the present time the word has very little use without some qualifying phrase to give it definition. See Bitumen, Petroleum, Methyl Alcohol, and Hydrocarbons. S. F. Peckham.

Naphtha Gas: See Petroleum.

Naphthalene [*naphtha* + *al*(*cohol*) + suffix *-ene*]: a hydrocarbon found among the products of the destructive distillation of bituminous coal. (See Gas-lighting and Hydrocarbons.) It occurs in Rangoon petroleum and the tar of shale oil. It is formed by passing the vapors of several other hydrocarbons through a red-hot tube, as toluene (C_7H_8), xylene (C_8H_{10}), cumene (C_9H_{12}), or mixtures of ethylene (C_2H_4) with benzene (C_6H_6), cinnamene (C_8H_8), anthracene ($C_{14}H_{10}$), or chrysene ($C_{18}H_{12}$). Alcohol and ether vapor, and even ethylene and vapors of acetic acid, petroleum, essential oils, etc., yield some naphthalene when passed through red-hot tubes. Soot and lampblack contain naphthalene.

Preparation.—Naphthalene is found in the tar formed from coal in the manufacture of gas and coke. It is found in that fraction of the tar that boils between 180° and 250° C. (350° and 480° F.), that is principally in the so-called "carbolic oil." From this it is separated by filtering and pressing between hollow plates heated by steam (hot-pressing). The product obtained in this way is treated with caustic soda for the purpose of extracting phenols; then it is washed with dilute sulphuric acid at about 100° C. (212° F.). During this stage a small quantity of finely ground black oxide of manganese is added to the vessel for the purpose of removing the color. The purified hydrocarbon is washed several times with hot water, then with dilute alkali, again with hot water, and then sublimed or distilled.

Properties.—Naphthalene appears in brilliant white, scaly crystals, very friable, strongly and unpleasantly odorous. The disagreeable odor is said by Ballò to be due to leucoline oil, which can be separated by boiling it with strong sulphuric acid and precipitating the resulting brown solution with ammonia. In medicine naphthalene has been employed for antiseptic and disinfectant purposes both internally and externally. Its specific gravity is 1·152. It melts at 174·5° F. (79·2° C.), and boils at 424·5° F. (218° C.). It sublimes at low temperatures and evaporates in the air. It is insoluble in cold, and almost insoluble in boiling water, but dissolves readily in alcohol, ether, fatty and essential oils, and most oils (naphthas) obtained by destructive distillation, in acetic and oxalic acids. The composition of naphthalene is represented by the formula $C_{10}H_8$ (see Hydrocarbons), and, so far as its chemical nature is concerned, it is regarded as related to benzene, C_6H_6. A very ingenious suggestion as to the relation between these hydrocarbons was first made by Erlenmeyer, and afterward shown by Gräbe to be in accordance with a large number of facts. It has long been used as a satisfactory working hypothesis, and much of our knowledge of this hydrocarbon and its derivatives is due to attempts made to test the hypothesis.

Naphthalene is a stable substance, as is clearly shown by its formation under the influence of high heat. It undergoes change under the influence of active reagents, and yields a great variety of derivatives, many of which have come into use on a large scale, especially in the manufacture of colors.—*Oxidizing agents*, as, for example, nitric acid, *potassium permanganate* (see Manganese), etc., convert it into Phthalic Acid (*q. v.*), or into α- naphthaquinone.—*Chlorine* forms addition products and substitution products.—*Nitric acid* forms several nitro-products, viz., one mono-nitronaphthalene, $C_{10}H_7.NO_2$; two dinitro-products, $C_{10}H_6(NO_2)_2$; three trinitro-products, $C_{10}H_5(NO_2)_3$; and two tetranitro-products, $C_{10}H_4(NO_2)_4$.—*Sulphuric acid* yields sulphonic acids, as follows: two mono-naphthalene sulphonic acids, $C_{10}H_7.SO_3H$; four disulphonic acids, $C_{10}H_6(SO_3H)_2$; two trisulphonic acids, $C_{10}H_5(SO_3H)_3$; one tetrasulphonic acid, $C_{10}H_4(SO_3H)_4$.—Among the most important derivatives of naphthalene are the *sulphonic acids*; the *nitro-naphthalenes*; α- and β- *naphthylamine*, $C_{10}H_7.NH_2$, made by reducing the corresponding nitro-naphthalenes; α- and β- *naphthol*, $C_{10}H_7.OH$, which bear to naphthalene the same relation that carbolic acid or phenol bears to benzene; *naphthionic acid*, $C_{10}H_6.NH_2.SO_3H$, or the sulphonic acid of naphthylamine. The naphthols and naphthionic acid are used in the preparation of azo-dyes.

Some years since Roussin prepared a substance which he supposed to be artificial alizarin, the most important coloring-matter of madder. Alizarin was at that time supposed to be a derivative of naphthalene, as both yield phthalic acid. Roussin's product was not alizarin, and has not proved to possess any value as a dye. It is called naphthazarin, and is dioxynaphtho-quinone ($C_{10}H_4O_2(OH)_2$).

Naphthalene Colors.—Many of the derivatives of naphthalene exhibit beautiful and intense colors, but a few only have been found available as dyes. (1) Martius yellow, Manchester yellow, *jaune d'or*, is the ammonium calcium or sodium salt of dinitro-naphthol. It imparts to wool and silk, without the aid of a mordant, yellow hues from lemon-yellow to golden-yellow, which are gradually volatilized by steaming. Picric acid imparts similar tints, but it is volatilized by steam. Martius yellow is not only used for dyeing yellow, but also to modify the hue of aniline red. (2) Naphthol yellow S., acid yellow S., is the calcium, sodium, or ammonium salt of dinitro-α-naphthol-sulphonic acid. It is prepared by treating α-naphthol with sulphuric acid and afterward with nitric acid. The acid and its salts dye like Martius yellow. Unlike the latter, they are not volatile in the process of steaming. (3) Magdala red, naphthalene red, naphthylamine red, roseonaphthalene, is made, according to O. N. Witt, by melting together hydrochlorate of naphthylene-diamine, α-naphthylamine, and amidoazonaphthalene. It has the composition $C_{30}H_{21}N_4Cl$, and belongs to the class of dyes known as safronines. The product appears in commerce as a dark-brown, somewhat crystalline powder, which is the chloride of the base. In tinctorial power it equals aniline red, while it surpasses it in being a very fast color. It can be readily distinguished from aniline red by the following reaction: On pouring a few drops of its concentrated solution into a cylindrical vessel filled with alcohol, a liquid is formed perfectly transparent, with light rose-color by transmitted light, but exhibiting in reflected light a strong and peculiar fluorescence, giving an appearance of opacity, as if a precipitate were being formed, and diffusing itself through the liquid in

clouds of fiery-red color. (4) Naphthylamine violets and blues are produced by the same reactions employed in converting aniline red into violets and blues (see ANILINE COLORS); i. e. replacing in magdala red one, two, or three atoms of hydrogen by methyl, ethyl, phenyl, etc. They may also be produced by treating naphthylamine with mercuric nitrate (*Wilder*); by substituting the radical naphthyl ($C_{10}H_7$) for hydrogen in aniline and toluidine (*J. Wolff*); from rosaniline and mono-bromnaphthalene, and from rosaniline and naphthylamine (*M. Ballô*). Blumer-Zweifel (*Dingl. polyt. J.*, cxcvi., 66) produces naphthylamine violet directly on the fiber by printing linen or cotton stuffs with a solution containing in a liter of suitable thickening material 30 grammes of naphthylamine hydrochloride and 15 grammes of cupric chloride solution of 15° B. For dyeing the thickening material is omitted, and the cupric chloride is reduced by a fourth. By increasing or diminishing the quantity of naphthylamine salt the color may be made darker or lighter. The printed or dyed stuffs are left for two or three days in the oxidizing chamber at a temperature of 77° F. (25° C.), and the colors fixed by washing with soap-water. Alkaline baths render the color reddish, acid baths make it bluish. A. Kielmayer (*Dingl. polyt. J.*, cxcvi., 67) has given a similar process, using chlorate of potassium instead of cupric chloride. (5) Chloronaphthalic or chlor-oxynaphthalic acid ($C_{10}H_5ClO_3$). When naphthalene is heated with chlorate of potassium and hydrochloric acid, a mixture of chloro-naphthalene and bichloro-naphthalene is obtained. By heating these with nitric acid a mixture of phthalic acid and chloride of chlor-oxynaphthyl is produced. The latter compound, on being heated with an alkali, is converted into the new acid. In a free state the chlor-oxy-naphthalic acid is yellow; it forms beautifully colored salts with baryta, zinc, and copper. It dyes wool scarlet without a mordant, but scarcely produces any change on cotton mordanted with alumina or iron. This acid almost rivals turmeric and litmus in its sensibility to alkalies. Paper stained with a very dilute alcoholic solution assumes a red color in ammoniacal vapors.

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Revised by IRA REMSEN.

Naphthol and **Naphthylamine**: See NAPHTHALENE.

Na'pier, Sir CHARLES, K. C. B.: admiral: son of Capt. Charles Napier, R. N.; b. at Merchiston Hall, Stirlingshire, Scotland, Mar. 6, 1786; entered the navy at the age of thirteen; was made commander in 1807; distinguished himself in the West Indies; served as a volunteer in the British army in Portugal; became commander of the Thames (32 guns) in 1811, and inflicted great damage upon the French in the Mediterranean; was engaged in the British naval operations in the Potomac and against Baltimore in 1814; settled in Paris after the peace, and lost his money in a steamboat speculation; was placed on naval duty on the coast of Portugal in 1829; accepted from Dom Pedro in 1833 the command of the squadron of the young queen; inflicted upon the fleet of Dom Miguel a decisive defeat off Cape St. Vincent July 5, for which he was made Viscount St. Vincent in the Portuguese nobility and admiral-in-chief of the Portuguese navy. In 1836 he resumed service in the British navy; was engaged as commodore on the coast of Syria in 1840, when he stormed Sidon with a land force, captured Acre, blockaded Alexandria, and concluded a convention with Mehemet Ali, for which services he was knighted. He sat in Parliament 1842–46; commanded the Channel fleet 1846–48; made vice-admiral May, 1853; commander of the Baltic fleet in the war with Russia 1854, and captured Bomarsund, but his refusal to attack Cronstadt provoked unfavorable comment, and he thereafter held no active command. He was made admiral of the blue 1858, and sat in Parliament for Southwark from 1855 till his death, which occurred at Merchiston Hall, Hampshire, England, Nov. 6, 1860. He wrote *An Account of the War in Portugal* (1836) and *The War in Syria* (1842), and furnished materials for a *History of the Baltic Campaign* (1857). See his *Life and Correspondence*, by Maj.-Gen. E. Napier, 1862.

Revised by B. B. HOLMES.

Napier, Sir CHARLES JAMES, G. C. B.: soldier; b. at Westminster, London, Aug. 10, 1782; received a commission in the army when twelve years of age; fought in the Irish rebellion; was wounded and left for dead in the battle of Corunna (Jan. 16, 1809); engaged in literary work in England; returned to the Peninsula as a volunteer and obtained a regular command in 1811; engaged in expeditions against the coast of the U. S. 1813; governor and military resident of Cephalonia 1822–30; conquered Sind in a series of battles, and showed great ability as governor of the conquered province 1842–47; resided in England 1847-49, when he was again sent to India as commander-in-chief, but found the Sikhs already beaten, and returned to England the next year. D. near Portsmouth, Aug. 29, 1853. He was of an imperious disposition, and often quarreled with those of greater authority; but he was loved by his soldiers and was the object of much hero-worship. He is the author of *Lights and Shadows of Military Life* (1840); *Indian Misgovernment and Lord Dalhousie* (1853).

Napier, JOHN, Laird of Merchiston: mathematician; b. at Merchiston Castle, near Edinburgh, Scotland, in 1550; studied at the University of St. Andrews; spent several years in travels in France, Spain, and Italy, and on his return entered upon a life of studious leisure. He first became known as an author by his *Plain Discovery of the Whole Revelation of St. John* (1593), giving in the dedication some wholesome advice to King James upon the reform of his "house, family, and court." About this time he was engaged in researches into the construction of warlike machines, and a letter to Anthony Bacon, dated in 1596, describes his invention of a mirror to set fire to ships by reflecting the rays of the sun, and of an instrument for scattering shot over a wide area; but these inventions seem never to have been tested or even perfected. In 1614 he published his great discovery of logarithms in a work entitled *Mirifici Logarithmorum Canonis Descriptio*, which, according to Kepler, he had indicated as early as 1594 in a letter to Tycho Brahe. In 1617 he published *Rabdologiæ, seu Numerationis per Virgulas Libri duo*, describing the invention known as NAPIER'S BONES (*q. v.*). He died at Merchiston, Apr. 4, 1617. His son Robert published, 1619, a posthumous work, *Mirifici Logarithmorum Canonis Constructio*, explaining the method of constructing tables of logarithms. Archibald, his eldest son, was created Lord Napier in 1627, and was ancestor of several of the Napiers of military and naval celebrity in modern times. Biographies of Napier were published by the Earl of Buchan (1787) and by Mark Napier (1834).

Napier, MACVEY: lawyer and author; b. in Stirlingshire, Scotland, Apr. 12, 1776; studied law; became writer to the signet 1799; published in 1817 an essay on the *Philosophical Writings of Lord Bacon*; edited the *Supplement* to the *Encyclopædia Britannica* (6 vols., Edinburgh, 1815–24); was appointed Professor of Conveyancing in the University of Edinburgh 1825; edited *The Edinburgh Review* for seventeen years (1829–46); superintended the seventh edition of the *Encyclopædia Britannica* (1830–42). D. at Edinburgh, Feb. 11, 1847. A posthumous work by Prof. Napier, *Lord Bacon and Sir Walter Raleigh*, appeared in 1853.

Napier, Sir WILLIAM FRANCIS PATRICK, K. C. B.: soldier and author; b. at Castletown, Kildare, Ireland, Dec. 17, 1785; brother of Sir Charles James and Col. George, and cousin of Admiral Sir Charles Napier, who together constituted a remarkable assemblage of military, naval, and literary talent, all being descendants of the Laird of Merchiston, the inventor of logarithms. Sir William entered the army in 1800; became captain 1804; served at the siege of Copenhagen 1807; in 1808 accompanied Sir John Moore to Portugal, and was actively engaged in the Peninsular campaign 1810–14; became major 1811, and lieutenant-colonel 1813, and wrote a *History of the War in the Peninsula and in the South of France from 1807 to 1814* (6 vols., 1828–40), admitted to be one of the most remarkable military histories of modern times. This history called forth a large number of replies and criticisms from officers alluded to in the text and the later editions contain replies printed under the title *Justificatory Pieces*. Napier was made colonel in 1830, major-general 1841, lieutenant-governor of Guernsey 1842, knighted 1848, and made lieutenant-general 1851. He devoted his later years to the illustration of his brother's exploits in the East, publishing *The Conquest of Scinde* (1845),

Administration of Scinde (1851), and *The Life of Sir Charles Napier* (1857); he also issued in 1855 *English Battles and Sieges in the Peninsula*, consisting of passages from his larger history, revised and sometimes rewritten. D. at Seinde House, Clapham, Feb. 12, 1860.

Napierian Logarithms: See LOGARITHMS.

Napier of Magdala, ROBERT CORNELIS NAPIER, Baron: soldier; b. in Ceylon, Dec. 6, 1810; son of Major C. F. Napier, of the Royal Artillery; was educated at the Military College at Addiscombe, and entered the Royal Engineers as second lieutenant in 1826; served throughout the Sutlej campaign of 1845–46, as chief engineer in the battles of Moodkee and Ferozeshah (severely wounded), and as brigade major of engineers at the battle of Sobraon; served in the Punjaub campaign of 1848–49; was chief engineer and wounded during the siege of Mooltan 1849; commanding engineer of the right wing at the battle of Gujerat and pursuit of the Sikh army; actively engaged throughout the Indian mutiny campaigns; chief of staff to Outram in 1857, and distinguished in the actions leading to the first relief of Lucknow and subsequent operations; brigadier and chief engineer at siege and capture of Lucknow; commanded a brigade at the capture of Gwalior, reducing the fort of Powrie Aug., 1858; commanded a division in the China expeditionary force, and was distinguished throughout the campaign resulting in the surrender of Peking, and promoted to be major-general; appointed lieutenant-general in 1867, and commanded the Abyssinian expedition resulting in the capture of Magdala and the release of the British prisoners. On Napier's return to England, in July, 1868, he was raised to the peerage under the title of Baron of Magdala, and received an annual pension of £2,000. (See ABYSSINIA and MAGDALA.) He was also nominated a G. C. B., having previously been made C. B. and K. C. B. for his services during the Indian mutiny. He was governor and commander-in-chief of India 1870–76; governor of Gibraltar 1876–82. D. in London, Jan. 14, 1890.

Napier's Bones (or **Rods**): a set of tablets of bone, horn, ivory, or other material, invented by the mathematician Napier for facilitating multiplication and division. They are of no practical use, and are only interesting as a mathematical curiosity.

Naples [= Fr., from Ital. *Na'poli* < Lat. *Nea'polis* = Gr. Νεάπολις, liter., New Town; νέος, new + πόλις, city]: city of Italy; capital of the province of Campania, and formerly of the kingdom of the Two Sicilies; on the Bay of Naples; in lat. 40° 50′ N., lon. 14° 16′ E.; 161 miles by rail S. E. of Rome (see map of Italy, ref. 7–F). It is magnificently situated, rising like an amphitheater from the shore, and has an almost perfect climate. The city is dominated on the W. by the Castle of St. Elmo, once of immense strength, which crowns the hill of St. Erasmo or St. Ermo; on the seaside are the fortresses of Castel Nuovo, often compared to the Tower of London, and adorned with a triumphal arch in honor of Alfonso of Aragon (1442); the Castel dell' Ovo, with its mediæval traditions about Vergil, but which was probably built by the Norman William I. (1150); also many batteries.

Means of Communication, Streets, etc.—There is regular steam communication by water between Naples and all the principal Mediterranean ports, and railways connect it with Central and Northern Italy; the city itself is intersected by tramways and omnibus lines. It is divided into the Old, or eastern, and the New, or western, towns by the ridge extending from the palace of Capodimonte to the sea, thus dividing the city into a kind of double crescent. The modern streets are broad and well paved, while the older thoroughfares, lined by houses of great height, are, the Via Roma excepted, extremely narrow, and sometimes very steep and crooked, and the glimpses caught of them in driving through the wider avenues are strikingly picturesque. Among the principal streets are the Via Roma (formerly called the Toledo), a grand street intersecting the old town; the Chiaja, or Riviera di Chiàja, which, passing the charming gardens of the Villa Nazionale on the left and a row of fine buildings on the right, winds for several miles along the curving, undulating western shore of the bay, and is the fashionable promenade of the city; the Vittorio Emmanuele, which skirts and crosses the higher portions of the town, commanding views of surpassing loveliness; the Corso Garibaldi, and the Via del Duomo. The lower part of the Via Roma formerly offered to the visitor the most animated pictures of Neapolitan habits, where the whole domestic life of the poorer classes might be studied in the open air, but all this has greatly changed since the unification of Italy and the consequent reduction of the *lazzaroni*. The public squares, called *larghi*, are irregular, and, though flanked by showy edifices and decorated with fountains, are not generally attractive. In the Villa Nazionale stand the aquarium and exhibition-rooms of the famous Zoölogical Station, established here in 1870–75 by Dr. Anton Dohrn, of Jena.

Churches and Public Institutions.—The churches number 350, some very quaint and curious in their construction, and have more archæological interest than architectural merit. In the sacristy of the Cathedral of San Gennaro is the almost priceless treasury of the saint; here also are the *ampolle* or small phials said to contain the blood of St. Gennaro, which is believed to liquefy twice every year. Among other prominent churches are the Incoronata, founded by Joanna I., with damaged frescoes attributed to Giotto; Sta. Chiara, with fine frescoes and curious old monuments; San Domenico Maggiore, very rich; the Church of the Gerolomini, one of the finest in the city; San Francesco di Paola, which has a cupola of great size and boldness of execution. Of the six large theaters, San Carlo is the largest and most elegant. The National Museum, formerly known as the Museo Borbonico, is one of the most extensive and most interesting in the world; among its treasures are a great number of objects found in Pompeii and its neighborhood. The National or Farnese Library contains over 250,000 volumes, besides 8,000 manuscripts on parchment and paper, and 1,800 from Herculaneum on papyrus; the Brancacciana has over 100,000 volumes; and 150,000 volumes belong to the library of the university, which was founded in 1224, and is attended by 3,500 students. Outside of the Capuan gate is the cemetery of the non-Catholics, remarkable for the simplicity and elegance of the monuments. The old Campo Santo, the cemetery of the victims of the cholera, and the new Campo Santo, are on the road to the Poggio Reale. Among the many objects of interest in the immediate vicinity of Naples is the grotto of Posilipo, the work of Lucullus or of Agrippa. This is a gallery cut through the rocky promontory of Posilipo, about 1,850 feet long, 17 or 18 in width, and at the extremities above 50 feet in height, though much lower toward the center. Just over the east entrance is the reputed tomb of Vergil.

Industry, Trade, etc.—Naples has, to a small extent, manufactures of woolen, silk, and linen fabrics, leather, gloves, coral ornaments, tapestry, porcelain, chemicals, machinery, carriages, and maccaroni, and is the site of a government ordnance-foundry. Its trade is large, however; some 3,700 ships of 1,700,000 tons burden enter the port annually. The principal exports are wine, olive oil, almonds, sulphur, hemp, and flax; the chief imports, grain, cottons, woolens, and earthenware. The fisheries also are important.

History.—Naples is said to have been founded as an offshoot of the still older town, *Parthenope* or *Palæopolis*, the site of which was probably Posilipo. Both towns were Greek colonies, and Greek continued to be spoken until the second century of the Christian era. The ancient city first appears in history as an ally of Rome against the Samnites. It continued faithful to the Romans in their wars with Hannibal, and eventually became the favorite resort of the Roman aristocracy, the ruins of whose splendid villas still meet the eye in every direction. After suffering much from the barbarians, it was besieged (537) by Belisarius, who, entering the town through an aqueduct, gave it up to his soldiers. Totila, who took it afterward, treated it more humanely. Later it became the capital of a dukedom, gradually extending over the neighboring towns and islands, and had fierce conflicts with that of Benevento. In 1037 the city fell into the hands of the Normans under Ruggiero, and was well governed by him and his successors as a part of their kingdom. The Suabian dynasty followed in 1194, but in 1268, at the instigation of the pope, Conradine, the last of his house, was taken prisoner and beheaded by Charles of Anjou, on whom the pope had bestowed the kingdom of Naples. Charles beautified the city and made it his capital. The weakness of Joanna I. and the assassination of her husband brought upon Naples the vengeance of his brother, Louis of Hungary, and for a century the greatest disorder and misery prevailed. In 1442 Alfonso of Aragon besieged the city and entered it through an aqueduct, as Belisarius had done before him. In 1495 Naples joyfully opened her gates to Charles VIII. of France, who, however, was soon forced to share his prize with Spain. Francis I. vainly endeavored to recover it from his rival,

Charles V. In the siege of 1528 both besieged and besiegers suffered cruelly from plague and famine. Under the government of the Spanish viceroys Naples presented a scene of disorder and squalor, while churches were multiplied and convents occupied the most beautiful and healthful positions in the city. Strong efforts were made by the best citizens and the purest ecclesiastics to introduce the Reformed religion, and a popular tumult in 1547 forced Charles V. to annul the order for the establishment of the Inquisition; but religious persecution under other forms and the most intolerable despotism finally brought about (1647) the famous insurrection of MASANIELLO (*q. v.*). Not long after a terrible plague appeared, during which 30,000 persons perished in six months. In 1701 the nobility attempted to overthrow the existing government and place an archduke of Austria at its head. During the wars of the French Revolution, Naples was several times taken, lost, and retaken by the French. In 1815 the Bourbons were once more restored; the citizens endeavored to obtain reforms, but were sternly repressed until 1860, when, on Sept. 7, Garibaldi entered the city, and the people, being called upon to decide their own destiny, voted for the annexation of Naples to the constitutional kingdom of Victor Emmanuel II. Since then marked changes for the better have taken place, and the material wealth of the city has increased. Its sanitary condition has been greatly improved by a system of drainage that carries the sewage to a distance, by the pure water-supply opened in 1885, and by the removal of unsanitary dwellings begun in 1889. Pop. (1882) 463,172; (1893) 532,500. Revised by S. A. TORRANCE.

Naples, Bay or **Gulf of** (anc. *Sinus Puteolanus*): a portion of the Mediterranean, on the southwest coast of Italy, running inland about 10 miles between Cape Miseno and Cape Campanella, 20 miles distant from each other. Its shores have a worldwide reputation for beauty of scenery and charm of climate.

Naples, Kingdom of: one of the old political divisions of Italy. See ITALY and SICILY.

Napo, naa'pō: a northern branch of the upper Amazon, in Ecuador; rising on the east slope of the Andes, S. E. of Quito, flowing S. E. by E., and joining the Amazon near lon. 72° 45′ W.; length, by the principal windings, nearly 800 miles; navigable for small steamers about 500 miles. The upper portion is obstructed by rapids, which are passed by canoes as far as the village of Napo; thence a rough trail leads over the mountains, by way of Archidona and Papallacta to Quito, forming almost the only route from the Ecuadorian plateau to the Amazon. The river flows through a vast, forest-covered plain, which is thinly inhabited by a few Indian tribes; a dozen miserable villages on the banks are the only marks of civilization. The Napo region is rich in gold, but it is collected only in small quantities by hand-washing. Sarsaparilla, a little rubber, etc., are obtained along the banks. The principal tributaries are the Curaray, Aguarico, and Coca. Peru claims the lower Napo, and the entire northern shore is in territory claimed by Colombia. See Orton, *The Andes and the Amazon* (1876); Simson, *Travels in the Wilds of Ecuador* (1886). H. H. S.

Napoleon: village; capital of Henry co., O. (for location of county, see map of Ohio, ref. 2–D); on the Maumee river, the Miami and Erie Canal, and the Wabash Railroad; 35 miles S. W. of Toledo. It is in an agricultural region, and contains two large flour-mills, elevators, several manufactories, water-works, electric lights, 2 private banks, and 4 weekly newspapers. Pop. (1880) 3,032; (1890) 2,764; (1900) 3,639. EDITOR OF "DEMOCRATIC NORTHWEST."

Napoleon I.: soldier, statesman, and Emperor of the French. The place of his birth was Ajaccio, in the island of Corsica, but the date is uncertain. The one commonly accepted is Aug. 15, 1769, but the Corsican record shows that his mother bore a son Jan. 7, 1768, who was baptized by the name Nabulione. If the earlier date is the true one, the motive for announcing the other was doubtless the fact that when, in Apr., 1779, he was admitted to the military school at Brienne he would have been excluded as more than ten years of age if Jan., 1768, had been given as the time of his birth. His father, Carlo Buonaparte, was descended from an Italian family of rank, which had migrated to Corsica in 1529. When he was eighteen, Carlo Buonaparte married Letitia Romolino, a Corsican young lady not fifteen years of age. The children of this marriage were thirteen in number, of whom eight grew to maturity, Napoleon being the eldest or the second. The mother had beauty and sagacity, but neither position nor wealth. The father, though noble in rank, was poor and indolent. Two characteristics of Napoleon's childhood are specially worthy of note. He grew up in poverty, though among luxurious noblemen. The condition of the country was one of uninterrupted turbulence and violence. France had purchased the equivocal rights of Genoa to the island in 1768 and had attempted to enforce them by a vigorous and cruel system of suppression. The Bonaparte family took the French or unpopular side. Up to 1795 Napoleon's interests were in Corsica, where he doubtless intended to pass his life. In the course of five years at the military school at Brienne he mingled very little with his fellow pupils. One authority says his life was that of a "hermit"; it is certain that he was solitary and unhappy. In 1784 he went from Brienne to a military school in Paris, and a year later received the rank of lieutenant in a regiment at Valence. During the next few years his regiment was moved from place to place, and on account of ill-health he frequently had long vacations, which he passed in Corsica. During this period he showed no unusual talent, though he had skill in mathematics, and was fond of military history. His writings at this time gave no promise of an exceptional future, though they indicated that kind of fierce impatience which was characteristic of his later years. Thoroughly alive to the interests of Corsica, his youth was familiar with a country in a constant state of turbulent disorder. At this period his allegiance wavered from one side to the other. In 1792, having obtained a limited command, he made an unsuccessful attempt at a *coup d'état*, but when pursued he escaped to France, thus probably saving himself from being shot by court martial. A little later the whole family, pursued by the fury of the Corsicans, fled from the island and subjected themselves to the risk of landing in France in the very midst of the Revolution. Thus ended the Corsican period of his life. His education, if not exclusively military, had been chiefly military in the very worst sense of the term; for from infancy he had been constantly familiar with deeds of violence.

Soon after Bonaparte's return to France his character and ability revealed themselves. Rising rapidly in the service, he impressed all who came in contact with him with a sense of his irresistible force of will. When he was first appointed to a command, Auguereau, a proud but heroic old soldier, ridiculed his insignificant figure and his youth (according to de Méneval he was only about 5 ft. 2 in. in height), but after an interview with the little general Auguereau confessed that he had been frightened and overawed at the first glance. Gen. Vandamme, one of the most energetic and brutal of the revolutionary soldiers, said to Marshal d'Ornano: "I, who fear neither God nor devil, when I approach him, tremble like a child. He could make me dash through the eye of a needle into the fire." United with these characteristics was a remarkable power of work and concentration. Roederer, during the early part of Napoleon's French career, wrote of him: "What characterizes him above all other men is the force, flexibility, and constancy of his attention. He can work eighteen hours at a stretch, on one or on several subjects. I never saw him tired." Pelet wrote a little later: "Often he keeps the counselors of state from nine o'clock in the morning until five in the evening, with fifteen minutes' intermission, and seems no more fatigued at the close of the session than at the beginning." Such powers were not long in producing an effect. Immediately after his return from Corsica Napoleon allied himself with the younger Robespierre and the Terrorists. In 1793 he was given command of a battalion of artillery, and so distinguished himself in planning the expulsion of the British from Toulon that he was at once named general of brigade. In the summer of 1794 he saw little military service, but was active in his political plans, and, according to Marmont, "acquired an ascendency over the representatives which it is impossible to describe." After the fall of Robespierre (July 28, 1794) Bonaparte was arrested and imprisoned, but was not sent to Paris, as the record quaintly says, "on the ground of the possible utility of the military and local knowledge of the said Bonaparte." Gen. Marmont says he "moved heaven and earth" to effect his escape from prison. He finally succeeded. In 1795 he showed a restless activity, though he seemed to act now on one side and now on the other. On Oct. 4 he received the command of the garrison, and on the following day showed himself master of the city by sweeping the streets with grapeshot and driving the Terrorists into seclusion. He thus practically

brought the Revolution to an end. In Mar., 1796, he married Josephine de Beauharnais, a widow whose first husband had perished on the guillotine. Josephine had sweetness of disposition, and the favor with which she was regarded in Parisian society was of advantage to her husband. The marriage register declares that Bonaparte was born in 1768, instead of 1769, and Josephine in 1767, instead of 1763, the true date of her birth. Bonaparte's European career was now to begin.

The First Italian Period.—The coalition which had been formed against France in 1793 was broken up by the revolt in Poland, and the consequent withdrawal of the Prussian troops from the west. France in 1794 regained all she had lost, expelled the Austrians from Belgium and the Stadtholder from Holland, set up her boundary on the Rhine, and pushed her armies into Germany. This act of conquest led to the coalition of Russia, Austria, and Great Britain in 1795. The Austrian generals Wurmser and Clerfait forced the French armies back out of Germany and drove them across the Rhine. Bonaparte saw that the most formidable enemy of France was Austria, and that the most vulnerable point of attack was the Austrian territory in Italy. He urged his views on the members of the Directory with so much cogency that an Italian campaign was determined upon, and he himself was placed in command. His personal characteristics showed themselves instantly. Though the ostensible purpose of the war was to free Italy from Austria, Bonaparte issued a proclamation to the soldiers in which he said: "Soldiers, you are naked and ill-fed; I will lead you into the most fruitful plains in the world. Rich granaries, great provinces will be in your power. There you will find honor and fame and wealth." This order was issued Mar. 27, 1796, eighteen days after his marriage. The course hinted at in the proclamation was carried out. The commander not only made the war support itself, but he levied enormous sums upon the provinces and cities, with which he filled the military chest and made his commanders rich. Marmont relates that Bonaparte at one time caused a large sum to pass through his hands, and that when he rendered a detailed account of the same the commander ridiculed him for not keeping it for himself. From the pope he extorted 15,000,000 francs. In this way he bound his officers and soldiers to him and overawed his enemies. His plan of campaign was essentially the same that he attempted nearly twenty years later at Waterloo. He separated the Austrian army from the Sardinian, and then defeated them both in turn. In less than a month he fought five important battles, and was in complete possession of the western part of Northern Italy. Turning to the E., he met greater difficulties, but he showed even greater ability and resources, and his success was not less marked. Wurmser had come to the rescue from N. of the Alps with a new army of 50,000 men, and Bonaparte came near being overwhelmed and ruined at Arcola. The Austrians were defeated at Rivoli Jan. 14, 1797, and a whole *corps d'armée* capitulated at Roverbella Jan. 16. These successes raised the reputation of Bonaparte above all the other French generals and made him from that time practically independent. He determined to strike at the heart of Austria from Mantua as a basis, but he was now to meet with a new enemy. The Austrian general, the Archduke Charles, who had succeeded Clerfait in the campaign against Jourdan and Moreau in Southern Germany, had beaten the French at Würzburg and driven them back across the Rhine. He was now ordered to return to the defense of Austria against Bonaparte. No important successes were achieved by the French, and Mar. 31 Bonaparte proposed to the archduke an armistice of six days. The result was what are known as the Preliminaries of Leoben, which were the basis of the Treaty of Campo Formio, signed in Oct., 1797. The unscrupulous way in which Bonaparte had even now begun to deal was shown in the treatment of Venice. This republic, which had maintained its neutrality though overrun by the French army, was now ceded to Austria in return for Belgium and the Rhenish frontier, though France had no right to cede Venice, and Austria had no right to cede those portions of the left bank of the Rhine, over which she had no control. By the same treaty a Cisalpine republic was set up under the protection of France. On the whole, the treaty was decidedly favorable to Austria, for she gained the territory of Venice as far as the Adige in return for a number of straggling provinces over which she had at best only partial control. The most important result of the campaign was the great fact that it revealed Bonaparte to the army, to France, and to the world. It was also of importance that he had given the republican Venice to imperial Austria; for by so doing he had thrown an apple of discord among the old powers of Europe.

The Egyptian Campaign.—The revolution of the 18th Fructidor (Sept. 4, 1797), led by Augereau, overthrew the republican constitution which had been definitely established in 1795, and substituted for it the government of the army. The elections had shown that the country favored a policy of peace, and consequently the element in favor of peace in the legislature was on the point of gaining control. Augereau, who was then one of Bonaparte's generals of division, surrounded the legislative body with a force of 12,000 men, and arrested the most obnoxious representatives. The elections in forty-eight of the departments were annulled, and a large number were proscribed and transported to die in the penal colony at Cayenne. Henceforth during the ascendency of Bonaparte France was to be ruled by the sword. Soon after congratulating the armies on the fall of "the enemies of the soldier, and especially the army of Italy," Bonaparte left Italy for Paris. His speech on the occasion of his reception by the Directory indicates that he was at the time uncertain what course to pursue. The Directory probably saw the necessity of giving him employment, and he was made "general-in-chief of the army of England"; but the affairs of continental Europe did not offer him a favorable opportunity for direct action against England. He had no faith in the permanency of the present form of government, and while the Directory was demonstrating its weakness an opportunity offered itself for showing his powers in another field. For some months he had talked of an Eastern policy which should unite France with Russia in taking possession of Turkey, for the purpose of weakening Great Britain. It was this thought which now gave shape to his action. France had not yet abandoned all its claims in India. He decided to attack Egypt, and then swing around upon Turkey from the East after he had taken possession of Palestine. It is significant, however, that at this very time the flames of war were bursting out in all parts of Europe. In the early spring of 1798 the Swiss constitution was overthrown, the French seized a treasure of 40,000,000 francs at Bern, the treasury of the aged pope was plundered, and the pope himself was carried into captivity; but these excesses, although they led to the new coalition against France, did not change Bonaparte's determination. He was not only willing that in the condition of affairs then existing France should carry on the war without him, but he was willing to take with him to Africa the flower of the French army and the most promising of the generals. With Murat, Berthier, Desaix, Kléber, Lannes, and Marmont he set out in command of 30,000 men on May 19, 1798. Stopping to take Malta, which capitulated June 12, he was ready to begin the Egyptian campaign early in July. The Egyptians were easily beaten. At the battle of the Pyramids the Mamelukes lost 2,000, and the French only twenty or thirty. Bonaparte, however, was thrown immediately into the greatest embarrassment by the complete destruction of his fleet by Nelson only a week after his arrival in Cairo. His grand design was ruined by this misfortune. While France was at war with nearly all Europe its best generals and an excellent army were imprisoned in another continent. From July until the following February Bonaparte and his army remained in comparative inactivity near Cairo. Meanwhile the Turks were gathering a force in Syria. He determined to anticipate their attack by advancing against them with 12,000 men. He entered Syria, and took Jaffa Mar. 3 by assault. More than 2,000 prisoners were taken. Unwilling to feed or to guard them, he ordered them to be taken to the seashore and shot. The order was carried out, every precaution having been taken to prevent any from escaping. At St. Jean d'Acre the fortress was furnished with supplies by the British from the sea. After vain attempts for two months to reduce the city, he was obliged to retire. He wrote to the Directory that he abstained from entering the city on account of the plague which he had heard was ravaging it. He afterward declared that the "grain of sand" which obstructed his way at Acre "changed the destiny of the world." At Mt. Tabor, and later in the Bay of Aboukir, some advantages were gained, but nothing could relieve the general character of the disaster. There was now nothing to show for the loss to France of some 6,000 soldiers and several distinguished generals at a very critical period. On Aug. 22 Bonaparte transferred the command of the expedition to Kléber, and, taking with him all

the other generals of distinction, set sail in two frigates for France. After a tortuous voyage and many delays he landed at Fréjus Oct. 9, 1799. Kléber was soon murdered, and Egypt and Malta passed into the hands of the British.

The Coup d'État of the 18th Brumaire.—During Bonaparte's stay in Egypt France had been threatened with overwhelming disaster; but the affairs of the allies had been mismanaged, and the affairs of France, on the whole, had been conducted with ability and skill. The Duke of York, in command of the British forces in the Netherlands, had conducted an unsuccessful campaign, and the Archduke Charles had gone to his assistance without result. The attack of the Russians, under Suvaroff and Korsakoff, had been successfully repelled by Masséna near Zurich, and Italy, though threatened, had not been lost. It would be too much to hope that this favorable condition could long be continued unless the coalition could be broken or the power of France strengthened. The return of Bonaparte therefore was most opportune. He was everywhere met with universal acclaim. The finances were in disorder, and the forces of the Government were not united. Bonaparte saw at once that affairs were ripe for a change. He had no difficulty in bringing the members of the Directory to his way of thinking. They caused reports to be spread that the legislative bodies were in danger of attack in the city, and by this means induced them to adjourn to St.-Cloud. Here the task of overthrowing the Government was not difficult. On the 18th Brumaire (Nov. 9, 1799), just one month after Bonaparte landed in France, the *coup d'état* took place which swept away the constitution of the year III. and placed Bonaparte in power. The legislative halls were cleared by the soldiery, and Sieyès drew from his pocket a new constitution, that known in the republican calendar as the Constitution of the year VIII. When modified by Bonaparte the new instrument of government practically put all power into the hands of three consuls. Sieyès had, no doubt, in planning the constitution made, as he supposed, ample provisions for himself; but Bonaparte as First Consul would brook no rival. He afterward boasted that he had pacified Sieyès with an ample bribe at the expense of the state. Sieyès and Ducos resigned as consuls, and Bonaparte put two unimportant officials in their places.

The Second Italian Campaign.—During all this period war was going on, and the enemies were on the borders of the country. Scarcely had he been installed as Consul when he made overtures of peace to Great Britain and Austria. It is not singular that these were rejected, for, after the events of 1799, the allies must have been confident of ultimate success. The new Government therefore was obliged to renew the war against Great Britain, Russia, and Austria. The condition, however, was not so bad as it seemed; for Russia, attributing the defeat of Suvaroff to Austrian jealousy, refused further aid to the coalition, and Great Britain, after the failure of York in the Netherlands, was not in condition to take an active part. The only enemy of importance therefore was Austria; but at that very moment Austria was in possession of Southern Germany and of a large part of Northern Italy, with powerful armies in the field. Bonaparte availed himself of all the new enthusiasm to re-enforce the army and put it in order. His plan of action was soon determined upon. In Italy the Austrian general Melas was advancing toward the W. with an army of 120,000 men, while Masséna was trying to keep him at bay with an army of 40,000. North of the Alps Moreau was in command of about 130,000 men, as opposed to 120,000 under the command of the Austrian general Kray. The plan of campaign now entered upon is generally considered one of the most brilliant ever designed by Napoleon. He directed Moreau to advance to Schaffhausen, in the eastern part of Switzerland, to cut off Kray, and then to send a part of his army across the St. Gothard Pass to co-operate with the French army in Italy. Masséna was to fall back to Western Italy, and Napoleon himself was to advance across the middle Alps. Thus the Austrians would be caught either between Napoleon and Masséna, or between Napoleon and Moreau. Napoleon's part of the campaign was conducted with the greatest secrecy. Masséna (in the early spring of 1800) was driven to the W., and finally shut up in Genoa, where he distinguished himself by a defense that made his name memorable. Moreau, though not venturing to march on Schaffhausen, drove Kray back to the Danube at Ulm, and sent the promised contingent across the Alps. The success of Napoleon's movement depended upon its secrecy. Troops were collected in Southern France in such a way as to bewilder the enemy. Rapidly during the second week in May they converged upon the Swiss frontier, and Napoleon placed himself at their head. A part of the troops advanced by Mont Cenis; but the main army, under Napoleon himself, crossed by the Great St. Bernard. So secretly had the movements been conducted, and so swift was the execution, that Napoleon reached Milan on June 2. The corps sent by Moreau across the St. Gothard, finding that the Austrians had advanced to the W., followed on and united with Napoleon immediately after his arrival in Milan. The approach of a French force by Mont Cenis had deceived Melas and thrown him off his guard. Meanwhile Napoleon, learning that Masséna had been obliged to surrender Genoa, feared that Melas would try to escape by the seaboard. He therefore determined to advance at any risk. Going through the Stradella Pass of the Apennines he came into the vicinity of the enemy in the great plain of Marengo. His army was inferior in numbers, and still more inferior in artillery and cavalry. The Austrian commander saw his advantage, and advanced to a furious attack on the morning of June 14. The battle raged with varying fortunes, but near the end of the day the Austrians were everywhere successful, and Melas retired from the field believing that the battle was won. At that moment, however, Desaix arrived with his division, and, heading a furious charge of the heavy cavalry, turned the tide, and changed the disaster into a complete victory. Desaix was killed in the hour of triumph, but the line of Melas's retreat was closed, and the Austrians had no choice but to make terms. Later in the year Moreau overwhelmed the Austrians at Hohenlinden, and was about to march upon Vienna when overtures of peace were made. The Peace of Lunéville (Feb., 1801) confirmed the provisions of Campo Formio in regard to the French frontier along the Rhine, but it was far more disastrous to Austrian interests in Italy. The power of Austria in the Italian peninsula was practically destroyed, and the ascendency of France became complete. Napoleon then turned his attention toward Great Britain. He succeeded in establishing a firm alliance with Russia; but at the critical moment the death of the czar and the victory of Nelson at Copenhagen destroyed his prospects. Negotiations were opened for peace. After months of discussion the Treaty of Amiens was signed in Mar., 1802. Unfortunately the treaty left many important questions unsettled. Great Britain agreed to give back Malta to the Knights of St. John under the protectorate of a great European power, but the conditions were obscure, and contained the seeds of future discord. Great Britain consented to the French status N. of the Alps, but refused to acknowledge the republics in Italy, which were in fact the dependent vassals of France. These refusals and ambiguities made the peace hardly more than a truce. The war, however, had won for Napoleon the respect of Europe, and had confirmed his power over all opponents in France. The success of the war was crowned by an overwhelming majority of the senate and the people creating him First Consul for life.

Napoleonic Reforms during the Consulate.—The years 1802–03 were devoted very largely to that reorganization of the government in which Bonaparte showed his extraordinary power quite as much as he had done in the fields of war. It is true that the Revolution had left the government in chaos, and consequently he was not embarrassed by the resisting power of precedents; but even after every possible allowance is made it will have to be admitted that the years of the First Consulate were remarkable for the number, the far-reaching importance, and the permanence of the changes brought about. The revolution of the 18th Brumaire met with popular favor, and Bonaparte at once as First Consul took the whole system of administrative and executive government into his own hands. In this new position he showed a faculty for organization perhaps never before equaled. His power of calculation, his force of insight, his tireless industry, his stupendous capacity for mastering details, and, above all, his ability at any moment to co-ordinate all these resources and bring them into their place in accomplishing any object he had in view, form one of the most impressive facts in the history of the human race. In a few weeks he reorganized the financial system of the Government, and rapidly brought order out of the chaos of practical bankruptcy. By a wise combination of energy and clemency he altered the chronic rebellion of La Vendée into enthusiastic loyalty. Though in the East he had avowed the Mohammedan faith, he now stopped the persecution of the nonjuring priests, ordered a solemn funeral for Pius VI., threw open the church doors in all parts of France, re-

stored Sunday as a sacred day of rest, and relieved the priests and bishops from the offensive "oath to the state." In less than a year he had secured the support in place of the enmity of the Church, and within the same period he had exterminated the most important of his opponents. Some of the reforms had to do not only with the principles of the Revolution, but with the very foundations of government. The old Bourbon method had been one which centralized all power in the thirty intendants, who were directly accountable to the king. The Revolution had swept away this method and set up a system which Burke characterized as "forty thousand republics." Napoleon reverted to the old method with an improvement. At the head of every department he placed an officer under whom there was a hierarchy of prefects, sub-prefects, and mayors, each dependent upon the person above him, and thus all dependent on the First Consul. The powers of local self-government, though not effaced, were greatly curtailed and controlled. This system, as Napoleon himself said, placed the First Consul in every department of France. His next step was a reform of a similar nature in the courts of justice. The Revolution had swept away the cumbrous Bourbon system and substituted for it an elective judiciary which had resulted in some of the wildest excesses of discord and injustice. Napoleon restored the appointment of judges and made them independent of popular clamor. While strengthening the courts of initiative he provided courts of appeal, by means of which justice was made prompt as well as effective. He also resumed and pushed forward the work begun by the National Assembly of collecting and fusing the laws and usages of the nation into an organic code. This work, like that of Justinian, was intrusted to a body of eminent jurists. The *Code Civil* was published in 1801, but the *Code de Commerce*, the *Code Pénal*, and the *Code d'Instruction Criminelle* occupied the commissioners till near the close of Napoleon's career. What is known as the *Code Napoléon*, which was made up of these four parts, at once took rank as one of the foremost legal productions of history; and its permanence in France has already more than justified the declaration of Napoleon himself that his code would outlive his victories. In his efforts to improve the system of education he was less fortunate. Under the Revolution the National Assembly had decreed that every commune should support a primary school, but from time immemorial the schools had been in the hands of the priests; and, as the revolutionary Government was in no condition to enforce its decrees, the weakening of the clergy had weakened the schools. Napoleon did not provide for supporting primary schools by taxation, and therefore his efforts in their behalf were only slightly successful. For the higher schools he did more; but his method abundantly shows that he had no adequate understanding of the elements of educational success. He endowed a few secondary schools, and some years later he concentrated the whole system for a nation of 30,000,000 of people in the single university at Paris which was made immediately dependent on the central Government. Another element of prodigious power in this work of centralization was the re-establishment in France of the ecclesiastical hierarchy. The National Assembly had swept away this great corporation by the confiscation of its lands and by requiring an elective clergy which should acknowledge supreme allegiance to the state. Under this *régime* the Church had assumed an attitude of active or sullen hostility to the Government. Napoleon now restored the Church in all the most essential of its powers and sealed its restoration by the Concordat which is the basis of all ecclesiastical law in France down to the present day. The Church, however, had been shorn of its endowments, and was made, therefore, strictly dependent on the Government. This action was an element of great power in consolidating and harmonizing the masses of the nation. It severed the Church from the Bourbons and attached it to Napoleon, who depended upon the peasantry for his army. A similar influence, though in another field, was the system of honorary rewards and dignities. He established the Legion of Honor, a national order of merit thrown open to pre-eminent success in every walk of life. It encouraged excellence in all ranks and callings, and was so successful that institutions of the same kind have been established by nearly all the governments in Europe. In Feb., 1800, a general law regulating the organization of local government was enacted, and at about the same date the financial system was concentrated in the newly established Bank of France. While these several reforms greatly tended to establish and consolidate the dictatorship, they conserved harmony and good order, and for the most part retained a permanent place in French government even after the fall of Napoleon. They were not enacted, however, without opposition. The old Revolutionists strenuously opposed the Concordat, and the ardent republicans saw in the general movement a complete overthrow of the revolutionary system. In Dec., 1800, the explosion of a bomb aimed at the Consul's carriage called for decisive action. Napoleon acted with characteristic energy. A hundred and thirty conspicuous opponents were seized, and without trial sent to the penal colony at Cayenne. Moreau, the hero of Hohenlinden, was condemned to imprisonment for two years, but was allowed to escape to America. Pichegru, found strangled in his bed, was either murdered or permitted to commit suicide. Thus the republicans were outdone, and opposition was annihilated. The supremacy of Napoleon was crowned by the declaration that the Senate was henceforth to have constituent powers, thus doing away with the legislative body, and enabling the Senate to make any change in the constitution that might be called for by its master. An open road was thus constructed to an imperial monarchy far more concentrated than was the monarchy swept away by the Revolution.

Causes of the Renewal of War.—In the management of foreign affairs Napoleon was less fortunate. It is now easy to see that he should have avoided vexing and alarming the states of Europe, but he chose the opposite course. He annexed Piedmont to France, made himself president of the Italian republic, and the remainder of Northern Italy a subject province. He reduced the Batavian republic to a dependency, and placed Switzerland under French control by the occupation of Bern. He made the lesser German states his dependencies by his interpretation of the Treaty of Lunéville, and he showed unwonted activity in all the ports and dockyards of France. A report of Sebastiani on the condition of Egypt seemed to take it for granted that the British were to be driven from the country by a new French occupation. The *Moniteur*, the organ of the state, was filled with boastful assertions of French power, and emissaries were dispatched to the British ports to observe and report on their condition and strength. This unwonted activity created general unrest throughout Europe, but it was especially irritating to Great Britain, where public opinion was beginning to oppose the peace policy of the Government. The dispute over the island of Malta was the occasion of the outbreak. Great Britain, in accordance with the Treaty of Amiens, had invited Russia, and a grand-master chosen by the pope, to assume the protectorate of the island, but both had declined. France had been at least lukewarm in suggesting expedients of settlement. Delay and the prodigious increase of French power had, as the British claimed, changed the situation. When the French envoy now referred to the condition at Malta, Lord Hawkesbury, the British foreign minister, hinted that Great Britain might have to take precautions, the state of the Continent had so greatly changed. Napoleon replied by a peremptory demand for the immediate evacuation of the island. While negotiations were pending the *Moniteur* published the report of Sebastiani, the French officer sent to examine the condition of Egypt, which, among other irritating statements, declared that "the country could be recaptured by 6,000 Frenchmen." This was immediately followed by a message of Napoleon to the legislative bodies, saying that Great Britain by herself was unable to cope with France. This was regarded as a direct challenge by all classes in Great Britain, and caused an instantaneous explosion of wrath. Public opinion in Great Britain was greatly aggravated by the absurd demand of Napoleon that the public prints which caricatured him should be suppressed. All attempts to negotiate were unsuccessful, for each refused to accept the terms of the other. Negotiations continued for some months, during which both sides carried on the most active preparations for war. Great Britain finally instructed her ambassador to propose that she should retain Malta for ten years; that the new Italian states should be recognized by her; that French troops should be withdrawn from Holland and Switzerland; and that, if these terms should not be acceded to in seven days, the British ambassador should demand his passports. The French refused the terms offered, whereupon Lord Whitworth demanded and received his passports on May 12, 1803. It is of importance to note that on May 2 of the same year Napoleon, notwithstanding the violent opposition of Talleyrand and of his brothers Lucien and Joseph, sold the territory of Louisiana to the U. S. for the sum of 60,000,000

francs. This transaction, of such immeasurable importance to the U. S., was proposed and pushed through by Napoleon purely for financial reasons. The money received was all devoted to the armament for the invasion of England. The flames of war at once sprang up and soon the whole European world was involved in the conflagration.

The Renewal of War.—Napoleon's first plan contemplated the invasion of England, and preparations were made on a stupendous scale. What he planned will always remain a monument of his comprehensive genius and of his extraordinary gifts in arranging even the minutest details. From the Scheldt to the Garonne along the banks of the rivers vessels were constructed for the purpose of converging at the right moment upon a single point with an army of 160,000 men. The number of vessels so prepared reached the vast number of 2,300, and these were manned by more than 15,000 seamen and 3,000 guns. Before the end of 1804 the shores around Boulogne were skirted with armed vessels ready to put to sea. Meanwhile four great military camps had been formed and the army put into condition for the descent. In Great Britain more than 200,000 men were put under arms, and made ready to repel the attack; but while these preparations were going on, evidences began to abound in France of plots against the life of the First Consul. These had their inspiration partly in the interest of the Bourbons, and partly in the disaffections of the republicans. It was discovered that meetings of the conspirators were frequently held in Paris and Strassburg. The report of a French spy declared that meetings of some of the *émigrés* had been held at the house of the Duc d'Enghien at Ettenheim, in Baden. Napoleon determined to terrify the Bourbon faction by a decisive act. Though Baden was a neutral state, he ordered a body of armed men to enter the territory, seize the duke, and bring him to Paris a close prisoner. The papers that were taken showed no evidence confirming the charges. He was then charged with having been an *émigré*, and with having been opposed in sympathy to the consular government. There could be no answer to such a charge. The duke was taken in the night before a military tribunal selected for the purpose, was given no opportunity for being heard in defense, and before morning was shot. In his last will Napoleon declared that he caused the duke to be "arrested, condemned, and shot because it was necessary for the security, the honor, and the interests of the French people." That the act would excite all the crowned heads of Europe to a new coalition against him does not seem to have entered Napoleon's mind. The event created a profound sensation. Signs of opposition began to show themselves in all parts of Europe. The friends of Napoleon soon saw that prudence required the consolidation of his authority in every possible way. The Tribune and the Senate proposed that he receive the name as well as the power of emperor. The proposal met with the general and enthusiastic favor of the people as well as of the legislative bodies, and the First Consul was crowned as emperor at Notre Dame, Dec. 2, 1804. A little later the emperor visited Italy to be crowned King of Lombardy, and in the course of a few months he made it evident to all of the European powers that he was henceforth to regard the smaller states of Italy and Germany simply as parts of his empire. He either made the political blunder of supposing that this course would not lead to a general coalition against him, or the miscalculation of believing that he could carry on successfully at the same time an invasion of England and a war against continental Europe.

The Austerlitz Campaign.—It was, no doubt, on account of the gathering clouds that on Jan. 2, 1805, Napoleon wrote to the King of Great Britain making overtures of peace. To this letter the Government of Great Britain, now again under the energetic guidance of Pitt, replied that that power could not enter upon any definite negotiations for peace without consulting her continental allies. This answer gave an unmistakable intimation of a new coalition. In the following April a treaty was signed between Great Britain and Russia, and a little later the league was joined by Austria. Prussia, induced by promise of Hanover, was kept neutral. Up to this time preparations for the menaced invasion of England had been unabated. Nelson, with his British fleet, manœuvered so successfully that Villeneuve, with the combined fleets of France and Spain, did not venture to approach for the protection of the transports intended for invasion. In the presence of the British fleet an attempt to cross into England would have been madness. As soon, therefore, as the hostility of Austria was openly declared, Napoleon obscured the failure of his plan of invasion by announcing that the operations of the "Army of England" were to be transferred to Germany. Early in September the camp at Boulogne was rapidly broken up, and the army was turned toward the Rhine. The Austrians, 80,000 strong, under Gen. Mack, about the same time advanced as far as Munich, with the intention of pushing on into France. Napoleon stationed himself at Strassburg, and ordered the larger part of his army around by the north through the neutral territory of Hanover. By a series of brilliant manœuvers he threw his troops between the Austrian army and Vienna. Mack, taken by surprise, was driven into Ulm and forced to capitulate with his army on Oct. 20. On Nov. 13 Napoleon entered Vienna, and established his headquarters in the imperial palace. His situation, however, was apparently by no means free from danger. The violation of Prussian territory had driven Prussia into the coalition, though too late for active service. The Austrian Archdukes Charles and John had collected a force of 90,000 men in Hungary, and a powerful Austro-Russian force was advancing from Moravia. Napoleon very naturally decided to deliver a decisive blow before these armies could be united, and for this purpose he crossed the Danube on Nov. 22 and marched upon Brünn. A series of masterly manœuvers, all executed with astonishing celerity and accuracy, brought the French into a favorable position at Austerlitz. In the battle that followed on Dec. 2 the Austro-Russian force was overwhelmingly defeated. The Emperors of Russia and Austria, compelled to witness the destruction of their splendid legions, saved themselves by flight. An armistice was immediately signed, and this was followed, Dec. 26, by the Peace of Presburg, by which Austria gave her Venetian territory to the kingdom of Italy, her Tyrolese territory to Bavaria, and her Suabian territory to Würtemberg and Baden.

Though Napoleon's Austrian campaign had everywhere been triumphantly successful, his project of invading Great Britain had been thwarted by the annihilation of his fleet at the battle of TRAFALGAR (*q. v.*). On the very day after the capitulation of Mack at Ulm, Lord Nelson, having hurried south as soon as Napoleon started for Austria, had met the combined French and Spanish fleets under Admiral Villeneuve, and of thirty-three line-of-battle ships twenty-four were either captured or sunk, in one of the most memorable naval battles in history. The emperor, therefore, abandoning all present thought of invading England, was able to turn his attention to the consolidation of his power on the Continent. The death of Pitt on Jan. 23, 1806, and the succession of Fox as Foreign Minister, gave temporary promise of peace; but even Fox would not consent to the demands of the emperor, and all hopes of an accommodation were thus brought to an end. For the consolidation of his power he now declared the throne of Naples vacant, and placed upon it his brother Joseph; he created his brother Louis King of Holland, and his brother Jerome King of Westphalia; he raised Bavaria and Würtemberg to the dignity of kingdoms; he consolidated the smaller German governments on the right bank of the Rhine into a confederation under the suzerainty of himself; he raised the subordinate members of his family by marriage to positions of dignity and influence; and the most successful of his generals he elevated to the highest nobility.

The Jena Campaign.—Peace was by no means established. In the summer of 1806 the Government of Prussia discovered that Napoleon was negotiating to restore Hanover to Great Britain, although he had promised that electorate to Prussia as the price of her neutrality. His violation of Prussian territory when advancing to the rear of Mack had given emphasis to Prussian distrust. The current of public opinion, greatly swollen by the letters of Queen Louise and the advocacy of Stein, had finally become irresistible. Prussia had joined in firm alliance with Russia; and the czar in August refused to ratify the treaty with France which had been signed by his representative in Paris. If Napoleon had sincerely desired peace it would have been easy to satisfy Prussia; but he decided to pursue another course, and to act as he had done in the case of Italy and Austria. The French had not yet evacuated Germany since the Austerlitz campaign. The Prussian army was mobilized, but before it could be brought into fighting condition Napoleon struck in upon the rear of his enemy, as he had done at Marengo and at Ulm. The battles of Jena and Auerstädt, Oct. 14, 1806, crushed the Prussian army and gave the conqueror Berlin as the capitulation at Ulm had given him Vienna. As Napoleon advanced toward the east the fortresses established by Frederick the Great capitulated one after another

almost without resistance. The French army was led on to the Vistula, where the terrible battle of Eylau, Feb. 8, 1807, left 12,000 Frenchmen and 15,000 Russians on the field. For the first time Napoleon had fought a great battle in which he was only partially victorious; but his weakened and shattered forces were recruited and manœuvered with characteristic skill, and on June 14, the anniversary of Marengo, at the battle of Friedland the cause of the allies suffered an overwhelming defeat. The Treaty of Tilsit, which was signed in July, 1807, deprived Prussia of nearly half her inhabitants and her territory, and reduced the army to 42,000 men. In this treaty Napoleon overreached his goal, for it was the severity of these terms that made the people of Prussia the most inveterate foes of the conqueror from this time until the final downfall in 1815.

Napoleon now had time to complete the rewards of his most efficient supporters. He had already made Berthier the Prince of Neuchâtel, Bernadotte the Prince of Ponteeorvo, and Talleyrand the Prince of Benevento; he now created four additional hereditary princes and thirty-one hereditary dukes. Of these new potentates, one (Berthier) received more than 1,250,000 francs a year, another (Davoust) more than 750,000 francs, nine others more than 250,000 franes each, and twenty-three others more than 100,000 francs each. Thus it was that loyalty was secured and power consolidated.

Though the invasion of England had been abandoned, Napoleon sought in the course of this campaign to strike an effective blow at British power and influenee by another method. The right to prevent a neutral from trading with an enemy by means of a blockade is conceded by international law; but the blockade must be a real one. It was impossible for Napoleon to blockade British ports; but notwithstanding this fact, he did not hesitate to proclaim by what is known as the Berlin Decree of 1806 that the harbors of neutrals were closed against British ships under penalty of war with Franee, and the confiscation of ships and goods. It was a defiant manifesto, designed to create what he called a "continental system," and to leave Great Britain in commercial isolation. The effort was not successful; for while it exasperated Great Britain into retaliation, it failed to bind the continental nations together.

The Spanish Campaign.—Having remodeled the states on the Rhine at his pleasure and placed members of his own family in power, he now turned his attention to Portugal and Spain with a similar purpose. Portugal defied the Berlin decree by keeping her ports open to British commerce; and Spain was embroiled with domestic diffieulties which afforded an opportunity for interference. In Oet., 1807, two conventions at Fontainebleau provided for the partition of Portugal; for the giving of Brazil to Spain; for giving the King of Spain the title of emperor; and for providing a French army to resist any intervention of Great Britain. On Nov. 30, Marshal Junot arrived with an army in Portugal, and a little later a Freneh force of 80,000 men took possession of a number of fortresses in Spain. The Spanish people, it is true, were indignant at the weakness of the king and the dissoluteness of the queen, but the heir-apparent, Ferdinand, was a favorite, and the popular movement was designed to overthrow the king and place the prinee on the throne. While Napoleon was supposed to support this movement he was welcome; but he soon disclosed another purpose. His course was perhaps the most unfortunate one adopted by him in the whole of his career. Spain for fifteen years had been perfectly subservient to revolutionary France and to Napoleon, and it would not have been difficult by a more moderate policy to have insured peaee and have placed Spain under permanent obligation. Napoleon, however, arranged for a meeting with King Charles IV. and his son Ferdinand, and at the end of a stormy interview extorted from both an abdication. The event was followed by an outburst of indignation in all parts of the country, and an uprising that has seldom had a parallel in history. Napoleon offered the throne to his brother Louis, who, seeing the difficulties, refused it. He then gave it to his brother Joseph. So general and fervid was the opposition that before the summer was over the emperor was obliged to invade the country in person with an army of 180,000 men. Junot was defeated by the British in Portugal, and Spain was everywhere open to communications with Great Britain. The result was not only a determined insurrection by a nation of 11,000,000 of people, but an insurrection everywhere supported by the power and resources of Great Britain. Napoleon may have believed that he could regenerate and improve the bad government of Spain, but he committed the blunder of misjudging human nature, and nothing ean excuse the perfidy of invading the country with an armed force for the ostensible purpose of settling a domestic difficulty, and then demanding an abdication of the king and of the heir-apparent in order that he might impose his own government upon a confiding people. There could be only one result. The Peninsular war, led on the part of the British by Sir John Moore and Sir Arthur Wellesley, and on the part of the French by Napoleon himself and such marshals as Soult, Ney, Lannes, Masséna, and Bessières, continued to drain the resources of Franee until the last of the French were driven across the Pyrenees in 1814.

The Wagram Campaign.—As soon as the magnitude of the Spanish war revealed itself, unmistakable signs of difficulty appeared in the East. Napoleon led his army into Spain and advanced as far as Madrid, where he reinstated Joseph, who had been obliged to flee for his life; but no sooner had he begun the active work of the campaign against Sir John Moore than he was obliged to leave Spanish affairs in the hands of his marshals in order that he might devote himself to the rising discontents in Germany. By appointment he met the czar at Erfurt and completed the negotiations for an alliance that had been secretly begun at Tilsit. The most serions source of difficulty, however, was in Austria. That Government had so far recovered from the Austerlitz disaster as to be able to put an army of nearly 400,000 men into the field. Affairs in Italy were in such condition that nearly all the Austrian troops could be used N. of the Alps. The course of Austria was inspired by the insurrection of Hofer in the Tyrol, the occupation of the French in Spain, the rising hatred of Napoleon in Germany, and especially by the policy of France now revealed of extending the power of Russia in the south. War was begun in Apr., 1809. Napoleon was compelled to fill the ranks of his army with conscripts from France and from the confederation of the Rhine. He entreated the czar to send a re-enforcement from Poland to the Galician frontier, but his request was only partially and tardily complied with. The Archduke Charles, now in supreme command of the Austrian forces, advanced with an army of 150,000 men across the Inn and the Isar. The Freneh army was widely scattered, Davoust being at Ratisbon, Masséna at Ulm, and Oudinot at Augsburg. In the face of a powerful and enterprising enemy it would have seemed impossible to bring them together. The movements whieh now extricated the French from their positions constitute one of the most remarkable of Napoleon's military exploits. With an army greatly inferior in point of numbers and experience, Napoleon not only reseued his forces from a perilous position, but defeated the enemy in the decisive battles of Abensberg and Eckmühl, and drove him across the Danube. The French entered Vienna on May 13; but the army of the Arehduke Charles was still far superior to that of Napoleon. The campaign that ensued was one of the most interesting in all the Napoleonic period. Impatient to crush the enemy by another Austerlitz, the conqueror crossed the Danube into the great plain of the Marehfield, a little N. E. of Vienna. The arehduke attacked with fury on May 21 and 22 at Aspern and Esling, and finally drove the French back to a precarious position on the island of Lobau. Here the superhuman energy and resources of Napoleon were shown as nowhere else in all his career. His army was huddled in upon an island, the bridges of which were either broken down or in command of a vietorious foe; but instead of asking for terms or weakening his efforts, he kept up an attitude of the most vigorous and aggressive defiance. On the night of July 4, under cover of a false attack and a furious cannonade, he threw six bridges across the river, and marehed 100,000 men to the left bank. In the course of the 5th the Arehduke Charles, baffled and almost paralyzed, brought his forces into line for battle. The armies were the largest that had ever confronted eaeh other in modern warfare. Napoleon had received re-enforeements until he now had 160,000 men and 600 cannon, while the army of the archduke consisted of about the same number of cannon and nearly as many men. In the battle of Wagram the French were victorious, but as the Austrians began their retreat the advance guard of the long-expected army of the Archduke John came in sight. Had he been a few hours earlier the end of the battle might have been like that of Waterloo. An armistice was agreed to at Znaim on July 11, and the Treaty of Schönbrunn was signed Oet. 14. By this act the humiliation of Austria was made nearly as complete as was that of Prussia by the Treaty of Tilsit. More than that, the

terms of the treaty, by raising the Polish question, set at nought the agreements that had been made with the czar at Tilsit and Erfurt. The great signifieanee of the treaty was the fact that Russia was eonverted by it into an enemy, and the Russian war began to loom up as soon as the Austrian war was brought to a elose. The alienation was soon converted into something like bitterness by the divorce of Josephine and the subsequent marriage of the emperor. The emperor's poliey of an hereditary empire required that provision should be made for a succession to the imperial throne. To this end Napoleon had for some time contemplated a divorce. On his return to Paris after the treaty of Sehönbrunn, he determined to earry out this poliey without delay. He first asked the ezar for the hand of his sister, but a little later withdrew the offer and eontraeted with the Emperor of Austria for the Arehduehess Maria Louise. By this marriage, Austria, after being weakened and humiliated, was practieally adopted as a dependent state.

The Russian Invasion.—The emperor now had leisure and opportunity for the further development of the plans he had adopted in 1806. With this end in view he entered upon a eommereial policy whieh sought at once to insure the independence of continental Europe and the destruetion of British supremaey. Perhaps the latter was the eause of the former; but whether his British poliey was the parent or the ehild of his poliey on the Continent, he found he eould not secure continental independence without elosing additional ports by means of additional annexations. He annexed Holland and eut it up into nine Freneh provinees. He rounded out his interior frontier by annexing the kingdom of Westphalia with all the territory added from Prussia after Tilsit. He extended the northern maritime border so far as to inelude Oldenburg, whieh was then under the protectorate of Russia. These events, taking plaee in 1809, 1810, and 1811, eonvineed Russia that there was no possibility of peaee except by erushing the power of Napoleon, or by an acknowledgment of a Napoleonic suzerainty over the whole of Western Europe. Great Britain had taken that position early in the century. The Austrian marriage, the birth of a Napoleonic heir (May 11, 1811), the looseness with which Napoleon had interpreted the obligations he had entered into with the ezar at Tilsit, the seizing of the northern provinces—these were enough to eomplete the evidenee, and so taken together were the eause of the war with Russia. Napoleon now had Austria and Germany under his eontrol, and entered into the war with the assistanee of their troops. Sweden, though now ruled by Bernadotte, formed an alliance with Russia. The great eontest therefore brought together Great Britain, Sweden, and Russia on the one side, France, Austria, and the rest of Germany on the other. Great Britain at war with the U. S., and still in the thiek of the contest on the Spanish Peninsula, could take no prominent part in the great struggle now about to begin. Napoleon, with the help of his allies, was able to begin the invasion with an army of more than 600,000 men.

The general plan of the eampaign was like all the eampaigns of Napoleon in its aggressive features, but it was fatally defeetive in its failing to take into aeeount the eondition of the invaded eountry, and the spirit of the invaded people. From the very first the ezar refused to negotiate for peace so long as the Freneh were upon Russian soil. Eylau and Friedland, not to speak of Kesseldorf and Kunersdorf, had abundantly shown that Russian soldiers were among the most formidable and persistent fighters of Europe. It is one of the most singular faets in the career of Napoleon that he did not pereeive the elements of the situation, but regarded Russia as he had regarded Italy, Austria, and Germany. His reeent experience in Spain should have taught him that the enemy would only have to fall baek in order to lure him on to eertain destruetion, as Peter the Great had lured on the conquering armies of Charles XII. The failure of Napoleon's Russian eampaign is often attributed to the unwonted severity of the winter, but if the winter had been no more severe than usual, the result must have been substantially the same. The number returning would have been somewhat greater, but the failure of the expedition would have been seareely less.

Napoleon advaneed aeross the Niemen on June 24, 1812. That he was so late in beginning the campaign, and that he did not leave Vilna until July 16, shows either that he had no adequate understanding of what was before him, or that mueh of his old energy was already gone. The forees of the enemy were divided into three armies, neither of whieh eould be brought to a deeisive engagement. Bad roads and huge baggage-trains delayed the advance. The French pushed forward with the main line between the rivers Dwina and the Dnieper, evidently intending to strike at Moscow. Napoleon's method of making war support itself told rapidly upon Russian patience, and the elamors for a battle at length became irresistible. The ezar, in answer to the demands for a vigorous resistanee, plaeed Kutusoff in eommand of the entire Russian force, a faet that indicated a ehange of poliey. The battle of Borodino, one of the most sanguinary of modern times, followed on Sept. 7, and left about 80,000 men on the field. The French were vietorious; but they did not press their advantage, and relatively they were no stronger than before. On the 14th they entered Moscow, but were surprised to find it praetically deserted. The next night fires broke out in all parts of the city. These, begun by the governor of Moseow before the evacuation, had probably been kept up by Russians, partly in the interests of patriotism and partly in the interests of plunder. Napoleon was obliged to evacuate the Kremlin almost immediately after occupying it. What was next to be done? Would the ezar negotiate for peaee? The pressure upon him by faint-hearted eouneilors was very great; but Stein, a representative of Germany, and Jaekson, a representative of Great Britain, urged the opposite course with so mueh cogeney that the ezar stood firm. Napoleon hesitated six weeks before leaving Moscow. After blowing up the Kremlin he abandoned the old capital Oet. 20. Reeruits for the Russian army were eoming in from every quarter, while the foree of Napoleon was eonstantly growing weaker. He turned southward in the hope of rieher fields, but he could not bring the enemy to a deeisive battle, and was obliged to return to the north. He reaehed Smolensk on Nov. 9. Winter eame on with unusual severity to eomplete the work already far advaneed. The sufferings of the retreat form one of the most melaneholy pages of history. As in Egypt and in Spain, Napoleon left the defeated army in the hands of subordinates and returned to Franee. Passing through Poland and Germany in disguise he reaehed Paris in the early part of Deeember. After unparalleled sufferings, a remnant of the army tottered into Vilna on the evening of the 6th of the same month. It is estimated that by battle, by disease, by starvation, and by frost, half a million men had perished.

The Leipzig Campaign.—The disasters of the Russian campaign seemed to precipitate the distrust and diseontent that were now everywhere prevalent. Even in France the old fervor for the emperor was gone. The eonseriptions had drained the eountry of able-bodied men, and the levies for the great Russian movement had met with so much opposition that young men were willing to maim themselves in order to be exempt from the service. Napoleon's departure for the war evoked no enthusiasm, and his return was met with ominous indifferenee. Still his genius was able to prevent any general uprising in Franee. In Germany the situation was far different. Though Prussia and Austria, as well as the eonfederation of the Rhine, had been drawn into the Russian expedition, they had fought without zeal, and were probably not dissatisfied with the result. The Prussian contingent in the north and the Austrian in the south had not shared the fate of the Freneh. The signal for a general revolt was the course of Prussia. Field-Marshal York, eommanding a Prussian wing of the invading army, and seeing that the tide had turned, abandoned the eause of the Freneh, and put himself at the head of the opposition to Napoleon. The movement was eontagious and soon amounted to a popular uprising throughout Prussia. It was now found how effeetually the Napoleonie requirement that the army should be kept down to 42,000 men had been avoided. By terms of short serviee and rigorous drill nearly all the young men in the eountry had passed into and out of the army, and had reeeived a good military training in the course of the six years that had elapsed since the Peaee of Tilsit. In a few months the Prussian army amounted to some 250,000 men. In Austria the movement was slower, owing to the bond that had been established by the marriage and the birth of an heir; but Napoleon twiee refused definite offers by Austria, looking toward the establishment of peaee on a basis that would have seeured Freneh retention of a large part of the conquered territory. The result of these refusals was that Austria joined the new eoalition with Prussia and Russia. The eampaigns that followed in 1813 were intrieate, and for a long time without decisive results. It was the general poliey of the allies, inspired by Seharnhorst, the organizing military genius of

Prussia, to avoid general engagements, except when they could be fought with manifest advantage. The battles of Lützen, Bantzen, and Dresden gave Napoleon some advantage, but were not followed up with energy, and were by no means decisive. Blücher met and routed Ney at the Katzbach. Napoleon formed a grand design of holding Schwartzenberg and the Austrians in check with the corps of Murat in the south, while he advanced rapidly upon his allies in the north, and, after defeating them, returning and crushing the Austrians; but the design could not be carried out because of the inherent weakness of the situation. At the decisive moment Bavaria threw off her allegiance to Napoleon and joined the allies, Westphalia repudiated Jerome, and the confederation of the Rhine showed such unmistakable signs of disloyalty as to threaten the emperor's communications with France. For these many reasons the plan had to be abandoned. Murat was unable to keep Schwartzenberg in check, and Blücher, followed by Bernadotte, vigorously pressed back the forces from the north. The allies rapidly concentrated about Leipzig, and Napoleon was compelled either to fight a great battle or to withdraw. He decided to risk a general engagement. His force at Leipzig was about 160,000 men, while that of the allies, Austrians, Bavarians, Russians, Prussians, and Swedes exceeded 300,000. The allies began the attack on the morning of Oct. 16, and the battle continued until the 19th. The defeat was so disastrous to Napoleon that he was able to rescue only about 60,000 men from the wreck of his army. The garrisons on the Elbe, the Oder, and the Vistula were left unsupported and surrounded by enemies, so that the total loss to the French could hardly have been much less than 175,000.

The Invasion of France.—After the disastrous battle of Leipzig Napoleon slowly made his way back to the Rhine, while his flanks and rear were constantly harassed by the forces of Blücher and Schwartzenberg. Austria attempted to negotiate for a permanent peace on the basis of the "natural boundaries," i. e. the Alps, the Pyrenees, and the Rhine; but Napoleon was unwilling to abandon Germany, and so lost the last chance of saving Holland, Belgium, Cologne, Mentz, and Manheim. In the westward movement that followed, Blücher crossed the Rhine at Manheim with about 80,000 men, and Schwartzenberg at Basel with no less than 160,000. The defensive campaign now fought by Napoleon gave abundant evidence that his masterly strategic ability was in no way diminished. Wellington, who was one of the most discriminating of military critics, characterized it as "very brilliant, probably the ablest of all his performances." In a general way his policy may be described as a determination to prevent the two invading armies from uniting, and by keeping between the two, striking out to the right and left as there might be opportunity. The forces of the French probably did not exceed one-third the numbers of the allies. At La Rothière Napoleon was defeated, and his cause now seemed hopeless. Blücher pushed on with characteristic energy, Schwartzenberg with characteristic caution. With almost unprecedented force and skill the mighty Frenchman threw his army upon the advancing forces of Prussia, and not far from Troyes defeated them three times in succession, between Feb. 10 and 14. He then turned upon the hosts of Schwartzenberg, which were advancing along the Seine on the way to Paris, and defeated them at Nangis and Montereau after a series of movements which showed extraordinary skill. An armistice followed in the closing days of February, but the enemies could not agree upon terms of peace. The allies had discovered that Napoleon was now supported with no enthusiasm by the French, and they therefore demanded that the boundaries should be established on the basis of the France of Louis XVI. The emperor scornfully refused to consider these terms, and the war accordingly was renewed. Blücher had recovered and united with the Austrian force on the Seine. Napoleon fought two disastrous battles at Craonne and Laon, in which he lost nearly a fourth of his army. He now adopted a course which could hardly have been the result of anything but desperation—he threw himself in the rear of the enemy and called for re-enforcements from the troops shut up in the fortresses along the Rhine. This movement left the way to Paris open for the allies. Having already discovered a formidable conspiracy in the city, led by Talleyrand, to repudiate Napoleon, they did not hesitate to march directly upon the capital. Marmont and Mortier made an honorable but fruitless defense, and on Mar. 29 the united armies reached the heights of Montmartre. The capitulation was signed on the evening of the same day. Meanwhile Napoleon, finding no forces to meet him in his eastward movement, and fearing that the allies were marching upon Paris, turned westward once more and reached a village near Fontainebleau before, on the evening of the 30th, he heard the terrible news that the capital was in the hands of the enemy. He sent an embassy at once to treat for peace, but the allies were in no haste. Strange scenes in Paris met the eyes of the envoys. A revolution was everywhere going on for the purpose of overthrowing Napoleon and reinstating the Bourbons. Talleyrand assured the allies that public opinion was ready for a complete repudiation of Napoleonic authority. The czar, smarting still under the remembrances of 1812, was in condition to dictate the policy; and answer was finally returned that the allies would not treat with Napoleon or with any one of his name. The emperor had gathered about him at Fontainebleau an army of 80,000 men, and now prepared to renew the attack; but the extent to which the poison of discontent and distrust had permeated all branches of the service, as well as of the Government, was now revealed. While Marmont himself was treating with the allies as an envoy of Napoleon, his corps, 20,000 strong, deserted the standard of the emperor and passed over to the enemy. Even worse than this, the Senate, which ever since 1804 had been his subservient tool, now proclaimed that Napoleon had forfeited his crown. The populace tore down the emperor's statue from the column of Austerlitz, and evidences of his name were rapidly effaced. Seeing that the contest could not longer be carried on without civil war, the emperor signed an unconditional abdication on Apr. 6, 1814. The evidences of defection on the part of the officers he had raised to power tormented him with the impression that he was forsaken and execrated by mankind. In a moment of anguish he swallowed poison, but the dose did not prove fatal. The allies decided to place the Comte de Provence on the throne as Louis XVIII., and to banish Napoleon to the island of Elba. Bidding a touching and memorable farewell to the soldiers of his guard at Fontainebleau, he was soon on his way to the little island in the Mediterranean. As he passed through the towns that had been made desolate by the commercial destruction of his continental system, he was denounced as a monster of crime, and the cause of all the sufferings of the French people. At Avignon the crowd attacked the carriages and wanted to throw him into the Rhône. He was obliged to disguise himself, and more than once his life seemed to be in extreme danger.

The Waterloo Campaign.—Scarcely had Napoleon landed on the island of his exile when new troubles broke out in France. Louis XVIII., and those he called about him, not only re-established many of the most offensive features of the old Bourbon government, but unsettled domestic affairs, played havoc with the positions of public men, and threw the titles of estates into dire confusion. These changes, so sudden and intolerable, were enough in themselves to suggest a new revolution. Meantime the old soldiers, who had been left in the garrisons or as prisoners in Germany, probably 300,000 in number, came streaming back into France with their enthusiasm for their chief unabated. The congress at Vienna, called to settle all disputed questions arising from the new conditions, added to the discontents. Meeting in September, the plenipotentiaries passed the whole of the winter without completing their work, but as the months passed on it became apparent that France would in the end be humiliated and the great powers would be greatly enriched. In all these facts Napoleon saw what he thought to be an opportunity to revive the old loyalty to himself. He formed the desperate resolution to abandon Elba and place himself at the head of the malcontents. Setting sail with about 1,100 soldiers on Feb. 25, 1815, he landed Mar. 1 near Cannes. He had not misjudged the feelings of the old soldiery, for he was at once, wherever he appeared, hailed with acclamations of joy. On Mar. 13, at Lyons, he issued an imperial decree dissolving the chambers established by Louis XVIII. and summoning an extraordinary meeting in the Field of May. On Mar. 19 the king left Paris; on the 20th the emperor arrived. Although the people generally maintained a sullen silence, the soldiers were enthusiastic. Many of the old commanders flocked to his side, and he soon had an army of more than 100,000 men; but, as so often before, he had not estimated the powers of his enemies aright. On Mar. 13 the news of his landing in France reached the representatives of the powers at Vienna. They at once forgot their differences and proclaimed

him "an enemy and disturber of the peace of the world." On the 25th the new coalition was signed, and the troops everywhere marching toward home, were ordered to halt and fall into line for the coming campaign. The allies put at once 700,000 men into the field, and the reserves at their disposal were probably twice as many more. Napoleon early in June commanded about 200,000. When the campaign began, on June 12, the emperor's force numbered 122,401. The allies consisted of Great Britain, Prussia, Russia, and Austria, besides the subordinate states of Germany, and it is evident that, whatever the result of the first great battle, the complete overthrow of the emperor could not now long be postponed. Napoleon advanced with characteristic rapidity. His plan was to strike in between his enemies, as he had so often successfully done before, and defeat them individually before they could unite. The army under Wellington, consisting of British, Hollanders, Belgians, and Germans, numbered 105,950 and was stationed at Brussels. The Prussian army of Blücher, numbering more than 116,000 well-disciplined troops, was approaching from the E. to join his British ally. Napoleon's purpose was to prevent their union and to defeat first the one and then the other. On June 16 the French and Prussians fought at Ligny, but the Prussians, though defeated, were able to withdraw from the field in good order. Napoleon now made the mistake of supposing that Blücher withdrew to the E. by way of Namur, while in fact he took the road N. leading to Wavre, a village about 8 miles E. of Waterloo. Marshal Grouchy, with a strong French force of about 33,000 men, was ordered to pursue Blücher and prevent his junction with Wellington. Grouchy naturally took the Namur road instead of that to Wavre. The mistake at Ligny led to another that was still more important. After the battle of Ligny, Napoleon's army, only about 15 or 18 miles from that of Wellington, if the old-time energy had been shown, could have overtaken Wellington by Genappe and Nivelles in time to fight the battle on the 17th. The night of the 16th Napoleon passed at Fleurus, a village about 3 miles S. of Ligny, though the left of his army, under Ney, was at Quatre Bras. The delays that now occurred have baffled many of the critics, but the most recent investigations have shown that Napoleon was so overcome with fatigue and illness on the evening of the 16th that he went to bed immediately after the battle, and did not allow himself to be disturbed till late on the morning of the 17th. He reached Ligny about noon, where he heard that Blücher had moved toward the N. Going to Quatre Bras early in the afternoon, he learned that Wellington had fallen back to the high ground S. of Waterloo. Furious rains retarded the movement of the army, but before dark the heads of the emperor's columns reached the hills in front of La Belle Alliance, less than 2 miles S. of Wellington's line. If, in the course of the night, the army had moved forward so as to begin the attack at daybreak, the result might have been different, but, notwithstanding the fact that Napoleon knew of Blücher's movement, the French army was so slow in coming into line that it was noon of the 18th before the battle began. The delay is not very satisfactorily explained by Napoleon's over-confidence in his own destiny and his underestimate of the power of his foes; and it can not properly be attributed to the rain, since the defeated army of Blücher was able to advance a much greater distance over inferior roads. It is evident that the Napoleon of Waterloo was not the Napoleon of Marengo or Austerlitz. When the attack began the French columns were thrown against the British squares with the fury of desperation. Attacks were repeated on the British right, on the left, and on the center. About four o'clock the imperial forces captured the important strategic point at La Haye Sainte. A gap was now opened in the British lines, and Napoleon followed up the advantage by an attack of the guard; but the head of the Prussian columns, under Bülow, had already reached the field, and at this moment Blücher's veterans came on as an irresistible re-enforcement. The Prussian force charged upon the French right with impetuosity. The French forces were thrown into some confusion, when Wellington ordered a general charge along the whole line. This movement not only decided the day, but drove the imperial army from the field. The pursuit was followed up with so much energy by the victors that the French army was shattered in pieces, and the fragments were sent flying in all directions toward the frontier. Napoleon himself hastened to Paris to make an appeal to the chambers, and, if possible, to repair the crushing disaster. His appeal fell on insensible ears. There was nothing left for him but abdication.

Final Abdication, Banishment, and Death.—He proclaimed his son Napoleon II., but, notwithstanding this fact, the chambers set up a provisional government. The allies, under the impetuous counsels of Blücher, pressed on to Paris. Napoleon saw that he could do nothing to resist the current, and, accordingly, he decided to embark for America; but on reaching La Rochelle he found the harbor thoroughly guarded by British cruisers, and so changed his purpose. On July 15 he placed himself under the flag of Great Britain, and was received on board the Bellerophon with high honors. At the same time he wrote a letter to the prince regent declaring that he "committed himself to the protection of the laws of the most powerful, the most persevering, and the most generous of his foes"; but the coalition had learned a lesson at Elba. In a few days the British Government decided upon its course. The dignified protest of the emperor was disregarded, and early in August the great exile was on his way to the rocky island of St. Helena, in the Southern Atlantic, where, after six years of mental and physical distress, he died, May 5, 1821, after much suffering, from an ulcer in the stomach. In his last will he distributed his fortune with munificent forethought, and expressed his desire that his remains might "repose on the banks of the Seine amid the people whom he had loved so well." This wish was respected by the British Government, but the remains were not removed until 1840. In that year the "solitary tomb under the willow-tree was opened, the winding sheet was rolled back with pious care, and the features of the hero were exposed to the view of the spectators. So perfectly had the body been embalmed that the features were undecayed, the countenance serene, even a smile on the lips, and his dress the same, since immortalized in statuary, as when he stood on the fields of Austerlitz and Jena." The remains of the mighty dead reached Paris early in December, and on the 15th, followed by a procession of 600,000 people, were deposited in their final resting-place under the dome of the Church of the Invalides on the banks of the Seine.

General Estimate of his Career.—Taken all in all, Napoleon was by far the greatest of the modern masters in the art of war. In those military combinations which are known as strategy he has never had an equal, and he was so consummate a master of details that he could often predict to a day or an hour the time when a remote result would be accomplished. By a kind of inspiration or intuition he was able to detect the weakest point in the policy of the enemy, and he had unrivaled skill in throwing himself between the opposing forces and beating them in detached parts. The boldness and swiftness of his movements often stunned and almost paralyzed his foes. If he met with reverses, he was often able to conceal them by some achievement that seemed to cover everything with a blaze of glory. By means of his bulletins and reports he kept an impression of his invincible power in the minds and imaginations of the people, and it long seemed to many of the thoughtful minds of Europe that his imperial system would be permanently established. Stupendous as were his successes, a careful analysis of his career will show that his failures were still greater. It is not probable that at the beginning of his career he had any clearly defined policy in view. He was, in a very exceptional sense, a product of revolution, and yet he was so far from having sympathy with revolutionary ideas that he reinstated many of the most offensive features that the revolution had overthrown. When he came into the revolutionary current and sought to control it, he saw that the most effective way to wield all the forces of France was to unite them against the traditionary foe of the nation. During the eighteenth century France had been almost constantly at war with Great Britain. The result had been humiliating to the French in the extreme. William III. and Marlborough had beaten the French on the Continent; and the statesmanship of Chatham had accomplished the stupendous result of driving the French out of America and out of India. A general hatred of the British was as dominant a factor in French life from 1775 to 1800 as was hatred of the Germans during the generation following 1870. Connected with this hatred was a natural desire to recover what had been lost. When Napoleon came upon the scene, France and Great Britain were at war. Napoleon found in this fact the greatest of opportunities. His Egyptian campaign was designed primarily as a blow at British power in the East, and its design, as well as its failure, was made all the more conspicuous

when he sent Sebastiani to explore the country with a view to a new attack. The refusal of Great Britain to give up Malta in consequence of these new revelations led, as we have seen, to a renewal of the war with the same purpose in view. The colossal preparations for the invasion of England followed; but Pitt succeeded in forming a continental coalition, and France was now obliged to fight not only Great Britain but Austria and Russia as well. As the French fleet had been unable to keep Nelson from guarding the Channel, Napoleon saw that the chances of a successful invasion were daily becoming less and less, and accordingly he changed his purpose and determined to strike the British allies instead of Great Britain herself. Ulm and Austerlitz concealed the defeat at Boulogne, as Marengo had concealed the defeat in Egypt. The war with Prussia, which began with Jena and ended with Friedland and Tilsit, humiliated the people of Frederick the Great, and by so doing prepared the way for the Nemesis of Leipzig and Waterloo; but even the tumults of this great war did not turn Napoleon for an instant from the line of his great purpose. The annihilation of the French navy at Trafalgar showed the great conqueror the utter futility of renewing the project of invasion; but the Berlin decree was aimed at the same result. By destroying commercial relations with continental markets he believed that Great Britain could be subdued; but in order to accomplish this purpose he must close all the ports of Europe. The Spanish Peninsula and the Russian Baltic ports were still open. The Spanish war was brought on by sending his brother to Madrid and Junot to Portugal for the purpose of completing the blockade in the Peninsula; and he brought on the Russian war, with all its horrors, by insisting upon a closing of the ports of Oldenburg. The failures of the Spanish and the Russian wars, among the most stupendous in history, were but the crowning failure of his policy in regard to Great Britain. Even this was not all. The failure of Napoleon in regard to France was no less complete. It is true that during the consulate and early empire he wrought important reforms that have been permanent; but it may well be doubted whether the most of these reforms were not the natural fruit of the Revolution. In making up our judgment it must not be forgotten that a great national upheaval or disaster, followed by a restoration, is always a period of great reform. Greece after the Persian invasions, Great Britain after the overthrow of the Stuarts, Prussia after Tilsit, even France after Sedan, give us intimations of what was the natural sequence of the Revolution of 1789; but whatever opinion may ultimately come to prevail in regard to the administrative reforms of the Napoleonic period, it will have to be admitted that what he fondly called his continental policy was a complete failure. In Italy, in Spain, in Switzerland, and in Germany his work perished with his overthrow. He found France in the peaceful and unquestioned possession of Belgium and the left bank of the Rhine, and he left it shorn of much of the richest and most populous portion of the realm. It was as the fruit of his policy that Cologne, Bonn, Coblentz, Mentz, and all the rich intervening territory which for twenty years had belonged to France, became permanently a part of Germany. It was not alone or even chiefly in losses of a material nature that the baneful influence of Napoleon's career left its impression on France. Far more damaging was the fact that it gave to the people those erroneous beliefs, unwholesome sentiments, and false ideals in which were bound up all the misfortunes of the second empire and the war of 1870.

AUTHORITIES.—Our knowledge of Napoleon was greatly modified by the publication, under the authority of the second empire, of the *Correspondance de l'Empereur Napoléon I.*, in thirty-two volumes 4to. Unfortunately, however, the published portion of the correspondence is by no means complete. The editors were under instructions to give to the public only "what the emperor himself would have given to the public had he survived himself." Of the entire correspondence in the French archives, numbering about 80,000 letters, only about 30,000 are included in the published collection; but the published letters have thrown new light on almost every important event of Napoleon's life. The most important of the systematic works that have received the benefit of these letters and dispatches are: Lanfrey, *History of Napoleon I.* (4 vols.); Jung, *Bonaparte et son Temps* (3 vols.); Taine, *Modern Régime*; Seeley, *Short History of Napoleon the First*; Morris, *Napoleon, Warrior and Ruler*; Ropes, *The First Napoleon*; Ropes, *Waterloo*; Gardner, *Quatre Bras, Ligny, and Waterloo*; Browning, *England and Napoleon in 1803*. Of the more elaborate standard works published before the *Correspondance*, Thiers, *Consulate and Empire* (20 vols.); Jomini, *Political and Military Life of Napoleon I.* (4 vols.); and Alison, *History of Europe from 1789 to 1815* (14 vols.), are the most important. Of the almost countless *Mémoires* the most worthy of note, as throwing important light on the period by personal observers, are those of d'Abrantès, Rémusat, Talleyrand, Metternich, Marbot, Pasquier, Montholon, Gourgaud, Bourrienne, de Méneval, Las Casas, O'Meara, Marmont, Masséna, Sachet, de Ségur, and Miot de Melito.

C. K. ADAMS.

Napoleon II., FRANCIS JOSEPH CHARLES: the only child of Napoleon I. by Marie Louise of Austria; b. in the Tuileries, Mar. 20, 1811, and baptized June 9 as King of Rome. After the defeat at Waterloo, Napoleon I. abdicated in favor of his son, and proclaimed him Emperor of the French (June 22, 1815) under the title of Napoleon II., but the allied powers paid no attention to this proclamation. He was educated in Vienna, where he was known as the Duke of Reichstadt, from a small estate in Bohemia. He was instructed in military science, and in 1830 was raised to the rank of major. In Apr., 1832, he was suddenly seized with consumption, and died at Schönbrunn, July 22, 1832. As Napoleon III. ascended the French throne, the Duke of Reichstadt is reckoned among the French sovereigns by the Bonapartists and known as Napoleon II., though he never occupied the throne.

Napoleon III., CHARLES LOUIS: Emperor of the French; the youngest son of Louis Bonaparte, King of Holland, and Hortense Beauharnais, the stepdaughter of Napoleon I.; b. in Paris, Apr., 20, 1808. The parents lived separately, the children with the mother. After the fall of Napoleon I., Queen Hortense repaired in 1816 to Arenenberg in Thurgau, and Louis attended for eight years the gymnasium of Augsburg, and after 1824 for some time the military school of Thun. On the dethronement of the Bourbons by the revolution of 1830 he took an active part in public affairs. He joined in the unsuccessful revolt of the Italians against the papal rule in Romagna and afterward returned to France, but the law exiling the Bonapartes was still in force and he was obliged to leave the country. After the death of his elder brother in 1831, and of the Duke of Reichstadt in 1832, he became the heir of the house of Bonaparte. A sort of conspiracy in Strassburg proclaimed him emperor Oct. 30, 1836, but only for two hours. He was arrested and sent to the U. S. without trial. He returned to Switzerland in 1837, just before the death of his mother, and spent the next two years in London, where he was generally liked, though he inspired no great respect for his abilities. On Aug. 6, 1840, he landed at Boulogne with fifty men and conquered the toll-gates. This time, however, he was sentenced to imprisonment for life, and he remained in the citadel of Ham till May 25, 1846, when he succeeded in making his escape. He bore his imprisonment with courage, spending much of the time in writing papers on political questions. His pamphlets *Réveries Politiques* (1832) and *Des Idées napoléoniennes* (1839) had already appeared, and while at Ham he published *De l'Extinction du Paupérisme* (1844). After his escape he again went to London, where he lived till 1848, when the February revolution in Paris brought his name into prominence. He was elected to the Assembly from Paris and from three departments. On Sept. 26 he took his seat, and on Dec. 20 was elected president of the French republic by a majority of over 5,000,000. Soon, however, a quarrel arose between him and the Assembly, the latter suspecting him of an intention of overthrowing the constitution, while he in turn maintained that the Assembly opposed all his plans for promoting the welfare of the people. The trouble finally culminated in his masterly but unscrupulous seizure of power by the *coup d'état* of Dec. 2, 1851. On that day Paris found its walls placarded with proclamations to the effect that the president had discharged the Assembly, charging it with being the "hotbed of sedition," and appealing to the people in support of the course he had taken. All civil and military officers likely to oppose his scheme were then arrested, the army, which was hostile to the Parisian populace, was skillfully disposed in the streets, and finally the brutal and needless massacre of the crowds on the boulevards on Dec. 4 completed the work of overawing the city. Reports that Paris enthusiastically approved the president's course were dispatched to the provinces, and on Dec. 20–21 the people of France were called upon to vote on the questions as to

whether or not the course of the president should be sustained, and whether he should be authorized to draw up a new constitution and to retain the presidential chair for ten years. A negative answer would have meant temporary anarchy, and the result of the vote was an almost unanimous acceptance of the proposals submitted, the dissenting minority numbering only 640,000 out of a total of 8,000,000 votes. From this time on he possessed in effect arbitrary power, and on Dec. 2, 1852, was proclaimed emperor, a second plebiscite having resulted in a still larger majority in his favor than the first. On Jan. 30, 1853, he married Eugénie de Montijo, and Mar. 16, 1856, she bore him the Prince Imperial, who died June 1, 1879. For the first ten years of his reign he was a conspicuous and at times a brilliant figure among European sovereigns. The Crimean war (1854–56), which was only a half success, immensely expensive, and small in its results, nevertheless added to the military reputation of France, and the Italian war (1859), although disappointing to the Italians on account of their failure to secure Venice, made him immensely popular. The Mexican war (1862–63) was showy enough, in that it gave him a crown to dispose of, but after Maximilian's overthrow and death people began to view the emperor's policy with some suspicion, and although he entertained Europe well enough by the opening of the Suez Canal, the World's Exposition, the rebuilding of Paris, by congresses and visits, France began to lose something of her prestige in foreign relations. Both in the Danish war of 1864 and in the war of 1866 Napoleon's policy betrayed weakness and inconsistency, and its results were humiliating and disappointing to France. One of the chief motives for the fatal war with Germany in 1870 was the desire to strengthen the empire by an access of military glory. Napoleon, who was then slowly dying of an incurable disease, seems to have been the victim of gross misrepresentations as to the resources of France and her readiness for war. During the contest he was misled by his advisers and urged on to rash measures by the dread of a popular uprising against his government. He was made prisoner with his entire army at Sedan, Sept. 2, 1870, and sent to the castle of Wilhelmshöhe, near Cassel, whence he afterward removed to England. D. at Chiselhurst, in England, Jan. 9, 1873. Among Napoleon's other writings are *Histoire du Jules César* (1865–66); miscellaneous works published under the title *Œuvres de Napoléon III.* (1854–69); and a collection of posthumous works, *Œuvres posthumes* (1873). See Delord, *Histoire du second empire* (1869–75); Gottschall, *Napoleon III., Eine biographische Studie* (1871); von Sybel, *Napoleon III.* (1873); Jerrold, *The Life of Napoleon III.* (1877); Hugo, *Histoire d'un Crime* (1877); Simson, *Die Beziehungen Napoleons III. zu Preussen und Deutschland* (1882); C. E. de Maupas, *Story of the Coup d'État* (Eng. trans. 1884); memoirs of the Duke of Coburg; Fyffe, *Modern Europe* (1890); and Murdock, *Reconstruction of Europe* (1891). F. M. Colby.

Napoleon, Prince Napoleon Joseph Charles Paul Bonaparte: See Bonaparte, N. J. C. P.

Napoleon IV., Prince Louis Napoleon: the name given by the Bonapartists to the only child of Napoleon III. and the Empress Eugénie, though he never ascended the throne. He was born Mar. 16, 1856, and was educated in the Tuileries; but when, on Sept. 4, 1870, the people of Paris, after the battle of Sedan and the downfall of Napoleon III., proclaimed the republic, he escaped with his mother to England. He received a military education at the Royal Military Academy at Woolwich. During the war against the Zulus, in South Africa, he volunteered his services, and was killed June 1, 1879.

Napoleona: a genus of two species of small trees, of the Myrtle family, natives of tropical Africa. The large flowers are crimson and orange in color, and of great beauty of form. These plants are now grown in conservatories, sometimes under the old name of *Belvisia*.

Nappe [= Fr. sheet, cloth < Late Lat. *nappa*, variant of Lat. *mappa*, cloth, table-cloth]: in mathematics, one sheet of a surface. Thus if an hyperbola is revolved about its conjugate axis, it will generate a surface which is everywhere continuous; this surface is an hyperboloid of *one* nappe; if the curve is revolved about its transverse axis, it will generate a surface composed of two parts or sheets; this surface is called an hyperboloid or *two* nappes.

Naquet, năă'kā', Alfred Joseph: chemist and politician; b. at Carpentras, in the department of Vaucluse, France, Oct. 6, 1834; studied medicine at Paris, and was appointed professor at the medical school in 1863. His principal scientific works are *Principes de Chimie fondés sur les Théories Modernes* (1865); *De l'Atomicité* (1868); *Précis de Chimie légale* (1872). He was one of the organizers of the congress of Geneva, and his speeches on this occasion cost him fifteen months' imprisonment, besides a fine. For his *Religion, Propriété, Famille* (1869) he was also punished by imprisonment and a fine. In 1873 he published *La République radicale*, but his journal (*La République*, 1876) was not successful. He was prominent as a senator, radical politician, and Boulangist, 1882–90.

Nara: an ancient town of Japan; situated in the northern part of the province of Yamato, about 27 miles S. by E. of Kioto (see map of Japan, ref. 6–C). The name is said to be derived from *nara*, a species of oak no longer common in the neighborhood. For seven reigns (709–784 A. D.) Nara was the imperial seat, and retains, in its wonderful old temples, relics of its past glory. In a pagoda, 156 feet high, is contained the largest image of the Great Buddha in the empire. It is 53 feet in height, and is ascribed to a Chinese founder of the eighth century. Some of the finest specimens of wood-carving in Japan are to be found in the various temples and shrines, as well as collections of invaluable antiques. Modern Nara is noted for its cutlery, sold mostly to pilgrims as souvenirs, and for its park, where is kept a herd of tame sacred deer. Pop. 21,000. J. M. Dixon.

Naraka [Sanskr.]: in Brahmanism and the religious systems developed from it, the place to which the wicked are consigned for punishment; hell. Manu enumerates twenty-one such places, and describes with great elaborateness the varied punishments meted out for different crimes. According to the Buddhist system there are eight large hot hells, eight large cold hells, eight large hells of utter darkness, and ten large cold hells on the edge of the universe. Each of these has innumerable smaller hells attached to it. The eight large hot hells are situated in tiers beneath Jambudwipa (*q. v.*); each has four gates, and outside each gate are four other hells, making 136 hot hells in all. The lowest of the eight large hot hells is called Avichi, or the hell of unintermitted suffering. To it are consigned all those who disobey parents, or who speak ill of Buddha or his law.

The eight large cold hells are situated beneath the double range of iron mountains which form the periphery of the universe. The eight hells of utter darkness are situated between these two ranges, and are called "living" or "vivifying" hells, because if a being dies in one he is immediately reborn in another, where he continues 500 years, and is then reborn in a third, and so on until his sins have been expiated, when he is again born on earth in some one of the remaining five gatis. (See Gati.) Attached to each of the cold hells on the edge of the universe are 100,000,000 smaller hells, while besides all this there are 84,000 other hells situated on mountains, in deserts, on the water, etc.

All these hells are in charge of Yama (*q. v.*), the judge of the dead, who, with the assistance of eighteen officers and an army of demons, determines the kind, degree, and duration of torture to which each male culprit must be subjected. His sister performs the same duties in regard to female culprits. See Buddhism. R. Lilley.

Narbada: See Nerbudda.

Narbonne, năr'bŏn' (anc. *Narbo Martius*): town; in the department of Aude, France; on a branch of the Canal du Midi; 8 miles from the Mediterranean (see map of France, ref. 9–F). It is an old town, and was known to the Greeks 500 B. C. In 118 B. C. it was colonized by the Romans, and in the times of the emperors it became a magnificent city, the capital of Gallia Narbonensis, adorned with temples, triumphal arches, and amphitheaters, and famous for the salubrity of its air. Three emperors, Carus (282–283) and his two sons, Carinus and Numerianus (283–284), were born here. In 719 the Saracens took and burned it; in 859 the Northmen plundered it; yet in the twelfth and thirteenth centuries it was a city with 40,000 inhabitants and extensive commercial connections; in 1271 it began building its magnificent Gothic cathedral, which was never finished. The town sank suddenly. All its splendor has now shrunk into a collection of antiquities. Even its pure air has been spoiled by poisonous gases from swamps in the vicinity. Its only celebrity at present is due to its honey, which is the best in France. Pop. (1896) 27,824.

Narcissus [= Lat. = Gr. *νάρκισσος*, perhaps deriv. of *νάρκη*, numbness, torpor. Cf. Narcotics]: name of a genus of bulbous plants of the family *Amaryllidaceæ*, natives of the

Old World. The genus includes the garden and greenhouse plants called jonquil, narcissus, daffodil, and polyanthus, cultivated for ornament. They mostly have handsome flowers, appearing in spring, and many are very fragrant. See DAFFODIL.

Narcis'sus [= Lat. = Gr. *Νάρκισσος*, personification of *νάρκισσος*, narcissus]: the beautiful son of the Bœotian river-god Cephisus and the nymph Liriope. The nymph ECHO (*q. v.*) loved him, but he repulsed her, and was punished by falling in love with his own image as reflected in a fountain, so that not attaining the beloved image he pined away and died. When the Naiads came to bury his body, they found only a flower—the narcissus. The myth is thought to have had its origin in the Bœotian pæderasty, having been invented to frighten unresponsive boys. J. R. S. S.

Narcotics [from Gr. *ναρκωτικός*, benumbing, deriv. of *ναρκοῦν*, benumb, deriv. of *νάρκη*, numbness]: in medicine, such drugs as have the power of stupefying the cerebral faculties, or inducing sleep, or deadening ordinary sensibility. No exact division of narcotics can be made, but such drugs as opium, belladonna, stramonium, henbane, Indian hemp, chloral, and the ethers are those to which the term is commonly applied.

Narcotine: See OPIUM.

Nard: See SPIKENARD.

Nares, nārz, Sir GEORGE STRONG, K. C. B., F. R. S.: navigator; b. at Danestown, Scotland, in 1831; was educated at the Royal Naval College, Greenwich; engaged in the Arctic expedition 1852–54, and was in 1875 at the head of the expedition sent out in search of the north pole, commanding the Alert, which reached lat. 82° 37′ N. He afterward made a survey of the South Pacific in the same ship. He published *The Naval Cadet's Guide* (1860; reprinted in 1862 under the name of *Seamanship*; 4th ed. 1868); *Reports on Ocean Soundings and Temperature* (in the Challenger; 6 parts, 1874–75); *The Official Report of the Arctic Expedition* (1876); *Narrative of a Voyage to the Polar Sea in 1875–76* (2 vols., 1878). In the period between his first and his second Arctic expeditions he was mostly employed in explorations of the southern polar seas and the coasts of China, being in command of H. M. S. Challenger 1872–74.

Nares, ROBERT, F. R. S.: clergyman and author; b. at York, England, June 9, 1753; was educated at Christ Church, Oxford; took orders in the Church of England 1778; became rector of Sharnford, Leicestershire; preacher at Lincoln's Inn 1788; assistant librarian at the British Museum 1795–1807; canon of Lichfield 1799; archdeacon of Stafford 1800; prebendary of Lincoln and rector of All Hallows, London. With Mr. Beloe he founded and edited *The British Critic* 1793–97; was a contributor to *The Classical Journal*; was vice-president of the Royal Society 1823; published several volumes of sermons and theology, and was author of *Elements of Orthoëpy* (2d ed. London, 1794), and a valuable *Glossary, or a Collection of Words, Phrases, Names, and Allusions, etc., which have been thought to require illustration in the Works of English Authors* (1822; new ed. by J. O. Halliwell and Thomas Wright, 2 vols., 1859; new ed. 1888). D. in London, Mar. 23, 1829.

Nariño, nāă-reen'yō, ANTONIO: patriot; b. at Bogotá, New Granada, 1765. He had only the limited education afforded by a college in his native city, but he acquired some fame as an author and orator, and held responsible positions under the viceroys. About 1793 he translated and secretly printed a French work advocating republican principles. Subsequently, fearing the authorities, he burned all the copies, but one of them had been seen by a royalist officer, and Nariño, after a tedious trial, was condemned to ten years' penal servitude, and sent a prisoner to Spain (1795). He escaped, and in 1797 returned to New Granada, but was again arrested, and was only released by the revolution of 1810. He at once joined the patriots, and was made president (1811), and subsequently dictator of Cundinamarca, which embraced the city of Bogotá. Nariño was the leader of the centralist republicans, and Cundinamarca refused to join the New Granadan confederation; civil war broke out, and Nariño defeated the federalists, who attacked Bogotá, Jan. 9, 1813. Soon after he resigned his dictatorship and marched to the south against the royalist forces; at first successful, he was defeated at Pasto in May, 1814, captured and sent to Spain, where he remained a prisoner until 1820. Returning, he was senator and vice-president of Colombia in 1822. D. at Villa de Leiva, Dec. 13, 1823.

HERBERT H. SMITH.

Naro, naa'rō: town; in the province of Girgenti, Sicily; about 15 miles from the town of Girgenti (see map of Italy, ref. 10–F). It is well built, and contains some fine churches and an old feudal castle with four towers. In the neighborhood are remains of ancient aqueducts, grottoes, and sepulchers. There are also productive sulphur mines in the vicinity. Naro is said to have been built by the Saracens on the ruins of the ancient *Motyum*. Tasso in his *Gerusalemme Liberata* calls it *Naja*. Pop. about 10,400.

Narragansets: See ALGONQUIAN INDIANS.

Narragansett Bay: an inlet of the Atlantic, extending 28 miles into the State of Rhode Island. It is deep and well sheltered from the sea, receives the estuaries of the Providence and Taunton rivers, and contains the islands of Aquidneck (or Rhode Island proper), Conanicut, Prudence, and other smaller ones. It has valuable fisheries.

Nar'ses: soldier and administrator; b. in the latter part of the fifth century; was a eunuch and a slave in the palace of the Byzantine emperors. His talents attracted the attention of Justinian, who made him keeper of the privy purse and a member of the council. In 538 he went to Italy as commander of a force sent either to re-enforce or to watch Belisarius, but he was recalled in 539. Nevertheless, after the death of Belisarius, he was made commander-in-chief in Italy in 552, and his success as a general was most brilliant. Near Tadini he defeated the Gothic king Totila, who was killed in the battle. He then conquered Rome; defeated Teias. Totila's successor, on the banks of the Sarna, and completely crushed the power of the Goths in Italy. Justinian made him governor of Italy, with the title of exarch. He fixed his residence at Ravenna, and governed the country with much severity, but also with much wisdom. After the death of Justinian and the accession of Justin II., he was ignominiously deprived of his office in 565, and died in retirement at Rome about 573. It is said that the invasion of the Lombards, which took place shortly before his death, was an intrigue by him to get revenge on the court of Constantinople.

Narthex: See GUM RESINS.

Narthex [Gr. *νάρθηξ*, name of a hollow-stemmed plant, the giant fennel; a casket, case. From this latter signification came in eccles. Gr. the application to a part of a church]: a vestibule or inclosed porch extending across the whole front of a church. In the early Christian and Byzantine churches it was commonly vaulted, and entered from the *atrium* or forecourt by a number of doors corresponding with those leading into the church proper. The unbaptized and heretics were not allowed to pass beyond the narthex into the church. Like most of the arrangements of the Christian basilica the narthex appears to have been imitated from the Roman secular basilicas, as may be seen in the ruins of the basilica of Maxentius at Rome. The most magnificent examples of the narthex are those of Santa Sofia at Constantinople, now a mosque, but formerly a Christian church, built in 538 A. D., and St. Peter's at Rome, built by Maderna in 1625. The term is also applied to porches less wide than the whole front, and also to those still larger than the front would allow, as in the case of St. Mark's church at Venice, where the narthex is carried along the north flank as far as the transept. This use of the term is limited to the Byzantine or Romanesque styles.

A. D. F. HAMLIN.

Narvaez, nāăr-vaa'eth, PÁNFILO, de: soldier; b. at Valladolid, Spain, about 1478. He went to Santo Domingo, probably in 1502, and from 1512 was the principal lieutenant of Velasquez in the conquest of Cuba, where he settled. Cortés, who had been sent by Velasquez to conquer Mexico, threw off his authority there, and Narvaez was sent to supersede and imprison him as a rebel. He sailed with a powerful armament, and in Apr., 1520, landed at Vera Cruz with 900 men; but on May 28 he was defeated and captured by Cortés at Cempoala, losing an eye in the engagement; his soldiers were incorporated in the army of Cortés and took part in the siege of Mexico. Narvaez was well treated, and was soon released. He went to Spain, and in 1526 obtained a grant to conquer Florida, of which he was made governor. In Mar., 1528, he sailed from Cuba with five vessels and 400 men; landed probably at Apalache Bay, and marched inland; but after losing half his men in

encounters with the Indians was obliged to return. Unable to find his ships he built boats, in which he made his way westward along the coast, nearly to the mouth of the Mississippi; there he and nearly all his men perished in a storm. The four survivors reached Mexico after years of wandering. HERBERT H. SMITH.

Narvaez, RAMON MARIA, Duke of Valencia: statesman; b. at Loja, Spain, Aug. 4, 1800; entered the army in youth, and in the first Carlist war attained the position of captain-general of Old Castile. He took part in an attempted revolution against Espartero in 1839, and had to take refuge in France, where he plotted with the ex-queen, Maria Christina. In her interest he placed himself at the head of an expedition with which he penetrated to Madrid in 1843 and overthrew the government of Espartero. In the following year he became Prime Minister; was created field-marshal, Count of Cañadas Altas, and Duke of Valencia, and effected the formation of a new constitution (1845), suppressing all his opponents with rigor. In 1846 he quarreled with the ex-queen, resigned his post, and went as ambassador to France; resumed power in 1847, but soon lost it again for the same reason as before. In 1849 he was again at the head of the government during the diplomatic quarrel with Great Britain which culminated in the withdrawal of the British ambassador, Sir Henry Bulwer. In 1851 he went as ambassador to Vienna; became again Prime Minister in 1856; repressed several revolutionary outbreaks, and took stringent measures against the press; was overthrown Nov., 1857; was again Prime Minister from Sept., 1864, to June, 1865, and from July, 1866, until his death, at Madrid, Apr. 23, 1868.

Narwhal [from Swed. and Dan. *narhval*; the latter element is akin to Eng. *whale*], or **Sea-unicorn**: a cetacean (*Monodon monoceros*) belonging to the family of the *Delphinidæ*, or dolphins. It is most nearly related to the white whale (*Delphinapterus catodon*), and forms with it the subfamily *Delphinapterinæ*. Belonging to an order in which many of the members never develop teeth at all, it is supplied with a tooth altogether out of proportion to its size; and this tusk is moreover developed in utter contravention of the rules of bilateral symmetry, which in every other known case among vertebrates govern the production of the teeth. In both sexes the lower jaw is edentulous; in the male the upper jaw is provided, on the left side, with a tusk from 6 to 8 feet long, straight, spirally grooved externally, and hollowed within into a persistent pulp-cavity. On the right side the corresponding tooth generally remains hidden, smooth, and solid, within the jaw, but sometimes is produced symmetrically with the other. These teeth are generally described as incisors, but erroneously, as the alveoli are situated at the junction of the intermaxillary and maxillary bones, and, according to Mivart, are even "embedded entirely in the maxilla." In addition to these, there are two small rudimentary molars concealed in the upper jaw. The female, although as a rule without apparent teeth, has the incipient tusks concealed in the jaw; one of these is, however, said to be sometimes developed as in the male. The narwhal in form of body resembles the porpoises; its mouth is small, and its single spiracle or blowhole is situated on the top of the head. Its flippers or "fins" are small, and it has no dorsal fin. It attains to a length of from 10 to 15 feet, exclusive of the tusk, and in color is whitish, marbled with brown. The single species inhabits the Arctic seas, where it lives largely on cuttlefishes, and in its turn serves an important purpose in the domestic economy of the Eskimos, yielding them a large supply of oil, etc., and an ivory of considerable commercial value. It has become somewhat rare. Revised by F. A. LUCAS.

Nasalization: the adding of nasal resonance to a sound or sounds. Thus in French the adding of nasal resonance to the vowel *e* of *perte*, *mer* yields the nasalized vowel of *fin*, *plaindre*, *bien*; to the *ö* of *peur*, *peuple* yields the vowel of *un*, *parfum*; to the *o* of *mort*, *porte* yields the vowel of *rond*, *nom*; to the *a of lâche* yields the vowel of *an*, *dent*, *temps*. The physiological process of nasalization consists in dropping the soft palate toward the base of the tongue and opening the passage into the nasal cavity. This has the effect in the sounding of a vowel of adding a second resonance chamber, which conditions not only the color of the sound, but the natural or inherent pitch of the vowel. This pitch is lower than in the corresponding pure vowels. The "nasal twang," widely characteristic of American English, consists in a partial nasalizing of the entire current of speech-breath. The nasal valve is left partly open, so that the nasal cavity participates to some extent in yielding the characteristic resonance of all the voiced sounds. An excellent test of the extent of nasalization may be made by holding a lighted candle before the nostrils and shielding the flame from the breath emitted at the mouth. The flickering of the flame will then indicate the presence of nasalized breath. See PHONETICS. BENJ. IDE WHEELER.

Nasals: a class of speech-sounds characterized by the opening of the nasal passages. The term in its narrower use applies to the common sounds of *n*, *m*, *ng*, the dental, labial, and palatal nasals respectively. These are formed by making with the tongue or lips the closures for *d*, *b*, or *g* respectively, and deflecting the voiced breath through the nasal passages. The sounds are used both as consonants (non-syllabic) and as vowels (syllabic). They appear as nasal vowels, e. g. in *written* (pronounced *ri'tn̩*), *sicken* (pronounced *si'kn̩*). The nasal vowels differ from the nasalized vowels in that the latter leave the oral cavity open. See NASALIZATION. BENJ. IDE WHEELER.

Nascent State [*nascent* is from Lat. *nas'cens*, *nascen'tis*, pres. partic. of *nas'ci*, be born]: in chemistry, a state in which, at the instant of evolution from previous combination, some substances manifest tendencies to combine directly with, and even to decompose, bodies upon which in ordinary circumstances they are inactive. The most familiar and the most remarkable examples of this class of phenomena are exhibited by the element HYDROGEN (*q. v.*). When evolving from combination in a diluted acid by means of a soluble metal, it is endowed with affinities so intensified that it will not only combine with other elements that may be present, such as sulphur, phosphorus, arsenic, carbon, etc., but will in many cases decompose oxides or other compounds of these elements, combining with and carrying off the latter in gaseous or volatile forms. Thus when common iron, which contains carbon, is dissolved in a diluted acid, hydrocarbon gases and vapors of an interesting kind are found mixed with the hydrogen gas, giving it a peculiar disagreeable odor, *pure* hydrogen being odorless. According to the prevailing views, the explanation of the phenomena of the nascent state is not difficult. There is good evidence in favor of the idea that hydrogen gas, or free hydrogen, consists of molecules which, in turn, consist of atoms. Free hydrogen is a compound of atoms of hydrogen. In order that this may act upon other things, it is necessary that the atoms be separated from each other, or the molecules of hydrogen must be decomposed. Therefore, free hydrogen does not act readily. When, however, the element is set free, it is in the condition of atoms which are free to act upon whatever they may come in contact with. If they find nothing else with which they can combine, they combine with each other in pairs, thus forming the comparatively inert free hydrogen.

Revised by IRA REMSEN.

Naseby, nāz'bi: village; in the county of Northampton, England; famous for the battle in which Fairfax utterly defeated Charles I. On the morning of June 14, 1645, the two armies stood arrayed opposite each other—the royal commanded by the king himself, with Prince Rupert on his right wing and Sir Marmaduke Langdale on his left, and the Parliamentary commanded by Fairfax, with Cromwell on his right wing and Ireton on his left. The Parliamentary forces numbered nearly 14,000 men, while Charles had barely 7,500. The attack was made by the royal forces, and Prince Rupert succeeded in overwhelming Ireton and put his corps to flight. On the other side Cromwell routed Langdale, but, while Prince Rupert left the general battle in order to pursue Ireton, Cromwell wheeled round and attacked the royal center in the rear. Of the Parliamentary army there were only about 1,000 killed, while of the royal army there were about 800 killed and about 4,500 were made prisoners.

Nash, JOHN: architect; b. in London, England, in 1752; obtained in 1797 a patent for improvements in the construction of the arches and piers of bridges; was much employed in designing mansions for the nobility and gentry. In 1815 he was taken into the Government service, and for many years thereafter was engaged in laying out streets and building public edifices in London. Part of Regent Street, the terraces of Regent's Park, Haymarket theater, and Buckingham Palace show the character of his work. D. at East Cowes Castle, May 13, 1835.

Nash, RICHARD, known as BEAU NASH: leader of fashion; b. at Swansea, Wales, Oct. 18, 1674; studied at Oxford, but

was expelled about 1690; held for some time a commission in the army, and began the study of law at the Temple; became famous as a diner-out, a gamester, and leader of fashionable dissipation, and in 1704 undertook the management of the balls at Bath, then the most celebrated watering-place in England. For fifty years he was master of ceremonies, acquiring a wide notoriety for his strictness in enforcing decorum in the midst of gayety and dissipation, and was popularly called "the king of Bath." He made his living chiefly by gaming, and was noted for generosity. In his old age he fell into neglect and often suffered from privation. D. at Bath, Feb. 3, 1761. His *Life* was written by Goldsmith (published anonymously, 1762).

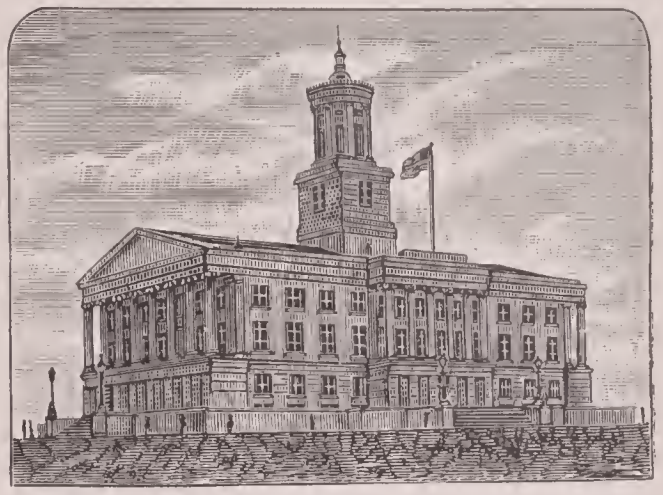
Nash, Stephen Payne: See the Appendix.

Nash, Thomas: author; b. at Lowestoft, Suffolk, England, in 1567; graduated at Cambridge in 1584; settled in London in 1589; attacked the Nonconformists in several pamphlets written in grotesque style; wrote a number of unimportant dramas. He lived in extreme poverty. Among the most interesting of his lampoons and miscellaneous pamphlets are *Pierce Penniless, his Supplication to the Devil* (1592); *The Terrors of the Night* (1594); and *Have with you to Saffron Walden* (1596). D. in London probably in 1601. See his *Complete Works*, edited by Grosart (6 vols., London, 1883–84). Revised by H. A. Beers.

Nashua: city (incorporated as a city in 1853); one of the capitals of Hillsboro co., N. H. (for location of county, see map of New Hampshire, ref. 10–E); on the Nashua river, near its junction with the Merrimack, and on the Concord and Montreal and the Boston and Maine railways; 35 miles S. of Concord, 40 miles N. W. of Boston. Since 1826 it has been noted for its manufactures, for the promotion of which a superior water-power was obtained from the rivers by means of a connecting canal 3 miles long, 60 feet wide, and 8 feet deep, with a head and fall of 36 feet. The principal manufactures are cotton goods, sheetings, embroidery, iron and steel, foundry products, furniture, edge tools, paper, and locks. The city has a public library (founded 1867) with over 10,000 volumes, 3 national banks with combined capital of $370,000, 2 savings-banks with combined deposits of nearly $3,500,000, a banking company with deposits of over $1,075,000, and 2 daily and 2 weekly newspapers. The assessed valuation in 1893 was $12,502,142, and the net debt on Jan. 1, 1894, was $563,160. Pop. (1880) 13,397; (1890) 19,311; (1900) 23,898. Editor of "Telegraph."

Nashville: city; capital of Washington co., Ill. (for location of county, see map of Illinois, ref. 9–D); on the Centralia and Chester and the Louis. and Nash. railways; 50 miles E. by S. of St. Louis, 120 miles S. of Springfield. It is in an agricultural and coal-mining region, and has 8 churches, high school, public school, 3 flour-mills, 2 coal mines, a State bank with capital of $25,000, and a daily and 4 weekly newspapers. Pop. (1880) 2,222; (1890) 2,084; (1900) 2,184. Editor of "Democrat."

Nashville: city; capital of the State of Tennessee and of Davidson County (for location, see map of Tennessee, ref. 6–E); on the Cumberland river, 200 miles from its mouth, and on the Louisville and Nashville and the Nash., Chat. and St. L. railways; 233 miles E. N. E. of Memphis. The city rests on a rocky foundation, the river bluffs rising to a height of 80 feet above low water. It is noted for its educational institutions, commerce, and manufactures. A new charter granted in 1883 vested its government in a mayor, a salaried board of public works, and a common council. The city contains Vanderbilt University, Peabody Normal School, Montgomery Bell Academy, University of Nashville, University of Tennessee, St. Cecilia Academy, Boscobel Female College, Ward's Seminary for Young Ladies, Belmont College for Young Ladies, Tennessee Industrial School, and 4 business colleges; also 5 schools and colleges for colored people: Central Tennessee College, Fisk University (founded in 1866), Roger Williams University, Meharry Medical College, Walden University. In the school year 1900 there were 29,211 children of school age, of whom 12,142 were enrolled in the public schools and 1,350 in private and parochial schools. There were 18 public-school buildings, 164 regular teachers, and public-school property valued at $350,000. The libraries in the educational institutions contained over 35,000 volumes, and 4 other libraries, including the State Library, had together over 40,000 volumes. The city also contains the State School for the Blind (established 1844), and the headquarters of the Tennessee Historical Society, the Tennessee Confederate Memorial and Historical Association, and of the Engineering Association of the South. There are about 150 churches. The Chamber of Commerce reported commercial receipts in the year ending Aug. 31, 1900, valued at $20,000,000. These included 6,079,000 bush. of wheat, 2,612,500 bush. of corn, 6,729,069 lb. of bacon, 38,310 bales of cotton, 2,357,000 lb. of bulk meats, 118,792 cases of boots and shoes, and 2,732,350



State Capitol, Nashville, Tenn.

bush. of oats. The census returns of 1900 showed that 494 manufacturing establishments (representing 85 industries) reported. These had a combined capital of $9,166,626, employed 7,434 persons, paid $3,318,961 for wages and $7,727,010 for materials, and had products valued at $13,673,730. The principal industry according to amount of capital employed was the manufacture of lumber products, which had 22 establishments and $1,587,626 capital, employed 1,524 persons, and had products valued at $2,217,420. In 1900 there were 3 national banks and 7 State banks with aggregate capital of $3,000,000; 2 daily, 24 weekly, 21 monthly, 5 semi-monthly, 2 bi-monthly, 1 German, 2 Spanish, and 5 other periodicals; and a debt (including a water debt of $1,497,000) of $3,339,600. The assessed valuations in 1900 aggregated $37,268,215. Pop. (1880) 43,350; (1890) 76,168; (1900) 80,865. Secretary of Chamber of Commerce.

Nashville, Battle of: a battle of the civil war in the U. S.; fought Dec. 15 and 16, 1864, between the Union forces under Gen. G. H. Thomas and the Confederates under Gen. J. B. Hood. After the battle of Franklin (see Franklin, Battle of) Gen. Thomas concentrated his forces at Nashville, Tenn., which was well fortified with field works extending along the crests of the low hills, surrounding the city on the S., with both flanks resting on the Cumberland river. Gen. Hood took up a position in his front Dec. 2–4. Thomas's army, although equal to or greater than Hood's in numbers, needed a few days for organization, and was without horses for the cavalry. He delayed making an attack upon Hood until he felt himself fully prepared to secure the best results. His army was ready to attack on Dec. 8, but was prevented by a sleet-storm which covered the country with ice and made a movement impossible up to the 15th. The impatience of the Secretary of War and of Gen. Grant at this delay was so great that on the 9th Grant issued an order directing Thomas to turn over his command to Schofield; but this order was revoked before it reached him. On the 13th Gen. Logan was sent to supersede Thomas, but stopped at Louisville upon learning the result of the battle which had taken place.

On the morning of Dec. 15 Thomas moved out. Making a demonstration on his left, he extended his right, turned Hood's left, carried his lines from left to right, and drove him back to a new position about 2 miles to his rear. On the 16th Thomas again attacked. He was held in check by Hood's right on Overton's Hill, but by turning his left he swept him from his new line and drove him from the field routed and in disorder. The well-equipped cavalry prepared for this contingency now led the pursuit, closely followed by the infantry. The pursuit was pushed vigorously to the Tennessee river, which the Confederates crossed at Decatur on Dec. 27; from here they fell back to Tupelo, Miss., where what remained of the army was broken up and the parts sent to different fields. The total Union loss was 3,057, of whom less than 400 were killed. The Confederate loss in killed and wounded was never accurately deter-

mined, but probably did not differ materially from that of the Union army. There were captured on the field about 4,500 prisoners, including four generals, besides 54 guns and numerous small arms. During the retreat a large number of prisoners were captured and deserters received. During the campaign of November and December over 15,000 prisoners and deserters, 72 cannon, and 3,000 small-arms were taken. See Cox, *Battles of Franklin and Nashville*, Scribner's War Series, and *Battles and Leaders of the Civil War*.

JAMES MERCUR.

Nashville, University of: an institution founded in 1785, fifteen years before the State of Tennessee was admitted into the Union, and chartered by the Legislature of North Carolina as Davidson Academy. The Legislature gave it 240 acres of land, now included in the city of Nashville. In 1806 the academy became Cumberland College, which in 1826 was organized as the University of Nashville. In 1850 the university was closed on account of the scourge of cholera; in 1855 the literary department was reorganized as a military school with Col. Bushrod R. Johnson as superintendent; in 1861 the teachers and students went to the war; after the close of the war the institution again became a military school under the direction of Gen. E. Kirby Smith; in 1875 the Peabody board and the trustees of the University of Nashville united in forming a college for the training of Southern teachers. Eben S. Stearns, LL. D., was elected president and chancellor; at his death in 1887 he was succeeded by William H. Payne, LL. D. The buildings are situated on an elevated campus of 16 acres, a mile from the public square. The Peabody board has established 184 scholarships, each worth $100 a year, and each student's railway fare is paid from his home to Nashville and back. The medical department was organized in 1850; the number of students annually in attendance varies from 300 to 400. The total number of students in the general departments exceeds 1,200. W. H. PAYNE.

Na'smyth, JAMES: mechanical engineer and astronomer; b. in Edinburgh, Aug. 19, 1808; the son of an artist; was educated at the School of Arts and the Edinburgh University; removed to London, and in 1834 to Manchester, where he became a successful machine constructor and inventor. The steam-hammer, steam pile-driver, and improved forms of ordnance are among his inventions. He also acquired fame as a practical astronomer, giving special attention to selenography, in which he employed telescopes and other instruments of his own construction. He published *Remarks on Tools and Machinery*, in Baker's *Elements of Mechanism* (1858), and *The Moon considered as a Planet, a World, and a Satellite* (1874). D. in London, May 7, 1890. See *Life*, by Smiles (1883). Revised by R. H. THURSTON.

Nâsr-ed-dîn, officially called CHAH EN CHAR (King of Kings): Shah of Persia; b. July, 1831; eldest son of the monarch Mehemet (or Muhammad) Shah, by Queen Velliat of the Kadiar tribe, and grandson of Abbas Mirza; succeeded to the throne Sept. 10, 1848; suppressed several revolts of the nomadic tribes; maintained neutrality during the Crimean war, at the close of which he signed a treaty with Russia; waged a nominal war against Great Britain in 1856, which was terminated by the Treaty of Paris 1857; gave his support to the passage of the Anglo-Indian telegraph through his dominions 1866; visited the principal countries of Europe 1873, and wrote an amusing diary, which was translated by J. W. Redhouse. The shah's desire to introduce reforms and material improvements into his kingdom actuated this visit, and was exemplified by the fact that he had learned French and Turkish in order to familiarize himself with the history and condition of European countries. He also visited Russia in 1878. Assassinated at Teheran, May 1, 1896.

Nas'sau: a part of the province of Hesse-Nassau, Prussia. Before 1866 it was an independent duchy of Germany, with an area of 1,800 sq. miles, and a population of (1864) 468,311 inhabitants. The country, extending along the Rhine, the Main, and the Lahn, and traversed S. by the Taunus and N. by the Westerwald, is beautiful and rich. The mountains are covered with extensive forests abounding in game, and contain iron, lead, copper, coal, marble, and building-stone. The valleys produce wheat, tobacco, flax, and fruit of superior quality, and grapes from which are made the choicest Rhenish wines, such as Johannisberger, Hochheimer, Rüdesheimer, and Marcobrunner. The mineral springs of Nassau are famous; the watering-places which are built around them, such as Wiesbaden, Ems, and Selters, are visited by people from all parts. In the thirteenth century the ruling family split into two branches, called after the brothers Walram and Otho. The younger branch, the Othonic, became the reigning family in the Netherlands, while the Walram line obtained the title of Dukes of Nassau by the formation of the Rhenish confederacy in 1806, and their troops fought under Napoleon against Prussia and Austria in Spain and Russia. The duke, however, was shrewd enough to abandon Napoleon at the right moment, and in reward he received a considerable augmentation of his territory by the Congress of Vienna. In 1815 he granted a constitution; but when, in 1818, the constitution came into operation and the house of representatives demanded an account of revenue and expenditure, the duke employed force to silence the representatives. When the revolution of 1848 came, the duke was obliged to grant a more liberal constitution, but soon adopted a reactionary policy. In 1866, when the war between Prussia and Austria broke out, he openly supported the latter; hence was forced to flee before the Prussians, who overran the duchy, and on Oct. 3 Nassau was incorporated with Prussia.

Nassau: town of the island of New Providence, and capital of the BAHAMA ISLANDS (*q. v.*). It has a good harbor, is fortified and well built, and is celebrated for its salubrious climate. Pop. about 11,000.

Nassau, ADOLPHUS WILLIAM CHARLES AUGUSTUS FREDERICK, Duke of: b. July 24, 1817; assumed the sovereignty of Nassau, Aug. 20, 1839. His state was joined to Prussia in 1866, and he received over 15,000,000 gulden as indemnification. On the death of the King of the Netherlands, Nov. 23, 1890, he became Grand Duke of LUXEMBURG (*q. v.*).

Nassau, JOAN MAURITZ, van, Count of Nassau-Siegen (commonly called Mauritz or Maurice of Nassau): general and administrator; b. near Delft, Holland, June 17, 1604. He early fought against the Spaniards and particularly distinguished himself at the siege of Breda, 1625. From Jan., 1637, to May, 1644, he was governor-general of the Dutch possessions in Brazil, and this period was the most prosperous in the history of the colony. Nassau was repulsed in an attack on Bahia 1638; but he gained a brilliant victory over the Spanish and Portuguese fleet Jan., 1640, and was able to send expeditions against the Portuguese in Africa and the Spanish on the Rio de la Plata. After his return he was lieutenant-general of cavalry, and from 1647 governor of Cleves; in 1652 he was made a prince of the German empire. As commander of the Netherlands army in 1665 he repulsed the invading army of the Bishop of Münster. He defended the frontier in 1672, and was prominent in the campaign of 1674 in the Spanish Netherlands. D. at Cleves, Dec. 20, 1679. HERBERT H. SMITH.

Nast, THOMAS: illustrator; b. at Landau, Bavarian Palatinate, Sept. 27, 1840; went with his father to the U. S. in 1846; received art instruction under Theodor Kaufmann; began when fifteen years old to furnish illustrations for papers; was in Europe 1860–61, and during the civil war began a long series of powerful and effective political caricatures, many of which appeared in *Harper's Weekly*. He has edited *Nast's Illustrated Almanac* and *Nast's Weekly*, and has given many public lectures, illustrated with pictures drawn in the presence of the audience. In 1894 he went to London to undertake an important task in connection with *The Pall Mall Magazine*. Revised by RUSSELL STURGIS.

Nastur'tium [= Lat.; *na'sus*, nose + *torque're*, *tor'tum*, twist. Named from the wry face caused by its pungent taste]: name of a genus of cruciferous herbs, mostly aquatic, containing many species, among which are water-cress and horseradish. (See CRESSES.) Popularly, the name nasturtium is given to *Tropæolum majus*, a fine, showy, climbing herb, a native of Peru, often seen in gardens. Its flowers are used in salads, and its pungent buds and fruit are pickled and incorrectly called capers.

Natal': a British colony on the southeast coast of Africa, extending along the Indian Ocean from lat. 28° to 31° S. Area about 20,460 sq. miles. Pop. (1891) 46,788 Europeans, 41,142 Indian coolies, and 455,983 Kaffirs, a total of 543,913. Natal is a temperate, healthful, and undulating but not mountainous region, more productive than the neighboring Cape Colony, on account of the greater rainfall. It is attractive to European colonists, who have doubled in number since 1879, while the foreign trade has doubled in the same time. The chief products are sugar, wool, hides, cotton, and ostrich-feathers. The large coal-fields now developing are becoming

of great advantage to the colony. Railway lines owned by the Government connect the port of Durban with Pietermaritzburg, the capital, and the frontier of the South African Republic. The capital is a handsome town, noted for the beauty of its churches, residences, and gardens.

C. C. Adams.

Natal, often called **Rio Grande do Norte**: capital and principal town of the state of Rio Grande do Norte, Brazil; on the Potengi or Rio Grande, 2 miles above its mouth. The river is navigable to this point and for some miles farther, but the bar does not admit vessels of over 13 feet draught. The town is on low land and has a picturesque appearance, owing to the cocoanut-groves around it; but the climate is hot, and yellow fever is a frequent visitant. Natal was founded in 1559, and was held by the Dutch from 1635 to 1654. Pop. about 9,000. H. H. S.

Natalie, Queen of Servia: See Milan I.

Natato'res [Lat., plur. of *nata'tor*, swimmer, deriv. of *nata're*, swim]: the name for an artificial combination of birds, agreeing only—and but partially even in this respect—in being adapted for swimming. It was formerly regarded as an order or sub-class, but is now discarded.

Natchesan Indians: a name applied to two tribes of North American Indians, called Natchez and Taensa. I. *Natchez.*—Of this tribe Commander P. Lemoyne d'Iberville, in 1699, mentions nine villages which were contiguous and constituted one town only. Probably there were more of them, and apparently only a part spoke the Natchez language. They were situated on or around St. Catharine creek, near Natchez City, Miss. This Natchesan confederacy was controlled by a head chief who belonged to the ruling family of the *suns*, and wielded a more centralized power than the chiefs of other Mississippian tribes. His confederacy formed a part of the larger league of the Chicasa and Yazoo river villages. The Natchez people had three serious conflicts with the colonial French troops, the last of which (in 1730) brought on their dispersion and decimation. At that time the population of the confederacy probably reached 1,200. Scattered remnants of the tribe still linger among the Creeks and Cherokees.

II. *Taensa.*—The Taensa people, who lived on the west side of the Mississippi river, above the Natchez, are now, on the strength of two passages in de Montigny's and Gravier's letters (about 1700), classed with the Natchesan family. These people were in 1714 settled on Mobile Bay, and about the year 1764 removed W. of the Mississippi river. Both the Taensas and the Natchez had a house of worship where the perpetual fire was kept.

See Margry, *Découvertes* (Paris, 1880), iv., 179, and *passim.*

A. S. Gatschet.

Natchez: city (settled by the French 1716, settlers massacred by Indians 1729, occupied by the English 1763–79 and by the Spanish 1779–98, made capital of the Territory of Mississippi 1798, became a city 1803); capital of Adams co., Miss. (for location, see map of Mississippi, ref. 8–E); on the Mississippi river, and the New Orleans and N. W. and the Yazoo and Miss. Val. railways; 100 miles S. W. of Jackson, 280 miles N. W. of New Orleans. The business part of the city is a narrow stretch of river bank, and the larger part, occupied by public buildings and residences, is the summit of a bluff 150 feet above the river. The entire brow of the bluff in the city limits has been converted into a public park. Its location on the river gives the city a large commercial importance. It handles 50,000 bales of cotton annually, and has steam saw, planing, grist, and cotton mills, cottonseed-oil factory, steam-ginneries, ice-factory, and other manufactories. There are a national bank with capital of $100,000, a State bank with capital of $50,000, and incorporated and private banks, and a monthly, 2 daily, and 3 weekly periodicals. The assessed valuation in 1893 was $4,197,062, and the net debt on Feb. 1, 1894, was $347,463. Pop. (1880) 7,058; (1890) 10,101; (1900) 12,210.

Editor of "Democrat."

Natchitoches: See Caddoan Indians.

Natchitoches: town (founded by the Spaniards in 1713); capital of Natchitoches parish, La. (for location of parish, see map of Louisiana, ref. 8–B); on the Cane river, and the Natchitoches Railroad; 95 miles S. of Shreveport, 450 miles N. of New Orleans. It is in the Red river valley, in a fertile region yielding large crops of cotton, corn, sugar-cane, and all kinds of vegetables. The surrounding country contains large tracts of Bermuda grass, on which cattle-raising is carried on extensively. The town is the seat of the State Normal School; has seven churches, a cathedral, Convent of the Divine Providence, U. S. land-office, free iron drawbridge across the river, a State bank with capital of $10,000, and two weekly newspapers; and contains an oil-mill, ice-factory, and other manufactories. Pop. (1880) 2,785; (1890) 1,820; (1900) 2,388. Editor of "Enterprise."

Natic'idæ [Mod. Lat., named from *Na'tica*, the typical genus, from Mediæv. Lat. *na'tica*, buttock, deriv. of Lat. *na'tes*, buttocks]: a family of Gasteropod molluscs with globular shells containing numerous species, occurring in the shallow seas and on the shores of the ocean in all parts of the world. The naticas, or sea-snails, have a very large fleshy foot; the shell has the aperture rounded in front and pointed behind. These animals are very voracious, feeding upon other molluscs, which they kill by rasping holes in the shell with their lingual ribbon. (See Gasteropoda.) The members of one species lay their eggs in those curved bands known to people on the shore as sand-saucers. J. S. K.

Natick: town (settled by John Eliot 1651, church of Christian Indians established 1660, town incorporated 1781); Middlesex co., Mass. (for location of county, see map of Massachusetts, ref. 2–H); on the Charles river, and the Boston and Albany Railroad; 17 miles S. W. of Boston. The town contains several villages and business centers, water, gas, and electric light plants, Morse Institute with library of over 16,000 volumes, national bank with capital of $100,000, savings-bank with deposits of nearly $1,200,000, a monument to the memory of John Eliot, and three weekly newspapers. The principal manufactures are boots and shoes, woodenware, clothing, rubber goods, chairs, and baseballs. A portion of Cochituate Lake, from which Boston derives a part of its water-supply, is within the town limits on the N. Pop. (1880) 8,479; (1890) 9,118; (1900) 9,488. Editor of "Bulletin."

National or Constituent Assembly, The: a convention of delegates of the French people, constituted as a national assembly June 17, 1789. See France, History of.

National Banks: See Bank.

National Convention, The: an assembly of deputies of the French people. See France, History of.

National Debt: See Debt, Public.

National Educational Association: See the Appendix.

National Guard [trans. of Fr. *garde nationale*]: a kind of militia in France, mostly recruited from the bourgeois class, and representing the burgher interests. In some of the French towns the national guards had long been known, but they were first organized in Paris in 1789 by the revolutionary Committee of Safety. There were 48,000 in Paris, and in 1790 a paper organization of 4,000,000 in France, and the whole were under La Fayette and carried the tricolor flag. Frequent changes in organization were made. In 1795 they were defeated and broken up by Napoleon, were reorganized by him in 1814, dissolved by Charles X. in 1827, were again reorganized in 1830, and again in 1831. They fell away from Louis Philippe in 1848, were remodeled in 1851, dissolved and reorganized in 1855, served against the Germans in the war of 1870–71, and in the latter year a part of them took a share in the Communist struggle, after which they ceased to exist. In some other European countries and in some of the U. S. there are militia organizations called national guards. See Militia.

National Humane Alliance: See the Appendix.

Nationalism: a theory of social reconstruction through the nationalization of the entire system of production and distribution. It demands the extension of the functions of government to include the control of all economic operations, and all personal services now rendered for profit or hire. In the U. S. in 1888 it was taken as the basis for a party organization by readers of *Looking Backward*, a work portraying an ideal state framed in accordance with the above theory. Approving of the economic system there pictured, and believing it attainable, they organized so-called nationalist clubs, and began the work of propagandism. It is proposed that the economic government of nations, now conducted by irresponsible private persons for their personal ends, shall be assimilated in the method and purpose of its administration to the so-called political government, and that just as under the latter all citizens not willfully evading their duties to the state have equal claims to the benefits and services afforded by the government, without regard to the extent to which they have contributed, whether by tax or

personal service to its support, so they should share equally in the benefits resulting from collective action in economic matters, notwithstanding unavoidable inequality in their contributions of service.

In order to protect the people in their equality the democratic polity gives to all citizens, whatever their inequalities in intelligence, character, or possessions, an equal voice in law-making. Nationalists propose the strict application of these fundamental principles of democracy to the organization of the economic system of nations. According to their plan all economic operations shall be carried on by the people under a uniform law of service, but, while this law will be equal for all, it is expected that the nature of the services rendered will vary as widely as do the amounts of tax and military service under the present system. Efforts will be made to prevent and punish willful evasion of duty, but no account will be made of the difference in the value of the services rendered in distributing the resulting total product among the citizens. It appears obvious to the adherents of nationalism that it is merely the strictly logical evolution of democracy, and that, unless a reversion to personal or clan government shall check the progress of democracy, nationalism must inevitably in the near future furnish the solution of the industrial and social problem. It should be understood that while the nationalist movement originated with admirers of the economic system depicted in *Looking Backward*, it by no means follows that the various details and devices introduced in that book in depicting the systems in operation form any necessary part of the plan of nationalism, which is, on the contrary, confined to general principles, leaving details to be filled out as occasion arises. Nationalists agree in deprecating the use of violent methods to bring about the desired reorganization, but favor a gradual and peaceable evolution, advocating as first steps toward nationalism all measures looking toward the assumption by municipality, States, and the nation of the ownership and operation of all forms of business, discharging quasi-public functions, such as lighting and water-works, milk-supply, tramway system, telegraphs, railways, etc., and wherever any sort of business has become an oppressive trust monopoly they would have the State or the nation take such business into its own hands. The growth in popularity of nationalistic ideas in the U. S. since the inception of the movement in 1888 has been notable. The idea of assumption by municipalities of all sorts of quasi-public functions, such as lighting, water-works, and local transit, has found great favor, and is being widely adopted. In general politics a national party under the name of the People's Party (*q. v.*) has adopted for its platform nearly the entire immediate programme of nationalism, including nationalization of the telegraphs, telephones, railways, and money system, and secured 1,000,000 votes in the presidential election of 1892 for a ticket representing these ideas. The nationalist movement, while represented by organization and publications in all parts of the Union, has at present the most general popular backing in the States between the Mississippi and the Pacific.

Edward Bellamy.

National Museum of the United States: an institution, located in Washington, D. C., which dates its existence from Aug. 10, 1846, when the act of Congress establishing the Smithsonian Institution was formally approved, and all Government collections assigned to its charge. The use of the present name, however, did not begin until much later, and was first legally sanctioned in the act providing for the erection of a building to contain the material received at the close of the Centennial Exhibition of 1876.

The germ of the museum is to be found in a collection of minerals, containing about 10,000 specimens, which formed a portion of Smithson's bequest to the U. S., and was, so far as can be ascertained, the first scientific cabinet owned by the Government. This collection was lost in the fire of 1865, which destroyed a portion of the Smithsonian Institution.

The idea of a national museum was first prominently brought forward by the National Institution for the Promotion of Science, a scientific society organized in Washington, May 15, 1840, whose objects were, among others, "to promote science and the useful arts, and to establish a national museum of natural history." This institution, which was for many years the official custodian of the Government collections, made an earnest and nearly successful attempt to secure both the management of the Smithson fund and the care of all collections belonging to the U. S., and the failure of the effort was the death-blow to the association.*

The Government collections, consisting mainly of the objects collected by the Wilkes exploring expedition, were transferred to the Smithsonian building in 1857, the regents of that institution having accepted the trust on the condition that Congress should provide the funds necessary for their preservation. Prior to that date material had been received but not displayed, and up to 1876 the exhibition of specimens for the benefit of the public may be said to have been considered as of secondary importance, as well as largely precluded by lack of funds for their proper preparation. At the close of the Centennial Exhibition of 1876 the Smithsonian Institution came into the possession of the collections prepared to illustrate the animal and mineral resources, the fisheries, and the ethnology of the native races of the U. S., and in addition a large amount of material was presented by the governments of thirty foreign nations.

As these objects could by no possibility be displayed in the Smithsonian building, the bulk of them were placed in storage, and Congress was asked for funds for the erection of a museum building. After a delay of two years Congress on Mar. 3, 1879, passed a bill appropriating $250,000 for the construction of a building 300 feet square. On Apr. 14 of the same year ground was broken for its erection, and with the beginning of 1882 the work of installation was actively begun. The structure, which is of brick, has small architectural pretensions, but is well adapted for exhibition purposes, the sixteen halls into which it is divided affording on one floor 80,000 sq. feet of space. The main portion of the building is only a single story in height, but at each corner and on either side are towers three stories high, used for laboratories and offices. Owing to the fact that there is neither basement nor attic, the only space available for the storage of duplicate specimens is in the lower part of the exhibition cases, and the rapid growth of the collections has caused this defect to be severely felt.

The formal organization of the museum staff was in 1881, when the various departments were first defined and their curators appointed. Other departments have from time to time been established, until there are thirty-three departments, and a scientific staff of forty-one, including, however, a number of honorary curators who receive no salary.

By act of Congress the regents of the Smithsonian Institution are charged with the duty of preserving and utilizing all objects of art, all objects of foreign and curious research (i. e. ethnological collections), all geological and mineralogical specimens belonging, or hereafter to belong, to the U. S. The National Museum is thus the museum of the Smithsonian Institution, and its officers are appointed by the secretary of that institution. A practical distinction lies in the fact that the money for the maintenance of the museum is annually appropriated by Congress, while the operations of the Smithsonian are carried on by the fund bequeathed by Smithson.

By virtue of the provisions above noted the museum has been greatly enriched by various Government explorations and surveys, and especially by the material gathered during the investigations of the U. S. Fish Commission. Aside from specimens thus obtained the collections are increased by exchanges, by gifts, and to a limited extent by purchase, a privilege that has been granted comparatively recently, the earlier appropriations being simply for the "preservation of collections."

The museum is naturally richest in material relating to North America, particularly so in specimens illustrating the arts and occupations of the Indians, to which the Catlin paintings form an interesting supplement. In zoölogy the series of deep-sea fishes and invertebrates is very extensive, the collections of shells is one of the finest in the world, and the mammals and birds of North America are represented by large series. The departments of metallurgy and geology contain material exhibiting the mineral resources of the U. S., and many illustrations of the phenomena of physical geology. The fisheries of the U. S., and to a considerable extent those of other countries, are well shown by means of apparatus, models of vessels, and illustrations of modes of capture, and the section of animal products contains many examples of the direct and indirect ways in which animals are of use to man. The historical collections

* For a full account of the steps leading to the founding of the National Museum, see the article by Dr. G. Brown Goode on *The Genesis of the United States National Museum* in the *Report of the United States National Museum for 1891*, pp. 273–880.

include personal relics of such well-known men as Washington, Jefferson, and Grant. The collection of musical instruments is good, and the section of graphic arts gives a comprehensive history of the art of illustrating.

In 1882 the number of specimens in all departments was estimated at about 200,000; in 1893 the total was, approximately, 3,277,000. While the exhibition series is very extensive, containing the best specimens in their respective groups, or those of the highest educational value, the great proportion of this material is in the study series to which especial attention has been paid.

The chief publications of the museum consist of papers issued at intervals, corresponding to the bulletins of other institutions, and longer or monographic papers, of the nature of memoirs and issued as bulletins. Fifty of the bulletins have been published and 1,170 of the shorter papers, the latter forming twenty-one volumes of the *Proceedings* of the U. S. National Museum. The museum also publishes an *Annual Report* containing, in addition to the reports of the assistant secretary and the curators on the condition and progress of the various departments, papers of general interest, and often of considerable length, descriptive or illustrative of the collections. Articles by museum officers or based on its collections are also printed in the Smithsonian publications or in those of other Government departments.

The work of the museum, by the accumulation and study of specimens, their exhibition, and by the publication of papers, is thus threefold, and its aim is to be in every particular an educational museum in the broadest sense of the term.

Every aid is given to students, and, in addition, a large amount of work is done in reporting on material submitted to the museum for identification or other information. The building is open to the public every day but Sunday.

FREDERIC A. LUCAS.

Nativism (in philosophy): the doctrine that the mind has certain kinds of knowledge, or principles of organization of its experience, native to itself or inborn. It is opposed to empiricism, which holds that knowledge is derived exclusively from experience. Other terms for nativism are *apriorism* and INTUITIONALISM (*q. v.*). J. M. B.

Natolia: See ANATOLIA.

Na'trolite [Eng. *natron*, soda (viâ Fr. and Span. from Arab. *natrūn*, *nitrūn*, whence Eng. *niter*) + Gr. λίθος, stone]: a mineral belonging to the zeolitic section of hydrous silicates, and essentially a silicate of aluminium and sodium, with 9·5 per cent. of water. It occurs generally in slender crystals assignable to the trimetric system, also frequently in radiated fibrous masses. It is met with most commonly in volcanic rocks, but occasionally also in granite and gneiss. Bergen Hill, N. J., Copper Falls, Lake Superior, Mich., and localities in Nova Scotia have yielded fine specimens.

Natron: See SODIUM.

Natu'na Islands: a group of islands situated in the China Sea, between Borneo and the peninsula of Malacca, belonging to the Dutch. Area, 664 sq. miles. Pop. 7,500. They are high and mountainous, and produce rice, maize, sago, and cocoanuts. Fishing is the chief occupation of the inhabitants.

Natural: a term used in music. The regular notes of the scale when unaffected by sharps or flats (as in the key of C major) are said to be *natural*, or in their original and ordinary condition; and when any note has been modified by the use of a ♯ or ♭ (whether placed at the clef or occurring as an accidental), such alteration may be revoked by prefixing to the note the sign ♮. This sign is called a "natural," because it restores to the altered note its original character. The natural is also of service in cases where a change of key takes place, as at the opening of a second or third movement, where such sharps or flats in the signature as are no longer needed are revoked by the substitution of as many naturals. Double sharps and double flats are restored to simple sharps and flats by the signs ♮♯ and ♮♭.

Revised by DUDLEY BUCK.

Natural Bridge: an arch of great size and beauty, carved or eroded in the horizontal strata of Cambro-Silurian magnesian limestone (Knox dolomite) in Rockbridge co., Va. The bridge is a small remnant of the roof of a former cavern, now for the greater part opened into a gorge, through which Cedar creek flows to James river. The gorge widens, and is clothed with trees above and below the bridge; under the arch the walls are bare and vertical, about 50 feet apart. The arch has a thickness of 44 feet and a span of from 45 to 60 feet. The crown of the arch is almost 200 feet above the creek, while the top of the bridge is 236 feet above the water. A public road leads across the bridge, the width of the top being about 30 feet.

W. M. DAVIS.

Natural Gas: a form of bitumen that under natural conditions exists as a gas. Before its true relations had been discovered it was familiar to the inhabitants of certain localities as escaping from springs and crevices in rocks, producing the phenomena of burning springs and fire-wells, and furnishing the fuel for the perpetual fires of Baku and other shrines of the Fire Worshipers.

History.—Travelers overland to Persia and India, from the time of Marco Polo in the fourteenth century to the first half of the nineteenth century, describe the burning springs of Asia Minor and the fires of Baku. Abbé Huc, in his *Travels in China*, describes the fire-wells and the method of drilling them. The gas from these wells was used in China for boiling brine and in domestic heating. Natural gas was also used in the fire-temples of Tibet and Northern India.

In the U. S. the burning springs that were common in the valleys of the western slopes of the Appalachian chain, from the St. Lawrence river to Alabama, early attracted attention. In the valley of the upper Cumberland, in Southern Kentucky, accumulations of gas beneath the thin horizontal strata of that region sometimes gained sufficient force to tear up a mass of earth and stone with explosive violence, thus producing what are locally called "gas volcanoes."

The earliest attempt to utilize the gas was made at Fredonia, N. Y. The gas was first used in 1824 from wells dug into the rock strata that underlaid the town, but later wells were drilled. At about this period, as borings for brine were made in the valleys of the streams that drain the western slopes of the Alleghanies, gas was often encountered, and was frequently utilized as fuel to evaporate the brine. This was particularly true of the valleys of the Kanawha and Muskingum rivers.

As the development of the petroleum-fields increased, the vast accumulations of natural gas that often accompanied the petroleum were utilized for fuel.

The immense number of test-wells that were drilled for petroleum during 1865 and 1866 throughout the valleys of the Mississippi and its tributaries led to the discovery in many localities of deposits of natural gas outside the limits of any productive petroleum-field. Yet for many years few attempts were made to utilize the gas. Among these the Neff Wells near Gambier, Knox co., O., may be mentioned. In drilling the first of these wells water was encountered in large quantities at a depth of 66 feet. At a depth of 600 feet gas was struck under great pressure. The boring throughout its whole length became alternately filled and discharged. The enormous volume of water thrown out—perhaps 10,000 barrels per day—kept the derrick soaked so thoroughly that at night the gas could be fired, when a struggle between the burning gas and water followed. Another similar phenomenon was witnessed in a well at Kane, Pa., on the Philadelphia and Erie Railroad. This well was drilled 2,000 feet deep, but as no oil was obtained the casing was withdrawn and the well abandoned. Then the struggle between the gas and water began. The stratum from which the gas issued was encountered at about 1,400 feet. The fresh water flowed into the well on top of the gas until the pressure of the confined gas became greater than the weight of the superincumbent water, when the water was forced out of the well to a great height, producing all of the phenomena of a geyser.

Gradually the great value of the escaping gas for fuel began to be appreciated. In several instances the gas was used to generate power without being burned, the pressure of the escaping gas alone being sufficient to operate an engine, as if the gas were steam. More frequently the gas escaping from one well was used as fuel under the boilers in drilling an adjoining well. The gas was also gradually introduced into the towns that were adjacent to oil territory. By 1880, besides Fredonia, N. Y., natural gas was being used notably in Rochester, Sheffield, Erie, and Bradford, in Pennsylvania; Painesville, East Liverpool, and Gambier, in Ohio; and in New Cumberland, W. Va.

The town of Findlay, O., was settled in 1836. In 1838 one of the settlers dug a well which yielded sulphurous water and inflammable gas. By a rude contrivance the gas was

carried into the house, and then used for domestic heating. The extended use of natural gas in the so-called oil region of the Ohio valley led in 1884 to the formation, in Findlay, of a company to drill for gas. The successful drilling of the first well at Findlay was immediately followed by others, until in Jan., 1886, the famous Karg well was drilled to a depth of 1,144 feet in twenty-four days. It is estimated to have yielded from a 4-inch pipe 12,080,000 cubic feet daily. The total gas-production in Findlay soon amounted to 25,000,000 cubic feet daily, numerous manufactories were established, and the place increased rapidly in population. Other towns throughout Ohio, Indiana, and Illinois had the same experience. The gas was carried into Chicago, Detroit, and other cities more than 100 miles distant from the wells through pipes that had scarcely been laid before the decreased pressure and volume of the gas necessitated the substitution of pumps for the natural pressure of the gas. Natural gas as a fuel has become an important factor in the commercial and industrial world of the central U. S., but it is generally conceded that an artificial substitute must soon take its place in the progress of civilization.

Geographical Distribution.—Natural gas is very generally distributed. It is particularly abundant in those regions that furnish petroleum and other forms of bitumen, but it is also found in other regions where metamorphic or volcanic action has not disturbed the crust of the earth. In the U. S. the most eastern point that has furnished it is Dutchess co., N. Y., on the east side of the Hudson river. The points, however, E. of the Alleghany Mountains at which it has been observed are few, if any, S. of the State of New York. It has been reported from nearly every county in New York State except the Adirondack region, but it is in the region tributary to the city of Buffalo that large and remunerative quantities have been obtained. Throughout the entire oil region of Western Pennsylvania, and extending into Armstrong and Westmoreland Counties to the E., enormous quantities of natural gas have been supplied, particularly to the city of Pittsburg. West Virginia and Eastern Kentucky have long furnished gas, while nearly the whole State of Ohio, Northern and Central Indiana, and Central Illinois have been prolific fields, in many instances furnishing enormous quantities for many years. Outside this territory, lying in the northern Mississippi basin, there is scarcely a section of country to the W. and S. of large extent that has not yielded natural gas, but rarely in quantities of economic importance.

On the Pacific slope natural gas occurs throughout nearly the entire State of California. It accompanies petroleum in the counties of Los Angeles and Ventura. A large part of the fuel consumed in the city of Stockton is supplied from wells. A large area around Sacramento yields natural gas in quantities sufficient to make it an important factor in the fuel-supply of that region.

Outside the U. S. the peninsula of Ontario, in Canada, has yielded natural gas in quantities locally valuable. In South America and the Eastern continent, with the exception of China, natural gas has never been developed by artesian borings, and the extent to which it exists is unknown.

The Chemistry of Natural Gas.—The natural gas which is the subject of this article should be distinguished from natural gas which occurs in volcanic regions and is the product of volcanic action. In a general way the first may be distinguished as a combustible gas, the second as consisting of the products of combustion.

The following results of analyses will, by comparison with those that are given of combustible gases, illustrate more clearly the generic differences between the two classes of gases. Nos. I. and II. are analyses of the gases rising through the Lago di Nafta in the Val del Bove of Etna. No. III. is an analysis of the gases evolved from fumaroles on the island of St. Paul.

CONSTITUENTS.	I.	II.	III.
CO_2	94·23	84·58	14·24
CH_4	1·82	2·42	.....
O	0·28	4·52	17·01
N	3·79	1·89	68·75
H_2S	....	6·17	.....

No combustible gases are evolved by the Caldeira de Fumas, San Miguel, Azores, which differs in this respect from the geysers of Iceland and the Suffioni of Tuscany, both of which invariably yield hydrogen and marsh-gas (CH_4), mingled with various incombustible gases. The gases evolved from solfataras contain CO_2, H_2S, O, and N. The Great Solfatara yields steam, hydrogen sulphide (H_2S), carbonic acid (CO_2), oxygen, and nitrogen.

The composition of the combustible natural gas of Pennsylvania, etc., is found to vary not only in different wells, but in the same wells on different days.

The following analyses were made on four different days in four months of gas from Westmoreland co., Pa., used at the Cambria iron-works:

CONSTITUENTS.	1.	2.	3.	4.
Marsh-gas, CH_4	67·00	49·58	57·85	75·16
Hydrogen	22·00	35·92	9·46	14·45
Ethyl hydride, C_2H_6	5·00	12·30	5·20	4·80
Ethylene, C_2H_4	1·00	0·60	0·80	0·60
Oxygen	0·80	0·40	2·10	1·20
Carbonic oxide, CO	0·60	0·40	1·00	0·30
Carbonic acid, CO_2	0·60	0·40	....	0·30
Nitrogen	3·00	....	23·41	2·89

Analysis of the Fredonia gas shows it to be a mixture of marsh-gas (CH_4) and ethyl hydride (C_2H_6), with a small quantity of carbonic acid and nitrogen. Analysis of the gas from two burning springs in West Virginia showed it to consist almost exclusively of marsh-gas, with a small quantity of carbonic acid and nitrogen, and traces of carbonic oxide and oxygen.

In the following table is shown the composition of the gas of five wells in the oil regions of Pennsylvania, and immediately following that is a table showing the composition of the gas from seven wells in Northwestern Ohio and Central Indiana, all of which yielded gas from the Trenton limestone:

ANALYSES OF GAS FROM WELLS IN THE OIL REGIONS OF PENNSYLVANIA.

NAME OF WELL.	Oxygen.	COMBUSTIBLE CONSTITUENTS.					Carbonic acid, CO_2.	Nitrogen.	Specific gravity.
		Hydrogen.	Methyl hydride, CH_4.	Ethyl hydride, C_2H_6.	Propyl hydride, C_3H_8.	Carbonic oxide, CO.			
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	
Burns's gas-well	....	6·10	75·44	18·12	trace.	trace.	0·34	....	0·6148
Leechburg gas-well	....	0·56	89·65	4·39	trace.	0·26	0·35	....	0·5580
Harvey gas-well	....	13·50	80·11	5·72	trace.	trace.	0·66	....	0·5119
Cherry-tree gas-spring	0·83	22·50	60·27	6·80	.....	.....	2·28	7·32	.....
Pioneer Run well	....	.....	.....	....	chiefly.	.....	small.	small.	.....

ANALYSES OF GAS FROM THE TRENTON LIMESTONE OF OHIO AND INDIANA.

LOCALITY.	Oxygen.	COMBUSTIBLE CONSTITUENTS.				Carbonic acid, CO_2.	Nitrogen.	Hydrogen sulphide, H_2S.
		Hydrogen.	Marsh-gas, CH_4.	Olefiant gas, C_2H_4.	Carbonic oxide, CO.			
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Fostoria, O	0·35	1·89	92·84	0·20	0·55	0·20	3·82	0·15
Findlay, O., sp. gr. 0·566	0·39	1·64	93·35	0·35	0·41	0·25	3·41	0·20
St. Mary's, O	0·35	1·74	93·85	0·20	0·44	0·23	2·98	0·21
Muncie, Ind	0·35	2·35	92·67	0·25	0·45	0·25	3·53	0·15
Anderson, Ind	0·42	1·86	93·07	0·49	0·73	0·26	3·02	0·15
Kokomo, Ind	0·30	1·42	94·16	0·30	0·55	0·29	2·80	0·18
Marion, Ind	0·55	1·20	93·58	0·15	0·60	0·30	3·42	0·20

A comparison of these several tables shows that marsh-gas is the principal constituent of all of these gases; at the same time it will also be observed that, while a marked variation is found in the gases from Pennsylvania, a very remarkable uniformity prevails in the Trenton limestone gas from wells scattered over a very wide area. This is due to the fact that the gas of Pennsylvania is uniformly associated with petroleum in greater or less quantity, and it therefore is nearly impossible to secure it free from the lighter products of petroleum that under varying conditions of temperature and pressure assume the liquid or gaseous form and mutually dissolve each other.

The presence of hydrogen sulphide in the gas from the Trenton limestone is characteristic of the bitumens issuing from that formation.

As related to the constituents of the petroleums issuing from the older rocks of the northern Mississippi basin, natural gas is composed to the extent of more than 90 per cent. of the initial member of the marsh-gas or paraffin series of hydrocarbons, of which those petroleums are largely composed. Some varieties also contain olefiant gas, which is the initial member of the ethylene series, a series of hydrocarbons also found in small quantity in Pennsylvania and other petroleums. As the production of oils similar to petroleum by artificial means is always accompanied by the formation of varying quantities of marsh-gas and olefiant gas, it is not surprising that similar operations in nature should result in similar products. So also the natural products of combustion are similar to the gases issuing from fumaroles and other forms of volcanic action. See HYDROCARBONS.

Drilling of Wells and Distribution of Gas.—The method of drilling wells for natural gas is precisely like that employed in the drilling of petroleum-wells. (See WELL-DRILLING.) The distribution of the gas is conducted in a manner precisely similar to that of distributing ordinary illuminating gas.

Uses of Natural Gas.—With the exception of the Neff wells near Gambier, O., and a few others, natural gas is used exclusively for fuel. The gas of the Neff wells was used for the production of lampblack soon after they were drilled. The black is obtained from the imperfect combustion of the gas, by which a large part of the carbon is deposited in a dense form of lampblack of excellent quality, known as diamond black.

Natural gas is the most valuable form of fuel known. Theoretically, 1 lb. of Pittsburg coal is equal to 18·33 cubic feet of Pittsburg gas; but experimentally 7·5 feet of gas is equal to 1 lb. of coal. Findlay gas has been proved to be somewhat better. At the height of the use of natural gas in Pittsburg, 28,000 domestic services and 900 manufacturers' services supplied the city. These used between 400,000,000 and 500,000,000 feet per day, displacing 8,500,000 tons of coal per year. It has been found excellent for the manufacture of iron, steel, and glass, for burning fire and other brick and pottery, and for the generation of steam.

See BITUMEN, HYDROCARBONS, PETROLEUM, and ILLUMINATING GAS.

S. F. PECKHAM.

Natural History: a term used in different senses at different times and by different persons. (1) Formerly it was extended to embrace the consideration of all the objects, as well as the phenomena, of nature, and hence, in addition to mineralogy, zoölogy, and botany, embraced chemistry, physics, and astronomy; and protests were made by physicists at the attempt to restrict the term to its present more generally accepted sense. (2) It is now, however, limited to the history of the natural objects known under the names of minerals, plants, and animals in their normal conditions. (3) There is also a tendency to still further restrict it to zoölogy, for which it is frequently used in conversation, and occasionally in popular literature, as an interchangeable term. This last usage, however, is not sanctioned by good authority or by the necessities of the case, the word zoölogy being all-sufficient, and the common name being necessary for that branch whose objects of study belong to the three kingdoms in question. The objects taken cognizance of by natural history fall naturally into two great groups: (1) the *mineral empire* or *mineral kingdom*, considered under the head of MINERALOGY; and (2) the *organic empire*, discussed under the term BIOLOGY. Biology is itself subdivided into (*a*) botany, which treats of the vegetable kingdom, and (*b*) zoölogy, which has for its domain the animal kingdom. Nothing can be predicated respecting characters common to all the bodies which belong to the several kingdoms indicated which does not more properly pertain to the science of somatology, which falls within the sphere of the physicist; and there is little in common even as to methods of study or terminology.

Naturalization: an act or process performed by an alien when he transfers his allegiance from the country of his origin and from his sovereign to another country and sovereign. His original allegiance remains until replaced by the new. There may be *partial* or qualified naturalization, which does not make aliens completely equal in all respects to native-born citizens or subjects; thus by the Constitution of the U. S. (Art. II., Sect. 2, § 5) no naturalized citizen can become President of the U. S., and for some time in England no such person could be a member of the privy council or of either house of Parliament. Complete naturalization gives all the rights and imposes all the obligations of a native-born citizen. Most states give privileges of naturalization, but there is great difference in regard to the conditions. Hence a conflict of laws may arise with respect to the same individual on his return to his original country. The English doctrine for a long time was that allegiance to the crown was perpetual and indissoluble. Hence an Englishman naturalized by the law of the U. S. was held to be still a British subject, and many such were in the early part of the nineteenth century taken on the high seas out of U. S. vessels, on the ground of owing military duty to the crown, and were impressed into the English naval service. If the allegiance were indissoluble, *jure gentium*, it would not follow that this procedure of taking these persons out of neutral vessels was authorized, since it was an attempt to enforce a municipal law of one state within the jurisdiction of another; at present this claim must be abandoned as far as the U. S. are concerned, owing to the new position in regard to naturalization which treaty has imposed on Great Britain, and in regard to taking persons out of neutral vessels on the high seas, which that Government took in the case of the Trent.

Naturalization involves all rights of person and property, including generally that of holding real estate, but does not extinguish claims which were in force at the time the person concerned altered his allegiance. Thus numbers of young men have left different parts of Germany to escape from the military duty required for a certain time of all able-bodied males. The fact of passing through the forms of allegiance according to the laws of the U. S. would not protect such persons from the operation of laws to avoid which they removed from their native country.

How far the incomplete process of naturalization is to have effect in entitling a person to protection is a matter of doubt, since it depends on the person himself whether he will complete the act according to his expressed intention. The case of Koszta, who was seized in a Turkish port at the instigation of the Austrian consul-general, next was put into the hands of the French consul-general in consequence of the threat of force made by a captain of a U. S. vessel then in the port, and finally set free so as to go to the U. S., is in point. This was in 1854.

Treaties of the U. S. with German powers and with Great Britain have so defined the claims of the original and the adopted country as to prevent conflict of laws as far as possible. In the treaty with the North German confederation, and in that with Bavaria made in 1868, five years of uninterrupted residence with formal naturalization constitutes citizenship on both sides. The mere declaration to become a citizen is of no effect. Residence is understood, as the Bavarian treaty expresses it, in the *jural* sense, so that it is not interrupted by a transient absence. A person returning to his former residence is not protected by his naturalization from responsibility for crimes committed before his emigration; and such a person residing more than two years in his original country is held to have renounced his naturalization. In the Bavarian treaty it is agreed that the treaty shall not affect a provision of the military law by which Bavarians, emigrating before the end of the prescribed military service, can not on their return be admitted to permanent residence in the land until they shall have become thirty-two years old; but it is understood that if a certificate of emigration has been granted liability to military service shall be wiped out by naturalization. Such treaties were made with Baden, Bavaria, Belgium, Hesse, Mexico, the North German Union and Würtemberg in 1868; with Sweden and Norway in 1869; with Austria and Great

Britain in 1870; with Denmark in 1872. It should be added that in the treaties with Austria and Baden evasion of military service, when the emigrant actually was in the ranks or had been drawn, was not to be pardoned though naturalization followed. This was expressly stated in these treaties, but the same rule would probably hold good in the other treaties, desertion being a crime. The convention with Great Britain provides that the subjects or citizens of either nation, naturalized according to the laws of the other, shall be held to be for all purposes subjects or citizens of the other; that they may again exchange their nationality on terms to be agreed upon within a certain time after the date of the convention; and that on renewing their residence in either country they may be readmitted to the character and privileges of a citizen or subject, and not be claimed by either country on account of the previous naturalization. In 1868 the U. S. gave up the claim to indelible allegiance.

Revised by T. S. Woolsey.

Laws Governing Naturalization in the United States and Great Britain.—At the common law a foreigner or temporary resident in a country is bound to yield a local or temporary allegiance to the state and obey its laws, and is entitled to protection by its government, and redress for his injuries in its tribunals. This allegiance, however, is to be distinguished from the allegiance which is due from a citizen to the state; and the right to protection and redress does not include many of the rights which belong to a citizen to acquire and dispose of property, to exercise political franchises, etc. See the articles on Alien, Allegiance, and Citizen.

Before the formation of the U. S. the American colonies of Great Britain each exercised the prerogative of adopting naturalization laws, and the laws passed mainly aimed to promote immigration; but the Constitution of the U. S. provides that "Congress shall have power to establish an uniform rule of naturalization." This power vested in Congress by the Constitution is held to be exclusive; and in the exercise of it various statutes have been passed prescribing the qualifications and formalities requisite for an alien to become naturalized. This exclusive authority, however, does not deprive the States of the right to regulate by statute the abilities and disabilities of aliens in regard to the acquisition and transfer of property, nor does it prohibit them from investing aliens with the privileges of State citizenship, such as the right to vote in State elections, hold State offices, etc. (See Citizen.) The Federal naturalization laws are very liberal, and in nearly all respects naturalized citizens are placed on the same footing as those who are native-born. The Constitution provides that no naturalized citizen shall be eligible to the office of President or Vice-President, and that no person shall be elected to the U. S. Senate who shall not have been a citizen for nine years, or to the House of Representatives unless he shall have been a citizen for seven years.

In substance, the naturalization laws of the U. S. at present provide that to become naturalized the alien must declare on oath before a circuit or district court of the U. S., or a district or Supreme Court of the Territories, or a court of record of any of the States having common-law jurisdiction and a seal and a clerk, two years at least prior to his admission, that it is *bona fide* his intention to become a citizen of the U. S., and to renounce forever all allegiance and fidelity to any foreign prince, state, or sovereignty of which the alien may be at the time a citizen or subject. His full admission to citizenship can not, however, take place until he has resided within the U. S. for the continued term of five years next preceding his admission, and one year at least within the State or Territory where the court is held to which he makes application. At the time of this application to be admitted he must declare on oath before some one of the courts above mentioned that he will support the Constitution of the U. S., and that he absolutely and entirely renounces and abjures all allegiance to every foreign power, and particularly to that state of which he was before a citizen. These proceedings must be recorded by the clerk of the court. It must be made to appear to the satisfaction of the court admitting the alien to naturalization that he has duly fulfilled the prescribed qualifications in regard to the term and place of residence, and that during that time he has behaved as a man of good moral character, is attached to the principles of the Constitution of the U. S., and is well disposed to the good order and happiness of the same. If the alien has borne any hereditary title or been of any of the orders of nobility in the kingdom or state from which he came, he must also make an express renunciation of his title or order of nobility; and this renunciation must be recorded in the court.

If the alien is a minor the rules in regard to his admission of citizenship are somewhat different. If he has resided in the U. S. three years next preceding his twenty-first birthday, and five years (including the three of minority) before making his application to be naturalized, the residence being continuous, he is not required to make the preliminary declaration above described of intention to become a citizen; but he must make the same declaration at the time of his admission as is required of other applicants; and must further declare on oath, and prove to the satisfaction of the court, that for two years next preceding it has been his *bona fide* intention to become a citizen, and must in all other respects comply with the naturalization laws. The minor children of alien parents who are naturalized become thereby citizens themselves, without any application on their own part being necessary if they are then dwelling in the U. S.

If a husband dies before he is actually naturalized but after he has taken the preliminary oath of intention to become a citizen, his widow and children are declared to be citizens, and are entitled to all rights and privileges as such upon taking the oath prescribed by law. There are also special statutory provisions in regard to the naturalization of aliens who have served in the U. S. army, and of foreign seamen. The general provisions of the naturalization laws apply to aliens of African nativity and to persons of African descent. Under the laws as they now (1894) stand Chinese and Japanese can not become naturalized.

Aliens who are citizens or subjects or denizens of a country with which the U. S. is at war at the time of their application can not be naturalized until the restoration of peace.

In Great Britain no general naturalization law was enacted until the year 1844. Before that time naturalization could be effected only by special act of Parliament, but it had been provided by statute that an alien naturalized in this mode should still remain under important disabilities; he was still incapable of being a member of the privy council or of Parliament, or of holding a civil or military office, or receiving grants of land from the crown. A practice, however, has existed from an early period for the king to grant letters of denization to aliens, which have the effect of removing an alien's disqualifications to a limited extent. A denizen is described as occupying a kind of middle state between an alien and a natural-born subject, having, as it were, an intermediate legal status. Thus he may take lands by purchase or devise, though an alien can not; but he can not take by inheritance. A denizen, moreover, can not belong to the privy council or Parliament or hold any public office of trust. A comprehensive statute in regard to the naturalization of aliens was enacted in 1870 (33 Vict., ch. 14), and this with slight changes or additions is the law at present in force. By this it is provided that an alien who has resided in the United Kingdom, or has been in the service of the crown, for a term of not less than five years, and intends, when naturalized, to continue either his residence or his service, may apply to one of her Majesty's principal secretaries of state for a certificate of naturalization. The applicant must present such evidence of residence or service and intention to reside or serve as the Secretary of State may require, and the Secretary may then, in the exercise of his own discretion, with or without assigning a reason, give or withhold a certificate as he thinks most conducive to the public good, and no appeal lies from his decision; but such certificate will not take effect until the applicant has taken the oath of allegiance. An alien to whom a certificate of naturalization is granted is entitled in the United Kingdom to all political and other rights, powers, and privileges, and is subject to all obligations, to which a natural-born British subject is entitled or subject, with this qualification, that he shall not, when within the foreign state of which he was previously a subject, be deemed to be a British subject unless he has ceased to be a subject of that state in pursuance of the laws thereof or pursuant to treaty provisions.

For a fuller treatment of the whole subject, and the particulars of statutory provisions, see the works of Cockburn and Howell on *Nationality*; the works of Scott, Cutler, Bidoulae, and Boese on *Naturalization*; Hansard on *Aliens and Naturalization*; and the works of Woolsey and Wheaton on *International Law*.

F. Sturges Allen.

Natural Law: See the Appendix.

Natural Philosophy: that branch of physical science which deals with properties of bodies that are unaccompanied by essential changes of the bodies themselves. See MECHANICS.

Natural Selection: See EVOLUTION.

Natural Theology: a science treating of the existence and character of God as these may be known from reason and nature. It investigates the evidences of his being and seeks to determine his attributes and relations to the world. The conclusions thus reached and scientifically established form what is rightly termed rational theism, or the doctrine of God as ascertainable apart from supernatural revelation.

The primary idea upon which it proceeds is that, if there be a God as the Creator or First Cause of the universe, his existence and character must be found impressed upon it and discoverable from it. The author of a work is revealed in the work he has done. The world is viewed as a visible expression of the being and thought, if there be any, of its source. One of the primary conceptions of science is that nature holds and presents in its constitution and order some record of its origin, legible to the reason of those who honestly study it. Natural theology therefore seeks to examine this record, take its testimony, and thus, if possible, ascend through nature up to nature's God.

History.—Efforts to construct a natural theology appear very early. The most ancient literatures of the nations present many of its truths or conclusions in more or less systematized form. The *Vedas* of the Hindus, the *Zend-Avesta* of the Persians, the *Book of the Dead* and other writings of the ancient Egyptians, contain illustrations of the earliest recorded efforts of the human mind toward a knowledge of Deity. Socrates and Plato among the Greeks, and Cicero and Seneca among the Romans, made earnest and to some degree successful efforts to give rational account of men's spontaneous faith in the divine existence. In all ages of the Christian Church theologians have claimed that the works of nature exhibit the being, power, wisdom, and goodness of their author, and that revelation presupposes and recognizes this truth. The *Theologia Naturalis sive Liber Creaturarum* of the Spanish physician Raymund de Sabunde, in the early part of the fifteenth century, however, seems to have been the first attempt to construct a distinctively natural theology. During the seventeenth century natural theology made considerable progress, rose to increased prominence in the eighteenth, and reached a golden period in the early part of the nineteenth century through the celebrated Bridgewater Treatises and other able works. The subject has continued to hold a place of undiminished interest amid the surpassing philosophical and scientific progress with which the nineteenth century closes.

Its Fundamental Postulates.—In its reasoning it assumes as valid the so-called intuitional or *a priori* truths, especially the law of causation, which demands an adequate cause for every event. In this, however, it does only what all true science does. Whatever psychological explanation may be given of these truths or beliefs, it is undeniable that their authority is supreme and invincible in the practical thinking and reasoning of the race, and that neither science nor philosophy can impeach their validity without suicide.

Great variety has marked the theistic evidences from the numerous sources whence they are drawn. Since the proper proofs of the divine existence must be regarded as including all the phenomena of the whole world of matter and mind open to our study and interpretation, these evidences must be literally countless and inexhaustible. They are impressively cumulative, as the immeasurable realm of nature, life, and history is more and more explored. They appear in thousands of different ways to different minds. If it is fair to assume a single evidence, there are many evidences. If there is one, there are innumerable points of light revealing the divine. Natural theology therefore rests its conclusions not simply on one or several formal proofs, but upon the aggregate testimony of the whole cosmical system and all its particulars, upon the force and consilience of the indications in nature, thought, and history as they are found running up and compacting their varied logic in one common demand.

Forms of Argument.—Different methods of viewing nature's testimony, as well as difference as to the parts considered, have given the theistic reasoning a number of leading characteristic forms. These stand simply for generic methods of shaping our view of nature's witness to the real existence and attributes of the Being for whom the idea of God stands in the human mind. Sometimes the method is *a priori*, proceeding directly from ideas which are held to be necessary in the mind's own insight and consciousness. Sometimes it is *a posteriori*, as necessary inference or logical conclusion from observed facts. Commonly the reasoning is found to unite the two methods. Sometimes the argument is based upon the existence and phenomena of mind; sometimes upon the facts of physical organization and life; sometimes on the order and glory of the heavenly bodies; sometimes on the structure and adaptation evident in the chemical elements and material atoms. Besides some forms of presumptive proof, such as the universality of the idea of God in the human mind, so normal as to force itself in some form or other into the belief of all ages and tribes; the religious instinct of the race, showing a natural and profound adjustment of the human constitution to worship; the benign influence of belief in God, quickening the sense of duty and responsibility, in which personal and social life reaches its best and happiest order; and the fact that all the phenomena of the world are best explained on the assumption of the existence of God, the theistic arguments, though wrought out in greatly diversified ways, have for the most part fallen under the following types:

1. The *ontological* argument. The germs of this were involved in Plato's "ideas," but it was first formulated by Anselm in the eleventh century. From the existence in the human mind of the idea of a most perfect being it concluded that the most perfect being exists—because real existence is a necessary part of the idea of the most perfect being. Descartes, Bishop Butler, Leibnitz, Cousin, Samuel Clark, and many other eminent writers have used this method of argument; but, standing alone, it has often been shown to be unsound, in confounding real objective existence with the simple idea of it in the mind. Its only force rests on the *necessity* of the idea in human thought. The universality of the idea proves it to be spontaneous and necessary in the action of mind in the presence of nature. Our knowledge of actual being compels us to believe in self-existent or unoriginated being. Thus God becomes the ultimate necessity in human thought. This method of reasoning, however, besides being too metaphysical for general apprehension, fails to exclude pantheistic conceptions or make clear the distinction between God and the universe itself.

2. The *cosmological* or, more exactly, *ætiological* argument. This reasons from the existence of the world as contingent and dependent, to the existence of God as the necessary unconditioned self-existent cause. That the world has had a beginning is indisputable, and science is busy only with the question *how* it came to be. In all its parts, and as a whole, nature is found to be finite and conditioned. In searching for the cause of it all, the inexorable demand of the law of causation can never be satisfied till a cause is reached that is not itself an effect, a first cause, a self-existent, absolute cause. This draws the line clearly between self-existent being and all originated and dependent being. Modern research and progress have not discredited, but rather, if possible, strengthened, the force of this argument, for they have left no place for the anciently asserted notion that the world itself may be regarded as eternal, and, despite former metaphysical questionings, they have recognized with the most absolute confidence the validity and universality of the law of causation for the real system of the world.

3. The *teleological* argument. This seems to have been the earliest form of theistic reasoning, and still remains the most prominent and impressive. It is usually known as the proof from design or "final cause." Its peculiarity is that while based, as is the cosmological, on the principle of causation, it considers specifically the marks of order and purpose everywhere in nature. Teleology, or clear adjustment of structure to predetermined ends, is so omnipresent a reality in the world that we are never out of sight of it. It seems to be coextensive with the highest law of the universe. The world appears to be a thought with purpose or intent shining all through it, from its primary adapted atoms acting like "manufactured articles" up through all the aggregations in which atoms are built into a cosmos. The correlate to all this is a Thinker, as the creator of the world. The excellence of this argument is that its conclusion leads directly and necessarily to the intelligence and personality of the self-existent First Cause. This argument, together with the cosmological, has been assailed by severe criticism in

some modern philosophies and forms of speculative science. The chief philosophical objection, apart from that which has sought to vacate the law of causation itself as but a "form of thought," has been the claim that the world, being only finite, can not demand the infinite as its cause. This is conceded; but the value of the argument remains practically the same; for all that is sought from this form of proof is the existence of a personal creator of the actual universe. This is enough; but the main objection has come from a form of speculative science in connection with the hypothesis of evolution. This is thought by some to show how the universe of structure and organism has been immanently evolved from primordial matter without intelligent purpose. The answer to this, believed to be amply sufficient, is that any atheistic hypothesis of evolution must resolve itself into the incredibility of "chance," and especially that the great majority of evolutionists themselves maintain that evolution, being not a *cause*, but only a *mode*, does not set aside teleology, but enlarges its scope and range. Numerous discussions, especially the masterly work on *Final Causes*, by Paul Janet, have thoroughly vindicated the high place of this form of proof.

4. The *moral* argument, drawn from the facts of conscience and ethical law in the world. It is shaped in different ways, according as it reasons directly from the existence of conscience or from the course of history, with their realities of moral law and necessary presuppositions of a moral law-giver. In the ethical capacities and obligations human nature reaches its highest ascent. As the cosmical system thus culminates in ethical law, its author must be a moral governor. To this argument evolutionism suggests the objection that what is reputed to be ethical law is but the race's experiences of utility transformed into judgments of approval and incorporated as mental instincts by hereditary descent, but this objection fails by disregarding the fact of an irreducible distinction between the judgments of utility and those of right or righteousness.

Divine Attributes.—Natural theology claims that the evidences of the divine existence necessarily fix some fundamental conceptions of the divine nature and attributes. Over against the negations of agnosticism it claims to be able to know not only that God is, but to some degree *what* he is. Reflected from the realities which prove his being, we learn some of the perfections which belong to him and by which he is indeed God. Hence natural theology affirms of him self-existence, as the absolute First Cause; eternity, as necessarily involved in self-existence; personality, as the logical presupposition for the cosmic order and design; unity, as the one and only ground of the universe; omniscience, omnipresence, omnipotence, infinite wisdom, perfections reflected from the immensity of nature; holiness or righteousness, necessarily presupposed from the moral constitution of man and the world; and goodness, evident from the general arrangement of nature's structures for creature enjoyment.

God's Relation to the World.—This also is in a measure reflected from the evidences of his being; but it presents many profound and difficult problems which at once challenge thought and baffle satisfactory solution. Yet as the Cause of the world God is necessarily apprehended as before and above it, in a divine transcendence. As nature, however, exhibits the divine causation as working everywhere within it, the divine immanence is equally certified. He is in the world, but not a part of it. There are thus excluded both a pantheistic identification of God with nature, and a deistical separation or withdrawal from it. The world is God's world, and must have its purpose and plan in the divine counsel; but here natural theology joins on to supernatural revelation, which gives the fuller needed knowledge both of the divine attributes and of God's relation and purposes with respect to nature and man.

LITERATURE.—Besides the older discussions by Clarke, Newton, Derham, Nieuwentyt, Paley, and the Bridgewater Treatises, the chief later works are Tulloch's *Theism* (New York, 1855); Thompson's *Christian Theism* (London, 1855); Buchanan's *Modern Atheism* (Boston, 1867); Mahan's *Science of Natural Theology* (Boston, 1867); Chadbourne's *Natural Theology* (Boston, 1867); Jackson's *Philosophy of Natural Theology* (New York, 1875); Cocker's *Theistic Conception of the World* (New York, 1875); J. P. Cooke's *Religion and Chemistry* (Boston, 1864); Fairbairn's *Studies in the Philosophy of Religion and History* (New York, 1876); Flint's *Theism* (Edinburgh, 1878); Flint's *Anti-Theistic Theories* (Edinburgh, 1879); Janet's *Final Causes* (trans. from French, Edinburgh, 1878); Diman's *Theistic Argument* (Boston, 1881); Bowne's *Studies in Theism* (New York, 1879); Harris's *Philosophical Basis of Theism* (Boston, 1883); Fisher's *Grounds of Theistic and Christian Belief* (New York, 1883), *Natural Theology* (1893); Valentine's *Natural Theology or Rational Theism* (Boston, 1890); Bowne's *Philosophy of Theism* (New York, 1887). M. VALENTINE.

Nature-study: See the Appendix.

Nauck, nowk, AUGUST: scholar; b. in Auerstädt, near Merseburg, Germany, Sept. 18, 1822; was educated in the gymnasium of Schulpforta and at Halle. After teaching at various gymnasia in Berlin, he was called in 1856 as member extraordinary of the Imperial Academy of Sciences to St. Petersburg, where he remained until his death Aug. 3, 1892. Nauck was one of the greatest text-critics of modern times. Of his many works, exclusively confined to Greek, the following are the most famous: *Aristophanis Byzantii fragmenta* (1848); Euripides with the fragments (3d ed. 1877); *Tragicorum Græcorum fragmenta*, his masterpiece, and the standard work on the subject (2d ed. 1889, with *Tragicæ dictionis index*, 1892): Sophocles with German notes, first edited by Schneidewin (text ed. 1867); Homer's *Odyssey* (1874) and *Iliad* (1877); *Iamblichus de vita Pythagorica* (1884); *Porphyrii Opuscula selecta* (2d ed. 1886). Cf. Th. Zielinski, *August Nauck* (Berlin, 1894), where a complete list of his writings, 121 in all, is given.

ALFRED GUDEMAN.

Naucratis, or **Naukratis**: a garrison city established by PSAMMETICHUS I. (*q. v.*) about 665 B. C., for his Ionian and Carian mercenaries. It was located at what is now called Tell Nebireh, on a canal W. of the Rosetta branch of the Nile, near Sais, the capital of the twenty-sixth dynasty, and close to the Libyan frontier (30° 50′ N. lat., 30° 30′ E. of Greenwich). Its site was discovered by W. M. Flinders Petrie in 1883, and explored by him in 1885–86. Its origin was entirely Greek. The subsequent history of the Persian, Ptolemaic, and Roman periods of the city is in doubt, on account of the excavations made by natives, which uncovered the Greek antiquities but destroyed all later accretions. A factory for making Greek imitations of Egyptian scarabs was found by Petrie, with remains dating down to Apries (Hophra), but none from the reign of Amasis. This dates the original town quite exactly, but the discoveries at Daphnæ (see TAHPANHES) serve to determine the time more closely still. The pottery found at Naucratis was clearly Greek, and apparently formed of Greek clay; in style it was quite distinct from that of Daphnæ. Naucratis contained a number of large buildings—a temple to Hera, another to Aphrodite, a small one to the Dioscuri, the Panhellenion, the largest of all and the Greek religious center of Egypt, and, oldest of all, a temple to the Milesian Apollo, in the center of the town. The whole was originally fortified. The discovery of Naucratis was important, not only in itself, but in its results, since it threw light upon the earliest intercourse between Egypt and Greece, and also upon the history of the Greek alphabet, the Naucratian specimens of Greek caligraphy being among the oldest known. After the time of Amasis and the destruction of Daphnæ the place was the only one where trade with Greece was allowed. See Herodotus, ii., 178; Strabo, xvii., i., 18, 23, 33; Petrie, *Ten Years' Digging in Egypt*: and Edwards, *Pharaohs, Fellas, and Explorers*. CHARLES R. GILLETT.

Naugatuck: borough (incorporated in 1893, made coterminous with the town in 1895); New Haven co., Conn.; on the Naugatuck river, and on the Naugatuck Division of the N. Y., N. H. and Hart. Railroad; 5 miles S. of Waterbury (for location, see map of Connecticut, ref. 10–F). Its manufactures include rubber and woolen goods, malleable iron, paper boxes, pins, buttons, belt-lacing, and electro-plated ware; and it has a public library (3,600 vols.), a public-school building (both the gift of a citizen), a national bank with capital of $100,000, a savings-bank, and three weekly newspapers. Pop. (1880) 4,274; (1890) 6,218; (1900) 10,541.

T. F. KANE, SUPERINTENDENT OF SCHOOLS.

Nau'plia: town of Greece, in the Peloponnesus; on a rocky peninsula in the Argolic Gulf (see map of Greece, ref. 17–K). Of small importance in the classic period, it was entirely deserted at the time of Pausanias (174 A. D.), but became prominent during the Middle Ages. The Ottomans and Venetians long disputed its possession; it was held by the former from 1715 to 1825, when it was captured by the Greeks, who made it the seat of their government from 1829 to 1834. Its deep harbor, well sheltered from the winds, is

protected by the citadels of Palamedes and Itskale, the former 720 feet above the town, and the latter built on the site of the ancient acropolis. From a military standpoint Nauplia is the most important town in the kingdom, and the Greeks call it the Gibraltar of Greece. Pop. (1889) 5,459.

E. A. GROSVENOR.

Nauplius [Lat., a kind of shellfish, from Gr. *ναῦς*, ship + *πλεῖν*, to sail]: a name given to the young of a certain crustacean under the impression that it was adult, and now used as a term for a particular stage in the development of these forms. A nauplius has an unsegmented body, a single median eye, and three pairs of appendages. Of these the anterior pair is simple and sensory, the two remaining pairs are two-branched and serve as swimming organs, while their basal joints, on either side of the mouth, are used for the comminution of food. A nauplius stage occurs in the history of most ENTOMOSTRACA (*q. v.*), but it is rare in the development of other Crustacea. From the wide distribution of the stage it was formerly regarded as indicating that the Crustacea had descended from a naupliiform ancestor, but many zoölogists no longer regard it as having any phylogenetic significance. See CRUSTACEA. J. S. KINGSLEY.

Nausea [= Lat., from Gr. *ναυσία*, sea-sickness]: the sense of impending vomiting. It is a symptom of many diseases, and occurs as a result of irritation of some part of the alimentary canal or of the nervous centers which preside over its functions. In some cases nausea passes on to vomiting, in others it goes no further than to produce a feeling that vomiting might occur if the conditions provoking nausea were to continue. Vomiting may occur without nausea. The exciting causes of nausea are very numerous. It may be provoked by certain drugs known as emetics, such as ipecacuanha, tartar emetic, apomorphia, sulphate of zinc, sulphate of copper, and alum; while lukewarm water, with or without the addition of ground mustard seeds, and tobacco are familiar excitants of vomiting. Nausea is also often observed after the administration of morphia and after prolonged debauches. Nausea may be provoked by mechanical irritation of various parts of the alimentary canal, as, for instance, tickling the fauces. Overloading the stomach is a well-known cause of nausea and vomiting, and another—equally known to medical men—is the irritation caused by the compression of a loop of intestine which sometimes takes place in hernia or in a form of entanglement of the bowels within the abdominal cavity. Nausea may be caused by blows upon the head, the abdomen, the testicles or the ovaries, and it is a symptom of various disorders or diseases of the stomach and intestines, the brain, and the kidneys. Nausea and vomiting are induced by many poisons, and often occur in the early months of pregnancy, sometimes being in the latter case of a most intractable character. Nausea occurs in surgical shock, in fainting, and after the administration of ether. A peculiar form of nausea with vomiting is seen in some cases of consumption and in a disease of the ear called Menière's disease or labyrinthine vertigo, and in hysteria. In many fevers—especially in children—nausea is an early symptom, and vomiting occurs almost invariably in whooping-cough, although there is usually little nausea (in the strict sense of the term) in connection with the vomiting. In addition to these causes of nausea may be mentioned the mental impression made by disgusting sights or odors, terrifying circumstances, and the fact that individual peculiarities (idiosyncrasies) make certain persons prone to nausea from causes which do not similarly affect most persons.

Nausea is often a salutary condition, either as a warning of some impending danger or as an indication of the presence of some insidious disease; it is also the customary forerunner of vomiting, which itself is very often a most salutary process.

For the elaboration of these ideas and much that ought to be understood in connection with nausea and vomiting conjoined, see the article on VOMITING. CHARLES W. DULLES.

Nautch (nawch) **Girls**: See BAYADERE.

Nautical Almanac: See EPHEMERIS.

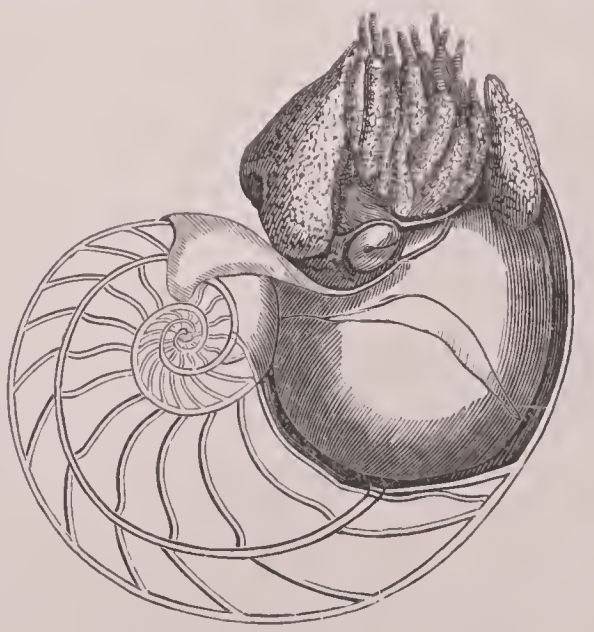
Nautical Schools: schools principally for the purpose of training boys for the merchant marine. They were of early origin, and were maintained with more or less success by the various nations engaged at different times in the struggle for commercial supremacy. In Great Britain there are a number of vessels upon which schools are maintained, some reformatory, others industrial in their nature, but all for the purpose of educating as sailors a class which otherwise would be unprovided for. In addition, there are two school-ships upon which boys are trained with a view to becoming officers in the merchant service.

By act of Congress, June 20, 1874, the Secretary of the U. S. Navy was authorized, for the purpose of promoting nautical education, to furnish, upon application of a Governor of a State, a suitable naval vessel, with her apparel, charts, books and instruments of navigation, to be used for the benefit of any nautical school established at New York, Boston, Philadelphia, Baltimore, Norfolk, San Francisco, (Wilmington, Charleston, Savannah, Mobile, New Orleans, Baton Rouge, Galveston, and in Narragansett Bay, added later), upon condition that there shall be maintained a school for the instruction of youths in navigation, seamanship, marine enginery, and all matters pertaining to the construction, equipment, and sailing of vessels, or any particular branch thereof. The President was authorized at the same time to detail proper officers of the navy that could be spared as superintendents or instructors.

By virtue of this act old wooden sailing vessels were assigned as follows: St. Mary's to New York in 1874; Jamestown to San Francisco in 1876; Saratoga to Philadelphia in 1889; and the steam-sloop Enterprise to Boston in 1892. While the nautical school in San Francisco lasted but a short time, that in New York has been maintained ever since its inception, and has served as a model for the others. Application for admission to it must be made in writing to the board of education of New York city, which controls the school, or in person on board the St. Mary's. The qualifications of candidates are as follows: Age between sixteen and twenty years; average size, sound constitution, and freedom from physical defects; inclination for seafaring life; and knowledge of reading, writing, spelling, and arithmetic. Candidates admitted are required to furnish their outfits and to deposit $30 to cover cost of uniform; the latter amount is forfeited should the lad desert or be withdrawn or expelled. The St. Mary's passes nine months of the year at sea, during which instruction is given in seamanship and navigation; the course lasts two years, and at its conclusion the proficiency attained is determined by examination.

According to the Postal Subsidy Act of Mar. 3, 1890, all subsidized ships must draw their apprentices from the nautical schools. C. BELKNAP.

Nautil'idæ [Mod. Lat., named from *Nau'tilus*, the typical genus, from Lat. *nau'tilus* = Gr. *ναυτίλος*, nautilus, liter., sailor, deriv. of *ναύτης*, sailor, deriv. of *ναῦς*, ship]: the only existing family of the once numerous group of Tetrabranchiate Cephalopods. (See MOLLUSCA.) The animal differs from that of other Cephalopods (squids and cuttlefish) by having numerous tentacles, an eye formed on the type of the pin-hole camera (i. e. without a lens), four gills, and a chambered shell. This shell is well known. It is coiled in



Section of a nautilus, showing its interior.

a flat spiral, and the interior is divided by partitions into numerous chambers, which are connected with each other by a tubular structure, the siphuncle. The animal occupies the large outer chamber. The only existing genus is *Nautilus*, and of the habits of this almost nothing is known, for while the shells—familiar as the "pearly nautilus"—are

common, the animals are among the greatest rarities. These animals feed on small crabs. Fossil forms belonging to this family are numerous, over 2,000 species being described; only six living species are known. J. S. Kingsley.

Nauvoo: city (founded by Mormons in 1840, subsequently occupied by a company of French Icarians, now settled principally by Germans); Hancock co., Ill. (for location of county, see map of Illinois, ref. 5–B); on the Mississippi river, at the head of the lower rapids; 8 miles S. of Fort Madison, Ia., 12 miles N. of Keokuk. The nearest railway station is that of the Chi., Burl. and Quincy, at Montrose, Ia., directly opposite, which is reached in summer by ferry and in winter on the ice. The city contains 5 churches, high school, 3 district schools, St. Mary's Academy for girls, a State bank with capital of $25,000, and 2 weekly newspapers. The prineipal business is agriculture and horticulture. About 100,000 gal. of wine are made annually, and from fifty to eighty carloads of table-grapes and twenty of strawberries are shipped each season. For events during the Mormon occupation, see Mormons. Pop. (1880) 1,402; (1890) 1,208; (1900) 1,321. Editor of "Independent."

Navajos: See Athapascan Indians.

Naval Academies: schools especially devoted to the training of officers for the naval service.

France.—Speeial instruction in the art of war originated in France, but it was carried on with no well-defined policy until 1810, when two schools for the navy were established, one at Brest, the other at Toulon. In 1816 they were united at Angoulême, and in 1827 the school was removed to Brest, where it has since remained. The naval school is on board the Borda, an old ship of the line, anchored in Brest roads; at its head is a captain, assisted by a commander, and a staff of 8 lieutenants, 12 professors, and 1 principal mechanician (engineer) as instructors. About 45 candidates are admitted annually. Admission is gained to the school by public competitive examinations held annually in various parts of the country. The qualifieations, in addition to a good bodily constitution and an age between fourteen and seventeen years, comprise a knowledge of history, geography, French, English, Latin, drawing, physics, chemistry, arithmetic, algebra, geometry, plane trigonometry, and analytical and descriptive geometry. The course of instruction embraces literature, history, geography, English, drawing, physics, chemistry, astronomy, analytical and mechanical science, naval architecture, and the theory and practice of seamanship, gunnery, steam-engineering, and small-arms. These are supplemented by praetical exercises and drills of various kinds, and by an annual practice cruise of two months. The discipline maintained is severe and the students, from whom over ten hours' daily work, Sundays included, is expected, are subjected to constant surveillance. With certain exceptions, the pupils are required to pay 700 franes yearly for subsistence, and 1,000 francs for outfit. After two years at the school those found qualified at the annual examination are transferred, with about four graduates yearly from the Polytechnic School at Paris, to the Flore, a screw steamer, eighteen guns, for the final practice eruise of ten months, after which, upon passing an examination in professional subjects, they become eligible for active service as midshipmen.

The school of naval architeeture, founded in Paris in 1765, and after several changes finally established at Cherbourg in 1872, is under the management of the naval construetors, the corps which designs and supervises the construction of ships and engines for the navy. At the head of the sehool is a director of naval construction, who gives instruetion, assisted by two naval constructors and two civil professors. The course of instruction covers two years, and ineludes the following subjeets: Ship-building, strength of materials, naval architecture, free-hand, mechanical, and ship and engine plan-drawing, workshop technology, steam-engine, thermodynamics, naval ordnance, compass deviation and compensation, aecounts, and English. Graduates of the Polytechnic School to the number of four annually are assigned to this school, where they receive theoretieal instruetion for eight months of the year, and practical illustration for the remaining four months in the dockyard at Cherbourg (first year) and in the national engine works at Indret (second year). Those found qualified at the end of the course are appointed assistant naval constructors. Private students having the necessary qualifications are admitted to this school by permission of the Ministry of Marine, and upon the conclusion of the course are given diplomas stating the work done and the proficiency attained.

The gunnery school for officers is on board the Souverain, twenty-five guns, at Toulon; in special cases the course is two years. At Lorient there is an artillery school for the instruction of officers of the marine artillery exclusively, and at the same place a number of officers are annually trained at small-arms. A torpedo-school was established at Boyardville, Isle of Oleron, in 1869, and transferred in 1886 to Toulon. Lately it has become the school of submarine defense, that of torpedoes having been separated and placed on board the Algesiras at Hyères. The course is five months, but those who show special aptitude receive a supplementary course of four months; the instruction is both theoretical and practical. Special schools are also maintained at the various naval ports for the training of officers of the medical and commissariat staff, the course lasting in both classes two years. In France, engineer officers of the navy are selected from mechanicians.

Great Britain.—The system is complex, and the changes made since the foundation of the Royal Naval Academy at Portsmouth in 1729 have been many; they have resulted in the formation of two schools, one for the training of naval cadets, the other for the education of officers of higher rank. The training-school for cadets, established in 1857, at first at Portsmouth, but now on board the Britannia, at Dartmouth, is in charge of a captain, assisted by 9 officers, 9 naval instructors, 2 French, 1 Latin and 2 drawing masters, and 6 warrant officers. About 40 cadets are appointed to the school semi-annually by the admiralty, the qualifications for admission being, in addition to a sound physique and an age between thirteen and fourteen and a half, knowledge of elementary mathematics, English, French, Latin, and Scripture history. The cadets are required to pay for their outfit, clothing, materials used, and also a fee of £70 yearly (in some cases reduced to £40), but receive their subsistence and a small weekly allowance for pocket-money. The course of study embraces arithmetic, algebra, geometry, plane and spherical trigonometry, astronomy, navigation, dictation and composition, physics, and French, and lasts two years; the cadets are then sent to sea, and after a year's serviee become ensigns. After five years' sea-service, and after attaining the age of nineteen, the ensign is examined, wherever he may be, in seamanship, and upon passing receives an appointment as acting sub-lieutenant. He then returns to England for instruction and examination in navigation and gunnery, and if successful is commissioned sub-lieutenant.

The Royal Naval College was re-established in 1873 at Greenwich, to provide for the education of officers of all ranks above midshipmen in theoretical and scientific study bearing upon their profession. At its head is a flag-officer, assisted by a captain, a civilian director of studies, and a corps of thirty-one professors and instructors. Courses of study (compulsory) are provided for acting sub-lieutenants, gunnery and torpedo lieutenants, naval construction students, acting assistant and assistant engineers, probationary lieutenants of the marine artillery, naval instructors, and (voluntary) for other officers on half-pay, and private students. The courses vary in length from six months for acting assistant engineers and sub-lieutenants to three sessions of nine months each for construction students and assistant engineers.

The gunnery-school is on board the Excellent at Portsmouth; the course for gunnery lieutenants is six months, for acting sub-lieutenants, marine artillery, and other officers, three months. The torpedo-school is on board the Vernon, also at Portsmouth; the course lasts nine months.

United States.—The U. S. Naval Aeademy was founded in 1845 by George Bancroft, Secretary of the Navy during the administration of President Polk. For several years prior to this there was a school at the Naval Asylum in Philadelphia, where the midshipmen prepared themselves for examination for promotion. The Naval School, as it was at first called, was formally opened Oct. 10, 1845, in Fort Severn, at Annapolis, Md., which had been transferred by the War to the Navy Department for the purpose. The course was fixed at five years, of which the first and last only were to be passed at the school, and the intervening three at sea. The first midshipmen that received a course of instruction and graduated from the school were those who entered the serviee in 1840. In 1850 the school was reorganized; the name was changed to the U. S. Naval Academy; the course was increased to seven years, the first and last two years to be passed at the school, the intervening three at sea; the number of instructors was increased, and separate departments of instruction established; a vessel

ORIGINAL COSTON NIGHT SIGNALS

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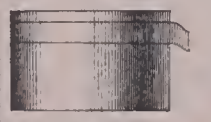

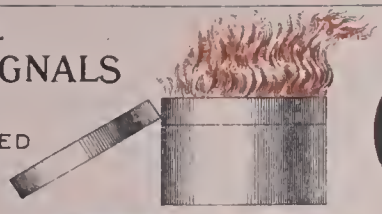

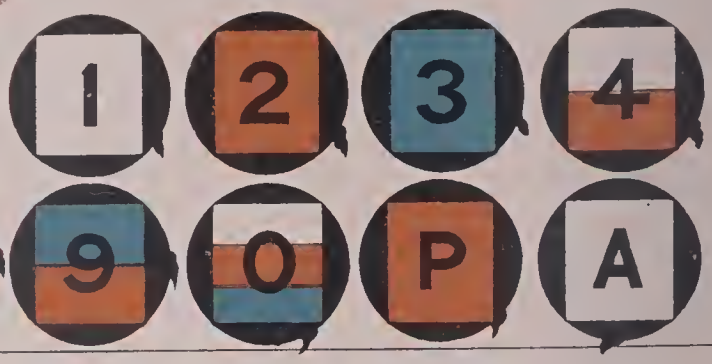

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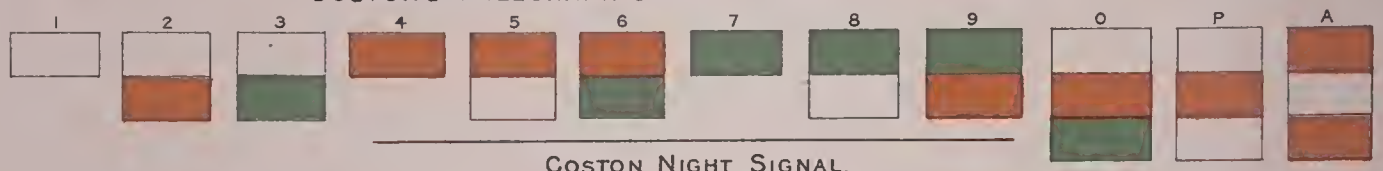
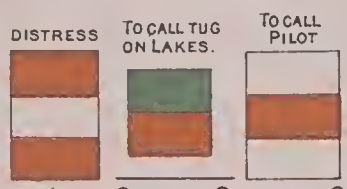


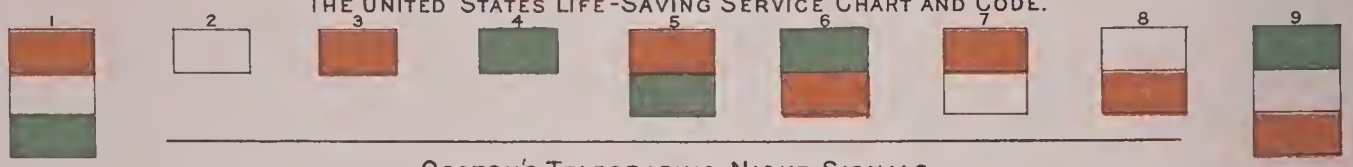
COSTON NIGHT SIGNAL.

ESTABLISHED FOR U.S. LAKE AND SEA COASTS.



ESTABLISHED FOR CALLING ALL U.S. PILOTS

THE UNITED STATES LIFE-SAVING SERVICE CHART AND CODE.



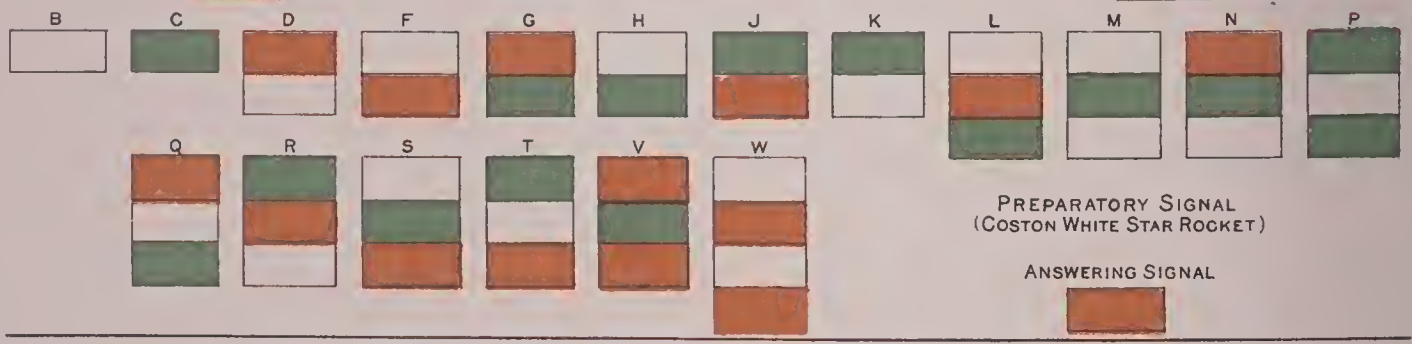
COSTON'S TELEGRAPHIC NIGHT SIGNALS.

YACHTING CHART

BROOKLYN CLUB SIGNAL

NEW YORK CLUB SIGNAL.

EASTERN CLUB SIGNAL

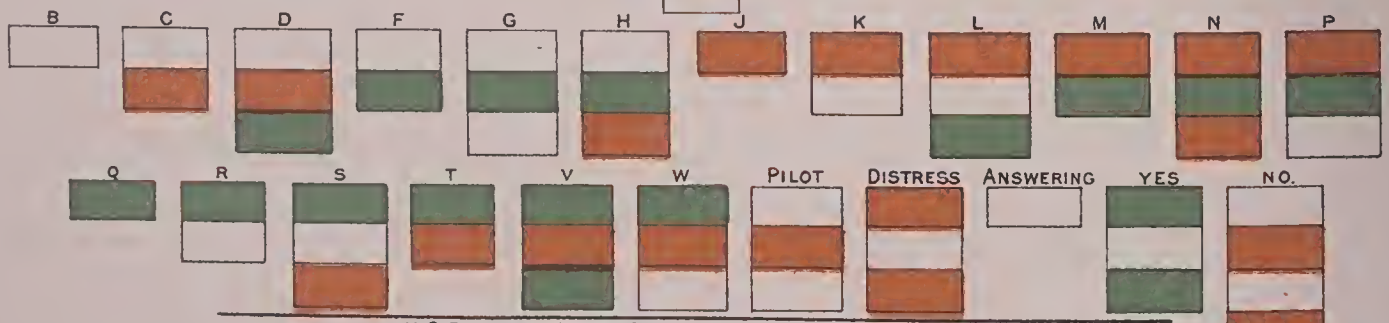


PREPARATORY SIGNAL
(COSTON WHITE STAR ROCKET)

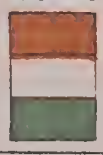
ANSWERING SIGNAL

COSTON'S TELEGRAPHIC NIGHT SIGNALS-INTERNATIONAL CODE CHART.

"PREPARATORY" AND "CODE SIGNAL"



U. S. REVENUE MARINE SERVICE
DISTINGUISHING SIGNAL.



U.S. LIGHTHOUSE SERVICE
DISTINGUISHING SIGNAL.

was provided, and annual practice cruises instituted; and provision was made for an annual board of visitors to inspect and report upon the condition of the school to the Secretary of the Navy. In 1851 the requirement of sea-service was abolished, leaving the course four consecutive years of study.

At the outbreak of the civil war in 1861 the Naval Academy was removed to Newport, R. I., where it remained until the summer of 1865, when it was re-established at Annapolis. In 1870 the title of cadet-midshipman was substituted for that of midshipman, and three years later the course was increased by the addition of two years' sea service in cruising vessels, at the expiration of which the cadet-midshipman returned to the Naval Academy for examination in professional subjects prior to final graduation. In 1866 the education of engineer officers was begun at the Naval Academy by the admission of a class of acting third assistant engineers, who pursued a special course of instruction for two years. Later cadet-engineers were admitted annually until 1882, when it was provided by act of Congress that naval cadets should be appointed in place of cadet-midshipmen and engineers, and that from those who successfully completed the six years' course appointments should thereafter be made to fill the vacancies in the lower grades of the line and of the engineer and marine corps, and that those for whom no vacancy existed should be discharged with a year's pay. By act of Congress, Mar. 2, 1889, it is provided that the academic board shall, prior to the beginning of each academic year, separate the first (highest) class of naval cadets into two divisions in the proportion which the aggregate number of vacancies that have occurred during the preceding fiscal year in the lowest grades of commissioned officers of the line and of the marine corps shall bear to those which have occurred in the engineer corps, and that the cadets so assigned shall thereafter pursue separate courses of study: those in the line and marine division, one arranged to fit them for service in the line of the navy; those in the engineer division, one to fit them for service as naval engineers. It is further provided that all vacancies in the line and in the marine and engineer corps shall be filled by appointments from final graduates at the end of the six years' course, in order of merit, the assignments to be made by the Secretary of the Navy upon recommendation of the academic board.

At the head of the Naval Academy is the superintendent, a naval officer of high rank, who is assisted by the commandant of cadets, and by the academic board, which is composed, in addition to the foregoing, of the heads of the different departments of study, who are, with one exception, naval officers. One naval cadet is allowed for each member and delegate of the House of Representatives, and, by appointment of the President, one for the District of Columbia, and ten for the country at large. Should a member of Congress fail to fill the vacancy that may exist in the cadetship for his district by July 1, the Secretary of the Navy is authorized to do so. In the regular sequence of affairs vacancies occur therefore in cadetships once in six years. The examinations for admission are held at Annapolis in May and September; the requirements, in addition to robust constitution, freedom from physical defects, and an age between fifteen and twenty years, are a knowledge of spelling, grammar, geography, history of the U. S., arithmetic, and algebra as far as equations of the first degree. If admitted, cadets are required to sign an engagement to serve in the navy for eight years, unless sooner discharged, and to make a deposit of $200 to cover the cost of outfit; the expenses of travel from their homes to Annapolis are refunded to them, and they receive $500 a year, but are required to pay for their subsistence, clothing, and other expenses.

For the first three years all the cadets pursue the same course of study, which includes English studies, history, French, Spanish, or German, algebra, geometry (including descriptive and analytical), trigonometry, calculus, mechanics, astronomy, physics, chemistry, mechanical drawing, and seamanship. During the fourth year the course of study is the same for both divisions of the class in naval construction, method of least squares, applied mechanics, electricity, and hygiene, but while the cadets of the line division pursue a course in seamanship, ordnance, gunnery, infantry tactics, navigation, surveying, compass deviation, and international law, those of the engineer division receive a separate course of instruction in marine boilers and engines, and in designing machinery. The academic year begins Oct. 1 and ends May 31, and is divided into two terms; the system of instruction is by means of daily recitations (oral), and by monthly, semi-annual, and annual examinations (written); those found physically or mentally disqualified at the half-yearly examinations are dropped; the instructors are almost exclusively naval officers. The course of study is supplemented by a very thorough system of practical exercises in seamanship, signals, management of boats under oars and sail, and of steam-launches, in infantry, howitzer, and great-gun drill, in ordnance, gunnery, and torpedoes, in marksmanship with revolvers, rifles, and rapid-fire guns, in navigation, surveying, and compass deviation, in machine-shop work and in running engines, and in athletics, including fencing with small and broad swords, bayonet exercise, boxing, swimming, and dancing. The departments of study are amply illustrated by models and apparatus of all kinds; the observatory contains a large collection of instruments, including an equatorial teleseope; the library contains 32,000 volumes. The Monongahela, a wooden sailing vessel, and the Bancroft, a steel barkentine-rigged vessel, 838 tons displacement, with triple-expansion engines, and twin screws, carrying an armament of four 4-inch rapid-fire guns, and seven guns of smaller calibers, with tubes for both Howell and Whitehead torpedoes, are stationed at the Naval Academy for purposes of instruction in sail and spar drill, and in great-gun, torpedo, and other exercises, and for use in making the summer practice cruises.

Immediately after the annual examination the cadets of the graduating class are ordered to cruising vessels for the two years' service prior to final examination; the first and third classes, with the candidates that have been admitted, are embarked on board the practice-vessels for the annual cruise of three months; the second class remains at the academy for practical instruction in the machine-shop for a month, and then joins the others on the cruise. All the cadets, except those of the fourth class, are granted leave to visit their homes in September.

The limits of this article do not permit description of other systems of naval education; in general, it may be said that all nations making any pretensions to naval power provide for the training of naval officers; the methods pursued resemble more or less closely those already described above.

Reference.—*Foreign Systems of Naval Education*, by J. R. Soley, late professor U. S. navy. C. Belknap.

Naval Architecture: See Ship-building.

Naval Signals: the means of transmitting intelligence at sea by the agency of sight or hearing. The code of day and night signals used in the U. S. navy is contained in two volumes—the *General Signal-book* and the *Fleet Drill-book*. The first contains about 7,000 words and sentences arranged alphabetically and regularly numbered. Resort is had also to a vocabulary of some 10,000 conversational words, to which is added an alphabet and a geographical list of nearly 11,000 places, each letter and word having its appropriate number. The *Fleet Drill-book* relates to the tactical formations of a fleet or squadron. Now, every vessel in the navy having a set of these books, it is only necessary, in order to signal a message from one ship to another, to indicate the volume and the number in that volume corresponding to the required words or sentences. To do this there are nine rectangular signal-flags representing the digits, one to stand for zero or ten, and three triangular pennants called *repeaters*, wherewith to make duplicate numbers. The sentence, for example, "Anchor in the order of steaming" may stand opposite No. 112 in the signal-book. To make this we first bend on signal-flag No. 1, next the first repeater, and lastly No. 2. Had the signal been No. 122, we should first bend on signal-flag No. 1, then No. 2, and lastly the second repeater, because the second number in the hoist is to be repeated; and so on. The lowest flag in the hoist represents the units. Besides the above-named flags there are the cornet, the danger-signal, the guide-flag, the annulling flag, the telegraph flag, the dispatch, quarantine, and convoy flags; also the answering pennant, the preparatory, interrogatory, numeral, geographical, and position pennants, their names suggesting their uses, save the cornet, which indicates a vessel's number in one case, and serves as a recall in another. Flags of various colors are available as signals only for a distance but little over 3 miles. Beyond that long-distance signals are used, such as the semaphore, the collapsing drum, or the use of cones, balls, and squares—in which the shape takes the place of color. *Night-signals* are made according to the system of Lieut. E. W. Very, U. S. navy, by which fire-balls

or stars are shot to a height of about 400 feet. Only two colors are used, red and green, with which any desired signal may be made, a rocket being used to indicate a ship's number and as a signal of execution. Electric lights are now used for distant night signaling. The search-light may be used for signaling a ship below the horizon, by reflecting the light on a cloud. Signals have been exchanged in this manner between two ships 60 miles apart. *Fog-signals* are made by firing guns, blowing horns, the steam-whistle, and by sounding the ship's bell. The long and short blasts of the steam-whistle, by representing the two elements of the army code, furnish the means of signaling in thick weather.

The army code, as it is generally called, invented by Gen. A. J. Myer, U. S. army, is used, with certain modifications, as a part of the naval signal system. By this method the signalman spells each word of the message, shortening the process by abbreviations. The letters of the alphabet are represented by signs, each sign and its corresponding letter having an arbitrary number assigned to it. A, for example, may be represented by 22, B by 2112, C by 121, etc. The usual manner of making these numbers is by a flag attached to a staff and waved by the signalman. At night the staff is surmounted by a torch. The signalman, facing the point of communication, and holding the staff in a vertical position to his front center, dips his flag to the right to represent 1, to the left for 2, and to his front for 3, each dip describing the quadrant of a circle. Nos. 1 and 2 are made in a vertical plane at right angles to the line of communication; No. 3 in a vertical plane in that line. All the letters of the alphabet are made up of combinations of 1 and 2, No. 3 being used to mark the end of a word, and when repeated the end of a sentence or message. Two practiced signalmen can communicate freely by this method, transmitting with accuracy and expedition long messages. Its great advantage consists in not requiring a signal-book. See SIGNAL-SERVICE.

The international code of signals furnishes a species of universal language to the entire maritime world. One system of flags having been adopted by all nations, and each one having a signal-book common to all, printed in its own language, it is plain that on the meeting of two ships at sea signals may be made and understood whatever their respective nationalities. A full explanation of the system may be found in the preface of *International Code*, together with a description of distance signals, semaphore, boat, and weather signals. S. B. LUCE.

Naval Tactics: See TACTICS.

Navarino, năă-vă-ree'nō (anc. *Pylos*): town of Greece; in the Peloponnesus, on the Bay of Navarino; situated on a rocky promontory, with a strong citadel (see map of Greece, ref. 18–J). Pop. (1889) 2,128. In the harbor the Turco-Egyptian fleet was destroyed by the allied British, French, and Russian fleets Oct. 21, 1827. The former consisted of 120 vessels of all sorts, carrying 2,240 cannon; the latter of only 26 vessels, with 1,324 cannon. The Turco-Egyptians lost 3 ships of the line, 16 frigates, 26 corvettes, 12 brigs, and 5 fire-ships, and 6,000 men killed. The allies lost one gunboat, 140 men killed, and 300 wounded. See MEHEMET ALI PASHA. E. A. GROSVENOR.

Navarre (Span. *Navarra*): a province of Northern Spain; between the Pyrenees and the Ebro. Area, 6,046 sq. miles. Pop. (1887) 304,122. The whole country is mountainous, traversed by branches of the Pyrenees, whose tops generally are bare, while their sides are covered with forests of beech-trees or afford excellent pastures where numerous cattle and sheep are reared. The mountains, which contain much iron and salt, inclose many beautiful and fertile valleys, such as that of Roncesvalles and Roncal, which produce wheat, olive oil, figs, grapes, chestnuts, and many varieties of fruits. The inhabitants are an almost pure Basque race, speaking the Basque language to a considerable extent (see BASQUES), and very jealous of their old customs and privileges; they are hardy, industrious, and hospitable. Besides agriculture, cattle-breeding, and manufactures of iron, glass, paper, and soap, they are much engaged in hunting and in smuggling. The old kingdom of Navarre (which originally included also what is now the French department of Basses-Pyrénées) successfully resisted the invasions of the Saracens, and remained independent until Ferdinand and Isabella conquered it in 1512 and annexed it to Aragon; it preserved many peculiar privileges, however, which were not finally abolished until 1876.

Navarrete, năă-vaăr-rā'tā, FRANCISCO MANUEL, de: poet; b. at Zamora, diocese of Michoacan, Mexico, July 16, 1768. On the completion of his studies at Zamora he went into business in the city of Mexico, but felt a strong call to the religious career, and about 1787 became a Franciscan. He obtained much fame as a preacher, and on account of his scholarship was made Professor of Latin in the college of Valladolid. His first poems were published in the *Diario de Méjico* in 1805, and before his death he had composed a considerable quantity of verses, some of them upon religious themes, but others modeled upon the works of his beloved Latin poets. He died July 19, 1809, in the monastery of Tlalpujahua, after trying, it is said, to burn all he had written; but his brother was able to gather a considerable body of poems and to issue them under the title *Entretenimientos poéticos del P. Navarrete* (Mexico, 1823; Paris, 1835). A. R. MARSH.

Navarrete, MARTIN FERNANDEZ, de: naval officer and historian; b. at Avalos, Logroño, Spain, Nov. 8, 1765. He entered the navy in 1781 and took part in the attack on Gibraltar Sept., 1782; in 1789 he had attained the rank of lieutenant, and was already known as a promising author. He then received orders to collect documents relating to the Spanish navy, and for this purpose he examined all the principal archives and libraries of Spain. Returning to active service in 1792, he served against the French; in 1796 he was attached to the Department of Marine, holding important positions in it until 1807, when he resigned rather than recognize Joseph Bonaparte. After the restoration he was again given office, and for many years he was one of the highest authorities on naval affairs. From 1823 he was director of the hydrographic office, and from 1824 director of the Madrid Academy of History, which owed its fame largely to his exertions. In later life he was several times senator. His best-known work is the collection of annotated documents entitled *Colección de los viajes y descubrimientos que hicieron por mar los Españoles desde fines del siglo XV.*, etc. (7 vols., 1825–65). He also wrote *Vida de Cervantes*, published by the Academy with its edition of *Don Quixote* (1820); *Biblioteca marítima española* (posthumous, 1851), etc. He edited the first four volumes of the great collection of documents relating to the history of Spain. D. at Madrid, Oct. 8, 1844. HERBERT H. SMITH.

Navasota: city; Grimes co., Tex. (for location, see map of Texas, ref. 4–I); at the confluence of the Brazos and the Navasota rivers, and on the Houston and Texas and the Gulf, Colorado and Santa Fé railways; 70 miles N. of Houston. It is in an agricultural and cotton-growing region, and is principally engaged in milling and several branches of the cotton industry. It contains a national bank, a private bank, and three weekly newspapers. Pop. (1880) 1,611; (1890) 2,997; (1900) 3,857.

Nave [viâ O. Fr. from Lat. *navis*, ship, Mediæv. Lat., body of a church > Mod. Fr. *nef*, Ital. *nave*]: in architecture, a term used to designate in general the principal hall of a church as distinguished from the choir, transepts, chapels, or side aisles. It is also sometimes applied in secular architecture to large and imposing halls of more than usual length and loftiness, which resemble in form and proportion the nave of a church. The typical arrangement of the nave and side aisles in Christian architecture was derived from the Roman secular basilicas. These were halls with nave, side aisles, a species of transept, and an apse or tribune. The naves, separated from the aisles by arcades or colonnades, were lighted by clerestory windows and covered with wooden roofs, sometimes with open trusses, sometimes with richly paneled or coffered ceilings. In a cruciform church the nave extends from the front to the transepts, and is commonly flanked by single or double side aisles on either hand. There are, however, many parish churches in England having a double nave, i. e. two nearly or quite equal naves side by side, without side aisles. In Southern Europe especially, though not exclusively, there are also many churches having a nave flanked by chapels without intervening side aisles, as in the cathedral at Alby in France, the cathedral at Gerona in Spain, and in a number of Italian churches of the Renaissance. In churches with a nave and aisles the former is separated from the latter either by columns, as in the early Christian basilicas of Rome and the East and their mediæval copies in Italy, or by piers, square, polygonal, or clustered, as is the case in all Romanesque, Lombard, Norman, and Gothic churches, and generally in those of the Renaissance. The piers or columns sustain arches called *pier-arches*, upon

which are built the upper side walls of the nave, which rise above the side-aisle vaulting and roofs, and are piereed with windows; the wall thus pierced is called the *clerestory*. Above it is the ceiling or vault of the nave. In most mediæval churches of importance in France, England and Western Europe generally the broad band of wall between the pier arches and clerestory windows, corresponding to the "lean-to" roofs over the side-aisle vaulting, is piereed with arches forming a *triforium* or gallery; but many German churches, and a few elsewhere, have the side aisles nearly or quite as high as the nave, all the light being received from windows in the side walls. Another type of basilica nave that was destined to profoundly influence Christian architecture was evolved in the basilica of Maxentius and Constantine, where the tepidarium halls of the greater thermæ were imitated with their huge groined vaults in three compartments spanning the great hall, while the three compartments or bathing recesses on either side were converted into side aisles by piereing arches through the wing walls or buttresses separating these recesses. These wing walls, continued above the vaulted roofs of the side aisles, formed buttresses to withstand the lateral thrust of the nave-vaulting. This Constantinian type of nave, with the substitution of domical for groined vaulting, became the prototype of Byzantine structures like Aya Sofia ("St. Sophia" so called) in Constantinople. It had the advantage of greater loftiness as compared with the earlier types, and of being thoroughly fireproof. It solved in one way the problem of the vaulted nave with side aisles which the architects of the Middle Ages afterward sought for 300 years to solve in another way. Gothic architecture is indeed the outcome of long-continued experiments in the adaptation of vaulting to the typical basilica plan of pagan and early Christian Rome. (See ARCHITECTURE.) In this effort to vault with masonry the nave as well as the aisles of the original basilica type by methods which reached their culmination in the splendid cathedrals of the thirteenth and fourteenth centuries—like Salisbury, Amiens, Strassburg, and Cologne—the nave took on an entirely new form. In place of the monolithic columns which formerly separated it from the aisles, heavy piers—square or round in the earlier examples, but in the later ones resembling clusters of shafts about a central core—sustained the greatly thickened clerestory walls by means of heavy arches richly moulded, some of the shafts being carried up to receive the spring of the ribs of the groined vaulting. The width of the nave was considerably reduced owing to the difficulty of constructing vaults of large span, while the span of the pier-arches was increased, the number of bays in the nave being correspondingly reduced. As the complexity, refinement, and perfection of the construction advanced, the piers were made lighter and loftier; each vaulting-rib was given its own shaft, carried clear to the ground; the arches, at first round, became pointed; the clerestory was made higher and its wall-surface treated as a mere screen between the vaulting and the supporting shafts; the clerestory windows were made of enormous size, and filled with magnificent stained glass held by elaborate geometric or "flowing" tracéries in stone; the triforium was made a wholly subordinate but ornate feature between the clerestory and the pier-arches; and in England, and to some extent in Germany, the vaulting itself was made highly decorative by the rich patterns of a complex system of vaulting-ribs. In Italy, however, the Gothic system was never comprehended, and the broad divisions and ample scale of parts of the old Roman vaulted halls seem to have prevailed in such naves as that of the Duomo at Florence, where there are only five bays of nearly 55 span each, against an average span of 18 to 25 feet for the 7 to 12 bays of French and English Gothic naves. The English naves are lower than the French, 70 to 80 feet to the crown of the vault being a common height, against 100 to 150 feet for the French; but the vistas of English naves are, on the other hand, enhanced by the almost excessive length of the choirs beyond.

In the Renaissance period Italy took the lead in the building of imposing churches; the dome at the crossing of the nave and transepts became the central and culminating feature of the design, and this arrangement was imitated in most of the large Renaissance churches of England, France, and Germany, as at St. Paul's (London), the Panthéon (Paris), and many others. Of the Italian churches St. Peter's is the archetype; its stupendous nave, 330 feet long to the opening of the dome, is 87 feet wide and 153 feet high. In this, as in most of the Italian churches of the Renaissance, the vault is a barrel-vault with penetrations, richly adorned by paneling executed in stucco and gilded. The arrangement of piers, invariably treated with one or another of the classic orders, varies greatly, with corresponding variety in the architectural effect of the nave. Stucco enrichments, inlays of precious marble, and sumptuous pictorial decorations in fresco on the vaults and spandrels contribute to these effects. See articles *Architecture* and *Cathédrale* in Viollet le Duc's *Dictionnaire Raisonné*; Mrs. Van Rensselaer's *English Cathedrals*; Parker's *Gothic Architecture*; Lübke's *Mediæval Architecture*; Prof. Moore's *Development of Gothic Architecture*; Fergusson's *History of Architecture* and *History of Modern Architecture*; also ARCHITECTURE and RENAISSANCE ARCHITECTURE. A. D. F. HAMLIN.

Na'vesink (or **Neversink**) **Highlands**: a range of hills on the south side of Sandy Hook Bay, in Monmouth co., N. J. They are important landmarks to ships approaching New York. The highest point, Mt. Mitchell, is 282 feet high. Two first-class lighthouses, 53 feet high, stand 100 feet apart on ground 195 feet high. The southeasternmost tower is in lat. 40° 23′ 43″ N., lon. 73° 58′ 49″ W. Both show fixed white lights.

Navicular Disease: See FARRIERY.

Navigation [from Lat. *naviga'tio*, a sailing, deriv. of *naviga're*, sail; *na'vis*, ship + *a'gere*, lead, drive, conduct]: the art of conducting a ship from port to port and across the ocean with safety and dispatch, and, more particularly, of determining her position from time to time on the face of the globe by observations of the heavenly bodies.

The inhabitants of ancient Sidon were the pioneers in this branch of knowledge. Neglecting the history of its development, this article gives a brief description of the practical navigation of a ship in making a voyage. The reader is referred, for a complete understanding of the subject, to Coffin's *Navigation and Nautical Astronomy* and to Bowditch's *Navigator*.

Before proceeding to sea, the ship should be furnished with charts of the ocean to be traversed; a sextant or octant, a compass fitted with attachments for observing azimuths; a nautical almanac for the current year; a chronometer running on mean time whose error for a given meridian (generally that of Greenwich, England) and daily rate of error are known; a standard work on practical navigation; a lead-line properly marked for taking soundings; and a log-line for measuring the ship's speed. When the cargo is stowed and the vessel otherwise ready for sea the local deviation of her compass should be determined. In iron or steel-built ships the local deviation, due to the magnetism of the ship, is usually very great, and renders the compass unreliable. When this is found to be the case, the compass is adjusted by placing near it other magnets which neutralize the ship's magnetism. These are generally horizontal magnets, acting in the direction of the ship's magnetic force; a vertical magnet directly under the center of the needle; vertical soft iron bars, called Flinders bars, with one end on the level of the compass needle; and two hollow spheres of soft iron, placed on a line through the center of the compass, with their centers in the plane of the needle, and at equal distances from the compass. Full directions for determining the deviation and for the adjustment of the compass will be found in the *Admiralty Manual of Compass Deviation*.

As the ship stands out to sea a *departure* is taken. This is finding the ship's latitude and longitude from the chart by the bearing and distance of one landmark, or from the bearing of two or more marks whose positions are laid down on it. As soon as this departure is taken the *course is shaped* for the port to which the ship is bound, due regard being had for the winds, currents, and dangers to navigation to be encountered by the way, and from this time on the courses steered, the speed of the ship, etc., are duly noted in the log-book. Suppose the ship sails at night. At or about 8 A. M., or, better still, when the sun bears most nearly true E., and yet has sufficient altitude to avoid the irregular refraction near the horizon, its *altitude* (angular distance above the sea horizon) is measured with the sextant, and the instant of observation is noted by the chronometer. With the latitude and longitude of the ship at the time of taking the departure, with the courses and distances sailed, the former corrected for variation, leeway, and deviation to the time of the observation, we compute by trigonometry the latitude and longitude, or the position by *dead reckoning*. From the altitude of the sun observed (corrected, as all altitudes of the sun taken at sea have to be, for semi-diameter, parallax, dip, refraction, and the index error of the sextant), we

have the true altitude of the sun's center as seen from the center of the earth; from *The Nautical Almanac* we obtain the sun's declination for the instant of the observation; and by the dead reckoning we have the approximate latitude, data giving the three sides of the astronomical triangle; and from this we compute one of its angles, the hour-angle of the sun, the local apparent time, which is converted into mean time by the application of the equation of time taken from the almanac; the difference between the local mean and the chronometer times gives the longitude by observation. When taking the sun's altitude its bearing by compass and the ship's heading by compass should be noted. With the same data as above the sun's true bearing can be computed, and by comparing its true and compass bearings the errors of that compass on that heading of the ship are obtained.

Near noon the observer again begins to observe the sun, and continues to do so as long as the altitude increases, noting the sextant reading at the greatest altitude attained. The sun is said *to dip* when the altitude begins to decrease. The greatest altitude is assumed to be that when on the meridian, which is correct within small limits. By combining the sun's meridian altitude with its declination we obtain the declination of the zenith, which is the latitude of the position. The ship's run worked from the place of departure gives the *latitude and longitude by dead reckoning*; from the longitude by the A. M. observation corrected for the ship's run to noon we have the *longitude by observation*, and from the meridian altitude the *latitude by observation*. Any difference between the ship's position by observation and dead reckoning is ascribed to *current*, and its set and amount are the bearing and distance of the position by observation from that by dead reckoning. From the noon position by observation the reckoning begins as from the place of departure. In the afternoon, when the sun bears most nearly W., the observations for longitude and variation are repeated, and the above observations continue daily throughout the voyage.

The sun, however, may be obscured by clouds at the time of its crossing the meridian, and then it becomes necessary to resort to some other method than the one above given for finding the latitude. Appropriate formulas have been deduced for this by considering in the astronomical triangle the coaltitude, codeclination, and the hour-angle. This last, at sea, is always somewhat in doubt, but small errors in the hour-angle, when the angle itself is small, produce but slight errors in the latitude; under most circumstances good latitude results can be obtained from observations taken within one hour of the transit over the meridian. Observations of other heavenly bodies, as well as those of the sun, may be used for determining the latitude, longitude, and error of the compass. They are less resorted to, however, because of the difficulty of clearly seeing the horizon at night, this obscurity throwing some doubt upon the accuracy of all altitudes measured after dark at sea.

The position at sea can also be found by a method introduced to the nautical world by Capt. Thomas H. Sumner in 1843, and known as Sumner's method. If an altitude of the sun or other heavenly body be measured, and the Greenwich time noted, we can with its hour-angle and declination plot its position on a terrestrial globe. With this as a center and the coaltitude (zenith distance) as the radius, draw a circle; the observer was at the instant of observation somewhere on this circle. After the lapse of sufficient time repeat the above, and the observer, who is supposed to be stationary, will be found on a second circle. As he is thus on two circles he must be at one of their intersections. In practice the observations are so timed that the interseetions are far apart, and the observer has no difficulty in knowing at which one he is. It is not essential that he remain stationary between the observations, as by appropriate reductions any change may be allowed for. In practiee the plotting is made upon a chart, and only a small part of the circumference coming within the belt in which the ship is known to be is laid down, and that by points computed from eaeh observation. The line joining the points calculated from one observation is called the *line of position*. The intersection of the lines obtained from the two observations gives the ship's position. The bearing of the heavenly body is always at right angles to the line of position, and the method gives the best results when the azimuth at the time of the second observation differs from that at the first by about 90°. The line of position is of much use in finding the bearing of the port in approaching land. For instanee, suppose we have determined a single line and laid it down on the chart and find that it cuts the land, say, 20 miles to the N. of the port to which we are bound. If we sail due S. for 20 miles and draw a line parallel to the first line, the ship is somewhere on this second one. As the new line passes through the port the course to the port is known, though not the distance; and by keeping a good lookout for the land and getting casts of the lead, the ship can sail on her way with confidence.

If, on a long voyage, the ship passes within sight of any known land, the longitude given by the land and that by observation should be compared as a check upon the running of the chronometer. The chronometer can also be cheeked by an observation called a *lunar*. The almanac gives for every three hours of Greenwich mean time the moon's angular distances (as seen from the center of the earth), from the sun, planets, and certain stars. Carefully measure with the sextant the distance between the moon and one of these heavenly bodies, and note the time by the chronometer. The angle measured can be reduced to what it would have been had the observation been made at the earth's center. By comparing our reduced angle with the almanac angle of the same magnitude for the body observed we obtain the Greenwieh mean time, which, compared with our noted time, gives the error of the chronometer.

The winds and currents of the ocean have a material influence upon the speed of ocean voyages, even with modern steamers; with sailing vessels they are most important, and are truly said to control the mariner in his course, and to know how to steer his ship on this or that voyage so as always to make the most of them is the perfection of navigation. The voluminous works of Horsburgh, Findlay, Kerhallet, and Maury contain full information as to the winds and currents. For many years Maury accumulated the logbooks from many ships in every part of the world, and tabulated and plotted the winds and currents they had encountered. The information thus collected has been graphically represented by the British Board of Trade, and conveys at a glance most complete information as to the winds and currents of the ocean highways. The approaches to the ports and the appearance of the land in their vicinity are described in local *Sailing Directions*, which are very complete for all parts of the globe, and are the guides for entering port and anchoring.

A. H. McCormick.

Navigation, Freedom of: the right to navigate freely the waters of seas or rivers. While the jurisdiction over the sea, near the land, and within bays and gulfs inclosed within not very remote headlands, is conceded to the territorial sovereign, it is admitted now on all hands that the open or high sea is common to all nations. Yet this rule has not always been conceded. Thus Portugal claimed the exclusive use of the African seas, together with the empire of Guinea, under a bull of Pope Nicholas V., given out in 1454. The pope's claim to do this seems to have been connected with his being the vicar of Christ, to whom the heathen were given "as an inheritance and the uttermost parts of the earth as his possession." The bulls of Alexander VI., issued in 1493, soon after Columbus had discovered America, carried out this assignment of parts of the world still further. One of them granted to Spain the lands lying W. of a meridian drawn 100 leagues W. of the Azores, and another divided the occupation of the seas between Spain and Portugal. It was to attack such pretensions, with others, that Grotius wrote his *Mare Liberum* in 1609. Other nations, especially Protestant ones, paid no regard to these grants, but the English in the seventeenth century claimed property in the narrow channels adjoining Great Britain, and on that account demanded that especial respect should be paid to their flag. This brought on war with Holland. In the peace of 1674 it was stipulated that even fleets should furl the flag and lower the topsails in honor of any English vessel of war between Cape Staten in Norway and Cape Finisterre in North Spain—quite beyond the claim of jurisdiction. Russia at a much later date claimed exclusive jurisdiction over the Pacific, N. of the 51st degree of latitude, on the ground that its territory, and no other, bordered on the ocean beyond that line; but this claim was abandoned in treaties made with the U. S. in 1824 and with Great Britain in 1825. All such claims may be considered as being now mere matters of history.

The free navigation of rivers forms another branch of this topic. Where a navigable stream flows through several countries and into the sea, by strict law exclusive rights of navigation of its lower waters and access to the ocean are

possessed only by the state within whose territory its mouth lies. Thus at the close of the eighteenth century the Spanish colony of Louisiana could impose its own conditions upon traffic on the Mississippi river between the Ohio valley and the Gulf of Mexico. In vain it was attempted to establish free navigation of the whole river as a natural right. Failing this, as necessity grew and liberal ideas also, partly through negotiation, partly through force, most of the great navigable rivers of the world have been made free to the world's commerce. By the Louisiana purchase the U. S. acquired the entire Mississippi. The Rhine and the Scheldt were opened at the Congress of Vienna in 1815; their free navigation was reaffirmed in 1831. In 1835 the Douro was opened to the common use of both Spain and Portugal. By various decrees and treaties between 1853 and 1859 the navigation of the Rio de la Plata system was declared free. The Treaty of Paris in 1856 opened the Danube. The Emperor of Brazil made the Amazon free by imperial decree in 1866. In 1854 the common right to navigate the St. Lawrence was arranged. This treaty expired in 1866, but the free mutual use forever of the St. Lawrence river, its canals, and Lake Michigan was again provided for by the Treaty of Washington in 1871, subject, however, to certain conditions and rights of regulation "on terms of equality." In 1871 also the navigable Alaskan rivers were opened to the free use of both Great Britain and the U. S. The treaty of 1846, which secured the Oregon country for the U. S., stipulated for the free navigation of the Columbia by the Hudson Bay Company and its trade. Lastly, at the Congo conference in Berlin, 1884–85, the free navigation of the Congo and the Niger was declared, subject to the regulations of an international commission. Thus in this direction little more remains to be asked for. These various decrees and treaties all prove that the free navigation of rivers has been granted as a concession, not secured as a right.

Revised by T. S. Woolsey.

Navigation, Inland: See Canals, Rivers, and Lakes.

Navigation Laws: See International Law.

Navigator's Islands: a group of volcanic islands in Polynesia, now usually called Samoa (*q. v.*)

Navy [from O. Fr. *navie*, navy < Late Lat. *na'via*, ships, neut. plur. for Lat. *naves*, fem. plur. of *na'vis*, ship]: a fleet or assemblage of ships or vessels; specifically, the whole of the war vessels of a nation; the war marine of a state. Navies have grown out of either military necessities or the requirements of an ocean commerce obstructed by pirates. Trade and navigation may be said to be the parents of navies, those countries most largely interested in the former generally boasting of the most powerful fleets. While foreign trade produces wealth, and at the same time trains a class of men to the hardships of the sea, it requires protection and assistance in return. This is rendered by the military marine, whose service is largely recruited from the commercial. The Carthaginians, descended from the Phœnicians, were the most successful navigators of their day, their powerful navy being the natural offspring of an extensive ocean trade. The Romans, on the other hand, were not a commercial people. Their navy was forced into existence as an implement necessary in the great game of war, but it always occupied a minor position in comparison with their land forces. The military value of a navy was demonstrated in the earliest pages of its history. We may cite the first Persian invasion of Greece as the earliest case in point. Defeated at Marathon, the Persians hastily took to their ships, and threatened Athens. Having no navy to oppose them, it was only by the rapid march of Miltiades that the barbarians were prevented from landing again. The facility with which the Persians transported a large army to a great distance by means of their fleet; the advantage they enjoyed of striking the coasts of Greece at any particular point, and of afterward transferring the field of operations to other parts, imposing exhaustive marches on their enemies, taught the Greeks the necessity of a floating force. The Athenians were among the first known to authentic history to maintain a navy respectable in its character and distinguished for its organization, its discipline, and its efficiency. By a skillful use of this arm during the Peloponnesian war they were enabled to hold certain strategic points, giving them great advantage over their enemies, as Sestos, by which they kept control of the Hellespont and the corn-trade of the Euxine.

A navy proportioned to the commercial tonnage of a country and the extent of its shore-line is the best and least expensive protection to the coasts and commerce of that country. Since an efficient naval force (unlike an army) can not be improvised, every maritime state has found it necessary to maintain a permanent navy; and such navies have seldom lent themselves to the subversion of the political organization of the state. Besides the ordinary duties of policing the seas to keep down piracy and of affording a moral support to ministers at foreign courts and merchants in foreign trade, navies are constantly engaged in the fields of science, and have contributed generously to the common stock of knowledge and the advancement in civilization.

From these general views the reader may understand how and why navies have come into existence. To render it clearer, many examples might be drawn from modern history, but we may cite the origin of the U. S. navy alone as a fair illustration. In Sept., 1775, the British troops, closely invested in Boston, could receive supplies only by water. To intercept these, Gen. Washington, by virtue of his commission as commander-in-chief of all the Continental forces, detailed certain of his officers and men familiar with nautical pursuits to operate afloat in small armed cruisers. Vessels were purchased, fitted out, armed, and manned by the seamen of New England, and cruised in Massachusetts Bay with such success that, while depriving the enemy of necessary supplies, their prizes furnished the colonial army with such materials of war as alone rendered the successful prosecution of hostilities possible. The measures adopted by Washington being confirmed by Congress, other vessels were soon added to the list by legislative authority, prize-laws enacted, and a navy gradually formed. The country was so exhausted by the struggle that on the termination of the Revolutionary war the navy for a time passed out of existence. Its re-establishment under the present constitution furnishes another illustration. The commerce of the republic spread to every sea, but the new flag was treated with little respect by either civilized or uncivilized states: the former disregarded its neutral rights, the latter did not hesitate to offer it insult. The U. S. was bound therefore, in the interests of peace and civilization, to create a navy. Peace with Algiers put an end for a time to naval preparations, when statesmen were again admonished of the necessity of an armed force on the ocean by the depredations of French cruisers; but as hostilities with France were of short duration and never fully recognized, the first notable service of the young navy was to fulfill the mission for which it was primarily created by putting down the Barbary powers, who had been plundering U. S. merchantmen and imprisoning U. S. citizens. The successful prosecution of the war with Tripoli, by which the dey was compelled to recognize the laws of nations, redounded greatly to the credit of the navy. The war of 1812 with Great Britain was the next in which the navy was called to take a prominent part. Although the U. S. had nothing on the ocean that could contend against the powerful fleets of Great Britain, yet the few single engagements that were fought developed so much professional skill on the part of the officers, such fine qualities on the part of the seamen, that the republic soon saw itself possessed of all the elements for one of the finest navies in the world. On the lakes, where the forces of the two countries were more nearly equal, this was still more manifest, for the results of the victories gained on Erie and Champlain were immediate and important, the British themselves admitting that they lost there all but their honor. During the Mexican war and the civil war the field of operations of the navy was confined to blockading and to service on shore, there being no sea-going ships on either occasion to contend with.

The single fights of isolated cruisers, however heroic, rarely have any effect upon the ultimate results of a war. The real fighting strength of a navy is measured by its line of battle, and the U. S. has never had ships in sufficient number and of requisite military value to form a line of battle; so that in reality its strength as a naval power has never been tested.

Among the notable scientific undertakings of the navy of the U. S. may be mentioned the U. S. Exploring Expedition and that to Japan, the interoceanic canal surveys, Arctic voyages, and those for deep-sea soundings, the Pacific explorations for hidden dangers, and the distant voyage of the Swatara (which, like that of Capt. Cook to Otaheite in 1769, was undertaken for the purpose of observing the transit of Venus), and besides these the War College, the Naval Observatory, the Coast Survey, Hydrographic Office, torpedo station, and Naval Academy are all contributing to scientific research and the common stock of useful information.

Organization of the U. S. Navy.—The Constitution of the U. S. imposes on Congress the duty of providing and maintaining a navy, and of making rules for the government and regulation of the naval forces. It declares the President to be commander-in-chief of the army and navy, and requires him to commission all officers of the U. S. Such commissions continue in force only during the pleasure of the President of the U. S. for the time being. The Secretary of the Navy presides over the Navy Department, and is the duly constituted adviser of the President on all questions relating to naval affairs. In his former duties he is assisted by an assistant secretary and the chiefs of eight bureaus, as follows: Equipment, yards and docks, navigation, ordnance, medicine and surgery, supplies and accounts, steam-engineering, and construction and repairs. The chiefs of bureaus are appointed by the President, with the sanction of the Senate, for a term of four years, and while so acting have the relative rank of commodore, unless already holding a higher grade. The law declares that the orders of the chiefs of bureaus shall be considered as emanating from the Secretary of the Navy, "and shall have full force and effect as such." The active list of the line officers is divided into eleven grades, the number in each grade being limited by the act of Aug. 5, 1882, as given below. The relative rank between officers of the navy and army on the active or retired list is as follows:

The admiral of the navy	to rank with	general of the army.			
The vice-admiral	"	"	lieutenant-general	of the	army.
6 rear-admirals	"	"	major-generals	"	"
10 commodores	"	"	brigadier-generals	"	"
45 captains	"	"	colonels	"	"
85 commanders	"	"	lieutenant-colonels	"	"
74 lieutenant-commanders	"	"	majors	"	"
250 lieutenants	"	"	captains	"	"
75 lieutenants (jr. grade)	"	"	first lieutenants	"	"
Ensigns	"	"	second lieutenants	"	"

The offices of admiral and vice-admiral expired on the death of Admiral D. D. Porter and of Vice-Admiral S. C. Rowan.

All staff officers are appointed by the President, with the sanction of the Senate. By act of Aug. 5, 1882, the active list of the medical corps consists of 15 medical directors, 15 medical inspectors, 50 surgeons, and 90 assistant surgeons, with the relative rank respectively of captain, commander, lieutenant-commander or lieutenant, and of lieutenant (junior grade) or ensign. The pay corps consists of 13 pay-directors, 13 pay-inspectors, 40 paymasters, 20 passed assistant paymasters, and 10 assistant paymasters, having a like relative rank; and the engineer corps of 10 chief engineers having the relative rank of captain, 15 of commander and 45 that of lieutenant-commander, 60 passed assistant engineers, and 40 assistant engineers. The law authorizes the appointment of 24 chaplains, who are permitted to conduct public worship according to the manner and forms of the Church of which they are members. The law also authorizes the appointment of 12 professors of mathematics, and as many naval constructors as the service may require. The foregoing officers are commissioned. The President is authorized to appoint for vessels in actual service as many boatswains, gunners, sailmakers, and carpenters as may, in his opinion, be proper. These are called warrant officers. All officers not entitled to hold commissions or warrants, except secretaries and clerks, are called petty officers. The number of enlisted persons in the navy, including seamen, ordinary seamen, landsmen, mechanics, firemen, coal-heavers, apprentices, and boys, is limited by act of Mar. 3, 1893, to 9,000.

The pay of all officers of the navy is fixed by law, and may be seen by reference to the *Navy Register* issued for the year. The pay allowed to petty officers (excepting mates), and the pay and bounty upon enlistment of seamen and others of inferior rating, are left by Congress to the President, with the sole proviso that the total amount of pay for officers and seamen shall not exceed the amount appropriated for that purpose. By the act of Aug. 5, 1882, vacancies in the lower grades of the line, Engineer Corps, and Marine Corps are to be filled from the graduates of the Naval Academy. The Marine Corps forms part of the naval organization.

Naval discipline is maintained by the code embraced in the "act for the better government of the navy of the U. S.," commonly known as the "Articles of War." By navy regulation of Dec. 26, 1891, the ships of the navy of the U. S. are classed as follows:

Ships of 5,000 tons displacement and above are classed as *first rates*; those of and above 3,000, but below 5,000 tons displacement, as *second rates*; those of 1,000 and above, but below 3,000 tons displacement, as *third rates*; and all those of less than 1,000 tons displacement, as *fourth rates*.

Vessels are named by the Secretary of the Navy, under direction of the President, as follows: First rates after the States of the Union, second rates after cities, third rates after important events, or names connected with the naval history of the U. S., fourth rates after lakes and rivers of U. S. Vessels of special class to be named appropriately to the service for which they are designed. The number of cruising vessels (which are built of steel) has been fixed at seventy.

The act of Apr. 21, 1806, authorizes the President to keep as many ships in commission during peace as he thinks proper, but Congress practically limits the number by the amount annually appropriated for the maintenance of the navy.

The following table shows the area, docks, etc., of the navy-yards and stations of the U. S.:

NAVY-YARDS AND STATIONS.	Acres.	Dry docks.	Floating docks.	Ship houses.	Slips.
Portsmouth, N. H.	164	.....	1 balance.	3	3
Boston, Mass.	87½	1 granite.	.....	4	6
New London, Conn.	86				
Brooklyn, N. Y.	161 6/10	1 granite. 1 timber.	.....	1	4
League island, Pa.	922½	1 timber.			
Washington, D. C.	42	.....	.....	1	4
Norfolk, Va.	82½	1 granite. 1 timber.	.....	..	5
Port Royal, S. C.	41	1 building.			
Pensacola, Fla.	83¼	.....	1 sectional (in part only).	..	1
New Orleans, La.	22	1 appropriated for.			
Key West, Fla.	2½	.....	1 stern dock.		
Mare island, Cal.	900	1 granite.	1 sectional.	..	1
Puget Sound, Wash.	192¼	1 appropriated for.			
Sackett's Harbor, N. Y.	3½				
Coaster's Harbor island, Newport, R. I.	90				
Naval Home, Philadelphia, Pa.	24 6/10				

Shore Stations.—Naval apprentice station, Naval War College, and naval torpedo station at Newport, R. I.; Naval Academy at Annapolis, Md.; Naval Observatory at Washington, D. C.

S. B. LUCE.

Navy Department: that department of a government to which is intrusted the control and administration of its navy. The official designation for this department varies in different countries. That of Great Britain is called the Board of Admiralty, constituted by the lords commissioners for discharging the office of lord high admiral, a controller of the navy, and an expert civilian. Of these the first lord has supreme authority, and is a member of the cabinet.

That of the U. S. is officially denominated the Department of the Navy, and its head or chief is a civil officer, called the Secretary of the Navy, who receives his appointment from the President, by and with the advice and consent of the Senate, and is a member of the President's cabinet. His salary is $8,000 per annum, without allowances of any description. As the President is, under the Constitution, the commander-in-chief of the army and navy of the U. S., the Secretary of the Navy is in reality his representative in the Navy Department. With the exception of cases in which independent powers are specially invested in him by law, his acts are regarded as having the direction and sanction of the President, and have full force and effect as such. Prior to the establishment of the Navy Department the administration of naval and maritime affairs was intrusted to committees, agents, and boards appointed under resolutions and acts of the Continental or the Federal Congress, and for nearly ten years (1789–98) to the Secretary of War. The establishment of a separate Navy Department was due to the increase in the size and importance of the navy, which took place partly as a result of the naval contests with Great Britain, and partly from the necessity of affording a reasonable degree of protection to the maritime interests of the nation.

By the act of Apr. 30, 1798, it was organized as a separate department, to be denominated the Department of the Navy, the chief thereof to be called the Secretary of the Navy, whose duty it should be to execute such orders as he should receive from the President of the U. S. relative to the procurement of naval stores and materials, and the construction,

armament, and equipment of vessels of war, as well as to other matters connected with the naval establishment of the U. S. It is from this act, through the President, that the general powers of the Secretary of the Navy are derived. Subsequent acts have provided for the method of discharging the ministerial duties of the Secretary of the Navy, and under the present law the department is organized in bureaus. See NAVY (*Organization of the U. S. Navy*).

June 8, 1880, an act was passed authorizing the appointment of a judge-advocate-general of the navy, by and with the advice and consent of the Senate, from officers of the Marine Corps or the navy. The judge-advocate-general has charge, especially, of matters relating to courts martial, and assists the secretary in various ways and in other matters coming before the department; he is to a great extent his law-officer. If appointed from the Marine Corps, he has the rank and allowances of a colonel; if from the navy, that of captain.

The duties of the office of the Secretary of the Navy are performed under his immediate supervision. By act of Congress approved July 1, 1890, the office of Assistant Secretary of the Navy (once before created and abolished) was revived. The assistant secretary is appointed by the President, by and with the advice and consent of the Senate, and (under the clause in the legislative appropriation act approved Mar. 3, 1891) performs "such duties as may be prescribed by the Secretary of the Navy, or required by law." He is, by virtue of Section 178 of the Revised Statutes, Acting Secretary of the Navy during the absence of the secretary. There is attached to the office a chief clerk of the department. The chief clerk has the care and custody of the files and records of the office, and the supervision of the duties of the other clerks and the subordinate employees thereto attached. An office of naval intelligence, the head of which is an officer of the navy, designated chief intelligence officer, is attached to the secretary's office; also an office of naval war records, combined with the library, in charge of an officer of the navy, who is designated superintendent of naval war records.

Revised by S. B. LUCE.

Nax'os (in Gr. Νάξος): the largest and most fertile of the Cyclades islands; 20 miles in length and 14 in breadth. It was celebrated for its wine, and therefore was one of the chief seats of the worship of Dionysus. This fact is embodied in the myth of ARIADNE (*q. v.*), whom Dionysus found here after her abandonment by THESEUS (*q. v.*). For this reason the ancients thought that it had been colonized by Thracians, but in the earliest known times it was inhabited by Carians, who were driven out by Ionians and Cretans. Its shape is somewhat round, and hence in poetry it was called *Strongyle*. The island flourished most under Lygdamis the tyrant, who was put into power by Pisistratus. It was devastated by the Persians in 490 B. C. Four Naxian ships fought at Salamis on the side of the Persians. It then became a member of the Athenian confederacy, but was crushed by Athens in 466 B. C. and was colonized by Athenian citizens in 453 B. C. Chabrias gained a victory over the Spartans at Naxos in 376, and forced the island once more to join the Athenians. The island was then owned in turn by Macedonia and Egypt, and was given by Antony to Rhodes. Henceforth the island played an insignificant *rôle* until it was conquered by the Venetians in 1206 A. D., when it became the capital of a duchy and the center of Venetian power in the Ægean. It fell to the Turks in 1579, but now belongs to Greece. A range of mountains of white marble, similar to that of Paros, runs through the island. It is high, but contains many beautiful, well-watered, and fertile valleys, which produce wheat, wine, figs, and olives in abundance and of superior quality. See Gruter, *De Naxo insula* (Halle, 1833); Engel, *Quæstiones Naxiæ* (Göttingen, 1835); Dugit, *De insula Naxo* (Paris, 1867); Tozer, *Islands of the Ægean* (Oxford, 1890).

J. R. S. STERRETT.

Nazareans: See MANDÆANS.

Nazarene [from Lat. *Nazare'nus* = Gr. Ναζαρηνός, deriv. of Ναζαρέτ, Nazareth]: a term employed in several significations in the New Testament and in ecclesiastical history. As first used (Matt. ii. 23) it is applied to Christ's residence at Nazareth as the fulfillment of a prophecy that "he shall be called a Nazarene"; but as no such passage occurs textually in the Old Testament, the term has been referred to the Nazarites; or to *Netser*, "the Branch" (Isa. xi. 1): or, rather, it expresses reproach, Nazareth being a proverbially contemptible place (John i. 46).

Nazareth [= Lat. = Gr. Ναζαρέθ, Ναζαρέτ, from Heb. *Nazareth*]: a village of Palestine; in the ancient district of Galilee; 70 miles N. of Jerusalem; in the modern eyalet of Beyrout; celebrated as the place of the Annunciation and the abode of Christ during most of his life (see map of Palestine, ref. 6–D). The Roman Catholics have erected a church on the spot where the angel came to Mary to announce the birth of the Saviour, and the Greeks a church on another spot where the event took place, according to their belief. Chapels have also been built over Joseph's workshop and over Christ's table where he used to eat with his disciples. The village is in a little valley about a mile long and a quarter of a mile wide, just N. of the Plain of Esdraelon. From the hill overlooking the village is obtained one of the finest prospects in Palestine. The population in 1891 was about 7,500, and the Christian part of it is steadily increasing. Besides Mohammedans (about 2,000), there are Orthodox Greeks, Roman Catholics, Roman Catholic Greeks, Maronites, and a few Protestants.

Nazareth: borough (established 1740 by George Whitefield as the site for a school for Negroes, site soon abandoned and purchased by Count Zinzendorf, who established a settlement for Moravians in 1743, incorporated 1858); Northampton co., Pa. (for location, see map of Pennsylvania, ref. 4–J); on the Bangor and Portland Railway; 7 miles N. W. of Easton, 60 miles N. of Philadelphia. It contains the Whitefield House, erected in 1740, now belonging to the Moravian Historical Society, and having a valuable library and collection of Moravian antiquities; Nazareth Hall, the Moravian military boarding-school for boys, founded in 1785; four churches; graded public schools; board of trade, organized in 1877; fair grounds of the Northampton County Agricultural Society; manufactories of seamless underwear and hosiery, agricultural implements, paper boxes, and guitars; and a weekly newspaper. The borough has become noted as a quiet summer resort, and has many attractions for tourists. Pop. (1880) 984; (1890) 1,318; (1900) 2,304.

EDITOR OF "ITEM."

Nazarite [from Gr. Ναζαρίτης, from Heb. *nāzar*, separate one's self, vow, abstain]: among the ancient Hebrews, an ascetic of either sex who had taken a vow to abstain from wine, strong drink, including date and palm wine, and everything that is made of the vine, to let the hair grow, and to touch no dead body. Nazaritism is older than the time of Moses (Num. vi. 2). The vow might be either for a specified time or for life. Samson and Samuel were Nazarites for life, and so was John the Baptist.

Neagh, Lough, loch'nā': a lake in the province of Ulster, Ireland; 17 miles long, 10 miles broad. Area, 153 sq. miles. It receives from the S. the upper Bann and the Blackwater, and communicates on the N. with the Atlantic by the lower Bann. The shores are marshy, and in its vicinity is found much carbonized wood. Tradition says that the lake was made by an inundation in comparatively recent times. Thomas Moore praised the lake, but it is now unattractive.

Revised by M. W. HARRINGTON.

Neal, neel, DANIEL: historian; b. in London, England, Dec. 14, 1678; studied at the Universities of Utrecht and Leyden; became a Dissenting minister in London 1703; preached at Lorimer's Hall 1706–07, and to a congregation in Jewin Street from 1707 until his death, which occurred at Bath, Apr. 4, 1743. Besides minor writings he published a *History of New England* (2 vols., 1720) and a *History of the Puritans* (4 vols., 1732–38). The latter work was reprinted in 1754, 1759, 1793–97 (with *Memoir* by Joshua Toulmin), 1822, and 1837, and an edition, revised, corrected, and enlarged, was issued by Rev. J. O. Choules (New York, 2 vols., 1844). Many replies to Neal appeared, the chief being by Bishop Isaac Madox and Dr. Zachary Gray, and Neal published several rejoinders. The *History*, although not free from a Puritan bias, is an instructive work.

Revised by G. P. FISHER.

Neal, JOHN: author; b. at Portland, Me., Aug. 25, 1793; was brought up in the Society of Friends, but left it when twenty-five years old; became a shop-boy at twelve; was admitted to the Maryland bar in 1819, having previously followed various occupations; was in Europe, most of the time the associate of Bentham, 1824–27, and a correspondent of *Blackwood*; returned to Portland and established *The Yankee* in 1828, and was engaged as editor, lecturer, lawyer, poet, novelist, and teacher of gymnastics. Among his works are *Keep Cool*, a novel (1817); *The Battle of Niagara*; *Goldau and Other Poems* (1818); *Otho*, a tragedy (1819); *Brother Jonathan* (1825); *Rachel Dyer* (1828); *Bentham's*

Morals and Legislation (1830); *The Down-easters* (1833); *True Womanhood* (1859); *Wandering Recollections of a Somewhat Busy Life* (1870); and a very large number of other works. D. at Portland, June 21, 1876.

Revised by H. A. Beers.

Neale, John Mason: theologian and hymn-writer; b. in London, England, Jan. 24, 1818; was educated at Trinity College, Cambridge, and graduated 1840; took orders in the Church of England 1842; was made incumbent of Crawley in Sussex, and warden of Sackville College, East Grinstead, May, 1846. He became one of the literary champions of the High Church party, and was the founder of the sisterhood of St. Margaret 1856; obtained the Seatonian prize at Cambridge for an English sacred poem on nine occasions between 1845 and 1861. He published nearly seventy volumes, chiefly upon theological and ecclesiastical subjects, of which the best known were *The History of the Holy Eastern Church, the Patriarchate of Alexandria* (4 vols., London, 1847–51); *Mediæval Preachers* (1857); *History of the so-called Jansenist Church of Holland* (1858); *Essays on Liturgiology and Church History* (1863); *Mediæval Hymns from the Latin* (1851): and *Hymns of the Eastern Church* (1863). He also published an edition of Bunyan's *Pilgrim's Progress* (1853) for the use of children of the Anglican Church, and his notes to that work gave rise to much controversy. He wrote the popular hymns on the New Jerusalem (*Jerusalem the Golden*, etc.) on the basis of the original, besides a great number of other hymns, partly original, partly translated; *Hymns for the Sick* (1843); *Hymns for Children* (1842–46, 3 series); *Rhythm of Bernard de Morlaix* (1858). D. at East Grinstead, Aug. 6, 1866.

Revised by S. M. Jackson.

Neander, nā-aan'der, Johann August Wilhelm; ecclesiastical historian, whose real name was David Mendel; b. at Göttingen, Jan. 17, 1789, of Jewish parents and in humble circumstances; was educated in Hamburg, where he frequented the Johanneum; embraced Christianity in 1806, when he changed his name; studied theology at Jena and Göttingen, and was appointed professor extraordinary at Heidelberg 1812, and Ordinary Professor of Church History at the University of Berlin 1813, where he died July 14, 1850. With immense learning and decided genius he joined great simplicity of character, earnestness, and enthusiasm. By his works he rightfully won the title of the "father of Church history." The old conception of history as a mere concatenation of individual exertions he abandoned, and represented the history of the Christian Church as a general process by which a divine force works its way into the life of the human race. By this idea, first developed by Hegel and afterward manifoldly elaborated by the romantic school, Neander remodeled or regenerated the science of Church history; and he was prominent in that circle of theologians whose center was Schleiermacher, and which, in the earlier part of this century, awakened the educated classes of the German nation from their rationalistic indifference and led them back to Christianity, without throwing them into the arms of Romanism, as the romantic school did. As a writer of history he lacks dramatic power, and his style is heavy. His principal work is his *General History of the Christian Religion and Church*, from the close of the apostolic age to the Council of Basel in 1431 (6 vols., in 11 parts, 1825–52), translated into English by Prof. Joseph Torrey; but several of his monographs, on Julian the Apostate (1812), St. Bernard (1813), Gnosticism (1818), St. Chrysostom (1821), *Memorials of Christian Life in Early and Middle Ages* (translated into English by Ryland, London, 1852), are models of that kind of composition. He also wrote *History of the Planting and Training of the Christian Church by the Apostles* (translated by Ryland, Edinburgh, 1842, 2 vols.; revised by E. G. Robinson, New York, 1864) and *The Life of Jesus Christ* (translated by John McClintock, New York, 1848), in refutation of Strauss, etc. A complete edition of his *Works* appeared at Gotha in 13 vols. (1862–66). His library was purchased after his death for the Baptist theological seminary of Rochester, N. Y. See his *Life*, by A. Wiegand (Erfurt, 1890). Revised by S. M. Jackson.

Nearchus, nē-aar'kŭs: one of the generals of Alexander the Great; commanded the fleet during the Indian expedition, and conducted it at the end of the campaign from the mouth of the Indus, through the Persian Gulf, to the mouth of the Tigris. Of his voyage he wrote an account, Παράπλους, of which the substance is in Arrian's *Indica*, and shows the trustworthiness of the author.

Neat-work: See Foundation.

Neb-neb: name given to the dry pods of a species of acacia, especially *A. arabia*, a native of the East and of Senegal. These pods contain much tannic acid, and are used by tanners in Egypt and in some other countries. They have also been used in dyeing.

Ne'bo [Heb. *Nebō*, the planet Mercury, worshiped by the Chaldeans and Assyrians as a god: Assyr. *Nabu*: Accadian, *Nabin*]: one of the principal divinities of the Babylonian pantheon, generally identified with the Egyptian Thoth and the Greek Hermes. His greatest temple was at Borsippa (Birs-Nimrud).

Nebo [Heb. *Nebō*, appar. named from being a seat of the worship of the god Nebo (*q. v.*)]: a mountain of Eastern Palestine, "over against Jericho" (Deut. xxxii. 49), identified, in 1875, by Prof. John A. Paine, of the American Palestine Exploration Society, with *Jebel Nebba*, 5 miles S. W. of Heshbon. It is 2,685 feet high. There was also a city of the same name (Num. xxxii. 3) in the immediate neighborhood.

Nebraska [from Indian, liter., shallow water, or Water Valley]: one of the U. S. of North America (North Central group); twenty-fourth in order of admission into the Union; popularly known as the "Blackwater State."

Seal of Nebraska.

Location and Area.—It lies between 40° and 43° N. lat., and 95° 23′ and 104° W. lon.; South Dakota lies N., the Missouri river separates it from Iowa and Missouri on the E., Kansas and Colorado lie S., and Colorado and Wyoming W.; extreme length E. to W. 420 miles, N. to S. 208 miles. Area, 76,840 sq. miles (49,177,600 acres).

Physical Features.—Nebraska is one of the prairie States, with gently rolling surface in the E., which breaks into a few hills in the extreme W. The general slope of the surface is toward the southeast corner, which is about 875 feet above the level of the Gulf of Mexico. From here the ascent is very gradual both to the N., up the Missouri, and to the W., toward the foot-hills of the Rocky Mountains. In the northeast corner the elevation is 1,140 feet; in the N.W., at Mansfield, it is 3,628 feet; and at the southwest corner 3,258 feet. The general elevation along the entire western boundary exceeds 4,000 feet. The highest point in the State is Scott's Bluff, situated a little to the S. of the point where the North Fork of the Platte enters the State. Its elevation is over 6,000 feet. The gentle inclination of the surface allows water to flow off slowly, so that rivers are generally wide and shallow. Nebraska ranks second in the area of its rivers and small streams (630 sq. miles). The forks of the Platte river, rising in Colorado and flowing through Colorado and Wyoming, unite in Western Nebraska and run the full length of the State, turning a third of it into a fertile valley. The North Platte river from its source to its mouth at the Missouri has an estimated length of more than 1,400 miles, making it the seventh river in length in the U. S. The Niobrara river flows through the northern portion of the State, flowing into the Missouri. The extreme S. E. is drained by the Missouri directly, but the S. and S. W. are drained by the Republican, a tributary of the Kansas. The rich black soil, in a past age the bottom of a great fresh-water lake, washes into the streams and renders them very dark colored. Along with the deposits of limestone, sandstone, and shale, in the southeast counties are light veins of coal. These are not productive enough for more than local use. Rocks of the Permian age appear only in and near Gage County, in the S. E. The rocks of the Dakota group are found within an area extending from the upper half of the eastern border to the Kansas line, through Saunders, Lancaster, Saline, and Jefferson Counties. The "rotten limestone" and "chalk rock" of the Colorado group

NEBRASKA

Scale of Miles
0 10 20 30 40 50
County Towns ⊙

Longitude West from Greenwich

are seen within a strip of country extending N. and S. next W. of the Dakota group, with an average width of 80 miles. The remaining surface, excepting a small showing of the Colorado group at the re-entrant angle of the boundary, is the area of the lake deposits. The western central part of the State is an unusually fertile country. The bad lands, or "mauvaises terres," cut into deep gulches by the tributaries of the White and Big Cheyenne rivers, are not absolutely worthless as was once supposed. Vegetable life has not obtained a foothold except in a few places, but where it has, grasses and other plants grow in abundance. The State geologist has pronounced the marl of this region to be as fine soil as the State can show.

Soil and Productions.—Nebraska is pre-eminently an agricultural State. As a mineral-producing State it ranks almost last. The output of 1889 (census of 1890) was valued at $257,019. A small part of this was the value of 1,400 tons of coal mined in Richardson County for local use. The rest was for limestone, which is quarried extensively and used in all kinds of masonry. Comparatively little is used in the manufacture of lime. A soil of unusual richness covers the State to an average depth of about 200 feet. S. of the Platte it seems to be one uniform stretch of loess formation. Covering two or three tiers of counties along the entire eastern border, much glacial drift is found, and at the very S. E. some rock soil. N. of the Platte, beginning at about the 99th meridian, there is sand, which increases to the W. The center of this region is Grant, Thomas, and Hooker Counties. The subsoils are as rich as the black soil, and raise a full crop the first year after being turned up. All that ever causes a failure of crops is lack of sufficient water. Comparatively little fertilizing is done because the soil yields abundantly without. All crops that are adapted to this latitude are grown in Nebraska.

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	63,387	113,608	79·2
Total acreage of farms	9,944,826	21,593,444	117·1
Value of farms, including buildings and fences	$105,932,541	$402,358,913	279·8

* Increase.

The following table shows the acreage, yield, and value of the principal crops in the calendar year 1900:

CROPS.	Acreage.	Yield.	Value.
Corn	8,093,464	210,430,064 bush.	$65,233,320
Wheat	2,066,825	24,801,900 "	13,145,007
Oats	1,732,962	37,778,572 "	9,066,857
Rye	61,073	867,237 "	346,895
Barley	33,374	587,382 "	193,836
Buckwheat	5,155	82,480 "	52,787
Potatoes	146,431	9,664,446 "	4,735,579
Hay	1,912,673	2,639,489 tons	13,593,368
Totals	14,051,957	.....	$106,367,649

On Jan. 1, 1900, the farm animals comprised 658,807 horses, value $28,120,512; 43,876 mules, value $2,384,667; 685,338 milch cows, value $24,329,499; 1,521,454 oxen and other cattle, value $46,220,249; 322,057 sheep, value $1,090,807; and about 2,000,000 swine, value $15,000,000; total head, 5,231,532; total value, $117,145,734.

Mention should be made of the introduction and rapidly increasing production of alfalfa as a forage plant, and of the success of nurseries and seed farms, of which there were nearly 15,000 acres in 1890. Many millions of trees have been planted in the State since Arbor Day originated.

Flora.—The State is the meeting-ground for the floras of the Rocky Mountains and the Mississippi valley. In all, more than 2,700 species of vegetable life have been catalogued. Grasses are especially abundant, and about 150 native species have been found. The Compositæ and the Leguminosæ are also numerously represented. There are 140 species of woody plants, of which sixty-two are trees. Among the most useful of these are yellow pine, red cedar, seventeen species of oak, seven members of the walnut family, a dozen of the willow, the white and the red elm, red mulberry, plane-tree, papaw, basswood, two species of maple, and the box-elder.

Fauna.—The large mammals are almost extinct. The bison does not occur wild. Elk, deer, and antelope are very rare. In the western part of the State there are many of the smaller animals, such as wild-cats, wolves, coyotes, and foxes. Twenty-three species of reptiles are found, none poisonous except three species of rattlesnake. About 400 species of birds are found, including the migratory ones. Owing to the position of Nebraska, midway between the N. and the S. and between the E. and the W., the number of insects is very large. Of the *Orthoptera*, 275 species are found, and other orders, so far as they have been studied, appear in correspondingly large numbers.

Climate.—The mean annual temperature varies from 46·8° to 51·4°. The southeast part of the State has both higher temperature and greater rainfall than the other portions. The facts of greatest value to agricultural interests are that there are many consecutive days in the spring and summer with temperature above 50°, and that a large portion of the annual rainfall occurs during the months when crops are growing. The rainfall for the whole State is not quite so large as for the States immediately E., but the fall is better distributed according to the needs of the crops. The following tables show the temperature and rainfall for the year 1892:

MONTHS.	TEMPERATURE. Mean temperature for State.	S. E.	Cent.	West.	Max.	Min.	PRECIPITATION. State.	S. E	Cent.	West.
January	18·8°	19·6°	17·8°	21·4°	72°	−42°	0·86	0·75	1·02	1·06
February	28·1	30·0	27·1	29·7	70	−10	0·99	1·02	1·32	0·91
March	33·3	34·8	33·1	33·9	82	−19	1·62	2·90	1·79	0·74
April	45·7	48·6	46·2	43·0	98	3	4·00	4·04	3·14	4·16
May	51·7	53·7	51·7	50·4	98	27	5·63	8·39	5·40	3·14
June	68·4	72·6	68·5	66·3	113	30	2·18	1·38	1·21	2·30
July	75·0	79·9	74·9	74·4	113	41	2·57	4·08	2·50	1·70
August	73·2	74·8	73·1	72·4	113	30	3·20	2·99	3·28	2·28
September	65·7	68·2	65·3	64·2	110	27	0·48	0·53	0·35	0·55
October	53·0	56·4	53·2	49·6	96	12	1·71	1·04	1·63	2·22
November	36·6	37·7	35·8	39·5	85	−2	0·27	0·26	0·37	0·08
December	23·3	23·0	22·7	26·9	80	−23	0·61	1·08	0·41	0·58
Year	47·7°	48·9°	47·5°	47·6°	...	...	24·12	28·46	22·42	19·72

Divisions.—For administrative purposes the State is divided into ninety counties, as follows:

COUNTIES AND COUNTY-TOWNS, WITH POPULATION.

COUNTIES.	*Ref.	Pop. 1890.	Pop. 1900.	COUNTY-TOWNS.	Pop. 1900.
Adams	11-F	24,303	18,840	Hastings	17,188
Antelope	9-F	10,399	11,344	Neligh	1,135
Arthur	10-C	91	.....	.....	.....
Banner	10-A	2,435	1,114	Harrisburg	.....
Blaine	9-D	1,146	603	Brewster	.....
Boone	10-F	8,683	11,689	Albion	1,269
Box Butte	9-B	5,494	5,572	Hemingford	133
Boyd †	8-E	.....	7,332	Butte	350
Brown	8-D	4,359	3,470	Ainsworth	605
Buffalo	10-E	22,162	20,254	Kearney	5,634
Burt	9-H	11,069	13,040	Tekamah	1,597
Butler	10-G	15,454	15,703	David City	1,845
Cass	10-H	24,080	21,330	Plattsmouth	4,964
Cedar	8-G	7,028	12,467	Hartington	971
Chase	11-C	4,807	2,559	Imperial	278
Cherry	8-C	6,428	6,541	Valentine	811
Cheyenne	10-B	5,693	5,570	Sidney	1,001
Clay	11-F	16,310	15,735	Clay Center	590
Colfax	10-G	10,453	11,211	Schuyler	2,157
Cuming	9-G	12,265	14,584	West Point	1,890
Custer	10-E	21,677	19,758	Broken Bow	1,375
Dakota	9-G	5,386	6,286	Dakota	521
Dawes	8-A	9,722	6,215	Chadron	1,665
Dawson	10-E	10,129	12,214	Lexington	1,343
Deuel	10-B	2,893	2,630	Chappell	.....
Dixon	9-G	8,084	10,535	Ponca	1,043
Dodge	10-G	19,260	22,298	Fremont	7,241
Douglas	10-H	158,008	140,590	Omaha	102,555
Dundy	11-C	4,012	2,434	Benkelman	296
Fillmore	11-F	16,022	15,087	Geneva	1,534
Franklin	11-E	7,693	9,455	Bloomington	488
Frontier	11-D	8,497	8,781	Stockville	269
Furnas	11-D	9,840	12,373	Beaver City	911
Gage	11-G	36,344	30,051	Beatrice	7,875
Garfield	9-E	1,659	2,127	Burwell	460
Gosper	11-D	4,816	5,301	Elwood	377
Grant	9-C	458	763	Hyannis	.....
Greeley	10-F	4,869	5,691	Greeley	552
Hall	10-F	16,513	17,206	Grand Island	7,554
Hamilton	10-F	14,096	13,330	Aurora	1,921
Harlan	11-E	8,158	9,370	Alma	923
Hayes	11-C	3,953	2,708	Hayes Center	.....
Hitchcock	11-C	5,799	4,409	Trenton	329
Holt	8-E	13,672	12,224	O'Neill	1,107
Hooker	9-C	426	432	Mullen	.....
Howard	10-F	9,430	10,343	St. Paul	1,475
Jefferson	11-G	14,850	15,196	Fairbury	3,140

* Reference for location of counties, see map of Nebraska.
† Formed since census of 1890.

COUNTIES.	* Ref.	Pop. 1890.	Pop. 1900.	COUNTY-TOWNS.	Pop. 1900.
Johnson	11-H	10,333	11,197	Tecumseh	2,005
Kearney	11-E	9,061	9,866	Minden	1,238
Keith	10-C	2,556	1,951	Ogalalla	207
Keya Paha	8-E	3,920	3,076	Springview	188
Kimball	10-A	959	758	Kimball	254
Knox	8-F	8,582	14,343	Niobrara	459
Lancaster	10-G	76,395	64,835	Lincoln	40,169
Lincoln	10-D	10,441	11,416	North Platte	3,640
Logan	9-D	1,378	960	Gandy	.....
Loup	9-E	1,662	1,305	Taylor	.....
McPherson	10-C	401	517	Tryon	.....
Madison	9-F	13,669	16,976	Madison	1,479
Merrick	10-F	8,758	9,255	Central City	1,571
Nance	10-F	5,773	8,222	Fullerton	1,464
Nemaha	11-H	12,930	14,952	Auburn	2,664
Nuckolls	11-F	11,417	12,414	Nelson	978
Otoe	11-H	25,403	22,288	Nebraska City	7,380
Pawnee	11-H	10,340	11,770	Pawnee City	1,969
Perkins	10-C	4,364	1,702	Grant	162
Phelps	11-E	9,869	10,772	Holdrege	3,007
Pierce	9-F	4,864	8,445	Pierce	770
Platte	10-F	15,437	17,747	Columbus	3,522
Polk	10-F	10,817	10,542	Osceola	882
Red Willow	11-D	8,837	9,604	Indianola	626
Richardson	11-H	17,574	19,614	Falls City	3,022
Rock	9-E	3,083	2,809	Bassett	270
Saline	11-G	20,097	18,252	Wilber	1,054
Sarpy	10-H	6,875	9,080	Papillion	594
Saunders	10-G	21,577	22,085	Wahoo	2,100
Scott's Bluff	9-A	1,888	2,552	Gering	433
Seward	10-G	16,140	15,690	Seward	1,970
Sheridan	8-B	8,687	6,033	Rushville	483
Sherman	10-E	6,399	6,550	Loup	826
Sioux	8-A	2,452	2,055	Harrison	168
Stanton	9-G	4,619	6,959	Stanton	1,052
Thayer	11-G	12,738	14,325	Hebron	1,511
Thomas	9-D	517	628	Thedford	.....
Thurston	9-G	3,871	8,756	Pender	943
Valley	10-E	7,092	7,339	Ord	1,372
Washington	10-H	11,869	13,086	Blair	2,970
Wayne	9-G	6,169	9,862	Wayne	2,119
Webster	11-F	11,210	11,619	Red Cloud	1,554
Wheeler	9-F	1,683	1,362	Bartlett	.....
York	10-G	17,279	18,205	York	5,132
Totals	.....	1,058,910	1,068,539		

* Reference for location of counties, see map of Nebraska.

N. B.—Arthur County is now part of McPherson County; Thurston County was formerly Blackbird County; Boyd County was organized in 1891 from part of South Dakota.

Principal Cities and Towns, with Population for 1900.—Omaha, 102,555; Lincoln, 40,169; South Omaha, 26,001; Beatrice, 7,875; Grand Island, 7,554; Nebraska City, 7,380; Fremont, 7,241; Hastings, 7,188; Kearney, 5,634.

Population and Races.—1860, 28,841; 1870, 122,993; 1880, 452,402; 1890, 1,058,910 (native, 856,368; foreigners, 202,542; males, 572,824; females, 486,086; white, 1,046,888; colored, 12,022, of whom 8,913 were of African descent, 214 Chinese, 2 Japanese, and 2,893 civilized Indians).

Industries and Business Interests.—Nebraska has not yet taken rank as a manufacturing State, but a good beginning has been made. In 1890 there were reported 3,014 manufacturing establishments, which had $37,569,508 capital, employed 23,876 persons, paid $12,984,571 for wages and $67,334,532 for materials, and had products valued at $93,037,794. The most important industries were smelting at Omaha; pork-packing at Omaha, Lincoln, and Nebraska City; distilling and brewing at Omaha and Nebraska City; limestone-quarrying and the manufacture of beet sugar at Norfolk and Grand Island; linseed oil at Omaha: cotton goods at Kearney; and flour and starch at Nebraska City. The Chicago, Burlington and Quincy Railroad has car-shops near Lincoln, and the Union Pacific at Omaha. In 1892 there were ninety-eight creameries in the State, which yielded butter to the value of $10,000,000.

Valuations.—The assessed valuations in 1899 aggregated $169,105,905, and the total levy was $1,286,792. On Nov. 30, 1898, the floating debt was $1,571,686.61, and the bonded debt $153,267.35; in 1900 the floating debt was $1,774,588.92, and the bonded debt $55,000. The receipts for the year ending Nov. 30, 1900, were $2,650,324.78, the disbursements $2,660,737.87. The balance at the beginning of the year was $624,523.43, at the end $614,110.34.

Banking.—On Sept. 5, 1900, there were 110 national banks with combined capital of $9,965,000, surplus and profits of $2,379,105, and deposits of $32,916,566; and 405 State banks with combined capital of $7,005,450, surplus and profits of $2,104,794, and deposits of $25,256,035.

Post-offices and Periodicals.—On Jan. 1, 1901, there were 1,070 post-offices, of which 114 were presidential (3 first-class, 11 second-class, 100 third-class) and 956 fourth-class. 601 money-order offices, and 3 money-order stations. There were 28 daily, 1 tri-weekly, 12 semi-weekly, 523 weekly, 2 semi-monthly, and 42 monthly periodicals; total, 608.

Libraries.—In 1892 there were 31 libraries of 1,000 volumes and over, which contained 150,668 bound volumes and 13,197 pamphlets. They were classified as follows: General, 6; school, 8; college, 5; college society, 1; law, 1; public institution, 2; State, 1; Y. M. C. A., 1; social, 3; historical, 1; not reported, 2.

Means of Communication.—The following is the mileage of the railways in Nebraska, given by the board of transportation in Mar., 1894: Chicago, Burlington, and Quincy ("B. and M."), 2,253·07; Chicago, St. Paul, Minneapolis, and Omaha, 261·85; Fremont, Elkhorn, and Missouri Valley, 985·19; Sioux City and Pacific, 26·95; Chicago, Rock Island, and Pacific, 248·33; Missouri Pacific, 279·46; Pacific R. R. in Nebraska, 71·22; Union Pacific, 467·48; Omaha and Republican Valley, 414·44; St. Joseph and Grand Island, 112·53; Kearney and Black Hills, 65·72; Kansas City, Wyandotte and Northwestern, 20·10; Nebraska and Western (Pacific Short Line), 129·16: total, 5,529·22. Total in 1899, 5,574·28.

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	213	220	51,503	$1,179,160
Methodist Episcopal	649	680	41,086	1,242,200
Lutheran, Synodical Conference	135	93	12,339	168,570
Presb. in the U. S. of America	228	187	12,159	576,210
Baptist	230	234	11,917	514,710
Congregational	172	144	10,145	640,204
Disciples of Christ	100	84	7,715	269,375
Lutheran, General Council	88	83	7,204	206,001
United Brethren in Christ	147	140	5,673	84,950
Lutheran, General Synod	73	73	3,731	330,420
Evangelical Association	81	84	3,458	86,100

Schools.—The system of public education is very complete. From the district schools and city grades, through the high schools to the university, the system is a unity. In addition there are a State normal school, schools for the blind, deaf and dumb, refractory youth and feeble-minded youth, and an efficient system of teachers' institutes and university extension. The management of the State University is vested in a board of regents, two members being elected biennially for the term of six years. The normal school is under the direction of a board of seven members, including the State superintendent of public instruction and the State treasurer.

In the school year 1898–99 there were 372,764 children of school age, of whom 277,765 were enrolled in the public schools, with an average daily attendance of 169,424. There were 6,710 schools; 9,192 teachers—2,038 men, and 7,154 women. The average monthly salaries were, men $45.05, women $36.56. The total value of school property was $9,215,220; revenue for school purposes, $3,737,950; expenditure, $3,815,593.

Charitable, Reformatory, and Penal Institutions.—These comprise the State School for Feeble-minded Youth, at Beatrice; School for the Deaf and Dumb, at Omaha; School for the Blind, at Nebraska City; Industrial School for Boys, at Kearney; Industrial School for Girls, at Geneva; Home for Fallen Women, at Milford; State lunatic asylums, at Lincoln, Norfolk and Hastings; Home for the Friendless, at Lincoln; Sailors' and Soldiers' Home, at Grand Island; and the State Penitentiary, at Lincoln.

Political Organization.—There are few unusual features in the constitution of the State. The State officers are Governor, secretary, auditor, treasurer, attorney-general, Lieutenant-Governor, superintendent of public instruction, and commissioner of public lands and buildings, each elected by the State at large for two years. The clerk of the Supreme Court is the State librarian. Much of the executive work is done by boards, chief among which are those for public lands and buildings, equalization, transportation, school lands and buildings, health and State printing. The Legislature consisted in 1894 of 33 Senators, elected from 30 districts, and 100 Representatives from 67 districts, each for a term of two years. Sessions are held biennially, beginning on the first Tuesday in January of odd-numbered years, and are limited to 60 days. A three-fifth vote passes a bill over the Governor's veto. The judicial department consists of a Supreme Court of three members, district courts in 15 districts, county courts, justices' courts, and in cities police courts.

History.—A Spaniard named Coronado came up from Mexico as far as the south part of Nebraska as early as 1541. Father Marquette mapped out the Platte and Missouri in 1673. Dutisne, a Frenchman, came into the plains W. of the Missouri in 1719. Twenty years later the Mallet brothers explored the Platte country. The fur-trading periods, in the latter part of which the Nebraska country served as trading-ground, may be divided as follows: French, 1634–1763; British, 1763–1816; American, 1816–34. In 1810 the American Fur Company located a trading-post at Bellevue, on the high bluffs just N. of the mouth of the Platte river. Lewis and Clarke's expedition had passed up the west bank of the Missouri river in 1804, and other expeditions followed, viz., Major Long, 1819; W. H. Ashley, 1822; Rev. Samuel Parker, 1835; and Gen. Frémont, 1842. The U. S. Government established old Fort Atkinson, afterward called Fort Calhoun, in 1820. It was abandoned in 1828. Missionaries to the Indians began to penetrate the region W. of the Missouri river very early. One of the earliest was Moses Merrill, who preached to the Otoes from 1833 to 1840. The Mormons removed from Illinois in 1846, and their "winter quarters," a few miles N. of where Omaha now is, are said to have contained at one time 15,000 people. Nearly all of them shortly made their way beyond the mountains to Salt Lake City. The next great movement of population to the West, that of the gold-hunters, beginning in 1849, gave to the west bank of the Missouri its first towns, and Nebraska City and Plattsmouth had become towns of some size when the lands were formally thrown open to settlers. The first organization of the country by the famous Kansas-Nebraska Bill in 1854 made one Territory of all the region between parallel 40°, the summit of the Rocky Mountains, the Canada line, and the Missouri river. From 1803 to 1854 the tract was nothing in fact but Indian country, known on the statute-books as Louisiana Territory (1805), or the Territory of Missouri (1812). The Territorial form of government lasted from 1854 to 1867, during which the capital was at Omaha, and settlements grew westward from the Missouri slowly. With statehood in 1867 came also the Union Pacific Railway, and a change of the capital to Lincoln, where it has since remained. With the exception of the controversy over one of the electoral votes at the time of the presidential election of 1876, there have been few important events in the recent history of the State.

GOVERNORS OF NEBRASKA.

Territorial.

Francis Burt	1854
T. B. Cuming (acting)	1854–55
Mark W. Izard	1855–58
Wm. A. Richardson	1858
J. S. Morton (acting)	1858–59
Samuel W. Black	1859–61
Alvin Saunders	1861–66
David Butler	1866–67

State.

David Butler	1867–71
W. H. James (acting)	1871–73
Robert W. Furnas	1873–75
Silas Garber	1875–79
Albinus Nance	1879–83
James W. Dawes	1883–87
John M. Thayer	1887–91
James E. Boyd	1891–93
Lorenzo Crounse	1893–95
Silas A. Holcombe	1895–99
William A. Poynter	1899–1901
Charles H. Dietrich	1901–

AUTHORITIES.—Publications of the State Board of Agriculture, State Horticultural Society, Bureau of Labor Statistics, reports of State officers, statutes, and publications of the State Historical Society; census of U. S., bulletins and three volumes for 1890; J. A. Barrett, *History and Government of Nebraska* (Lincoln, 1891); Johnson, *History of Nebraska*; *Nebraska State Gazetteer* for 1893.

JAY AMOS BARRETT.

Nebraska City: city; capital of Otoe co., Neb. (for location of county, see map of Nebraska, ref. 11–H); on the Missouri river, and the Burlington and the Mo. Pac. railways; 44 miles S. of Omaha, 57 miles E. of Lincoln; elevation above sea-level, 907 to 972 feet. The river here has two arms, which are crossed by a pontoon bridge that cost $18,000, and by a steel railway bridge that cost $1,000,000. The city contains 17 churches, a high school, 10 public-school buildings, the State School for the Blind, Roman Catholic convent, U. S. Government building, public library, hospital, 3 national banks with combined capital of $200,000, a State bank with a capital of $50,000, and a monthly, 4 daily, and 5 weekly periodicals. The industrial establishments include two large pork-packing plants, extensive stock-yards, cologne spirits and alcohol distillery, flour and starch mills, vitrified brick-works, several breweries, foundries, and machine-shops, creamery, canning-works, boiler-shops, marble-yards, plow and wagon factories, lumber-yards, and planing-mills. The city is in the center of a rich corn and fruit belt, and has adequate sewerage, gas, electric-light, water, fire department, and street-railway services. Pop. (1880) 4,183; (1890) 11,941; (1900) 7,380.

EDITOR OF "NEWS."

Nebuchadnez'zar [from Heb. *n'būkhad netstsar*, appar. the prince of the god Nebu or Mercury; but the form in Jer. xlix. 28 (Nebuchadrezzar) agrees more nearly with that found on the cuneiform monuments, *Nabu-kudurri-uṣur*, Nebo, defend the crown]: the greatest of the Kings of Babylon, son and successor of Nabopolassar, the founder of the empire; was of marriageable age at the time of his father's revolt against Assyria (B. C. 625), at which time Amuhia, daughter of the Median king, was betrothed to him; is supposed to have commanded the Babylonian auxiliaries in Cyaxares's war against Lydia, and to have brought the hostilities to a close by his mediation on the occasion of the famous eclipse foretold by Thales, B. C. 610; regained Carchemish on the Euphrates from the Egyptian king 605; subjugated Syria and Palestine, carrying the principal Jews into captivity in the same year; succeeded to the throne 604; besieged Tyre 598; completed the reduction of Judæa 586; destroyed Tyre after a siege of thirteen years 585; invaded and ravaged Egypt some years later; rebuilt in a splendid manner all the cities of Upper Babylonia; constructed vast temples, aqueducts, and palaces, the ruins of which still testify to their grandeur. He was, indeed, the most successful and the most powerful monarch who sat on the throne of Babylon. Of his insanity and the events preceding it we have no other account than from the book of Daniel, though numerous inscriptions tell us about his occupations at home. D. about 561. See Rawlinson's *Five Great Monarchies*; also the book of Daniel.

Nebulæ [= Lat., plur. of *neb'ula*, cloud; cf. Gr. *νεφέλη*, cloud : Sanskr. *nábhas-* : O. H. Germ. *nebul*] : a class of celestial objects characterized by a certain cloudy aspect resembling the light of the Milky Way or the Magellanic clouds, or in numerous cases the diffused light of a comet's tail. By means of powerful telescopes many bodies having this nebulous appearance can be shown to be merely clusters of apparently faint stars, but it does not seem at present improper to treat of clusters and nebulæ under one general name—nebulæ. The nebulæ are distinguished from the fixed stars by their apparent diameter, since the latter bodies appear, even under the greatest magnifying powers, without sensible magnitude. They are, on the other hand, distinguished from the planetary and cometary disks, not only by their peculiar luster, but by their immobility, since, as yet, a proper motion has not been demonstrated for any nebula except the trifid (*G. C.* 4355), although changes are known to have occurred within the body of one nebula and perhaps others. (See Holden in Silliman's *Am. Jour.*, May, 1876.) On account, therefore, of their fixity, it has always been considered that the nebulæ belong to the regions of space very far removed from our solar system. Knowledge of these celestial bodies has been peculiarly dependent upon the successful construction of large telescopes, and is therefore almost exclusively the result of the labors of modern astronomers, beginning with Sir William Herschel.

The term "cloudy stars" is first found in the catalogue of Ptolemy, but each of the five objects so named by him is now known to be a coarse cluster of stars, easily resolvable into its elements by feeble telescopes. The Arabian astronomer Sufi in the middle of the tenth century makes mention of the Magellanic clouds and of the Andromeda nebula. The first recorded telescopic observation of a true nebula is by Simon Marius, who in 1612 had appropriately described the great nebula in Andromeda as appearing to the naked eye like the flame of a candle seen through a semi-transparent sheet of horn. In 1656 Huyghens recorded the discovery of a similar nebulous body in Orion, which had been discovered without the use of a telescope by Cysat in 1619. The largest general collection of nebulæ previous to the time of Sir William Herschel was that published by Messier, whose first catalogue (1771) contained 45 nebulæ and clusters; while his second and third catalogues (*Conn. des Temps*, 1783 and 1784), contained 103. Sir William Herschel discovered several thousand new nebulæ and clusters, the places of which, with appropriate descriptions, were communicated by him to the Royal Society of London in three successive memoirs—in 1786, 1,000 new nebulæ and clusters; in 1789, 1,000 additional nebulæ and clusters; and in 1802, a third catalogue of 500 of these bodies. The next great work

is due to Sir John F. W. Herschel, son of Sir William, who in 1825 to 1830, with a 20-foot reflector, revised a portion of the work of his father in the northern hemisphere, compiling a catalogue of 2,306 nebulæ, of which 500 were new.

FIG. 1.—The nebula in Orion (*G. P. Bond*).

He then transported his teleseope and other apparatus in 1833 to the Cape of Good Hope, and devoted the years 1834 to 1838 inclusive to a "teleseopic survey of the whole surfaee of the heavens." Of the seven portions into which this great work was divided, the first, on the nebulæ of the southern heavens, contained a catalogue of 2,049 nebulæ, of which about 500 were new. Some of the nebulæ in the southern hemisphere observed by Sir John Herschel had also been catalogued by Dunlop, who in 1828 had presented to the Royal Society a catalogue (full of errors, however) of 629 nebulæ and clusters observed at Paramatta.

Equally brilliant were the labors of William Parsons, Earl of Rosse, who applied reflecting telescopes of 3 and 6 feet diameter and 30 and 53 feet focal length to the study of the nebulæ, and who directed his efforts rather to the minute study of interesting objects than to the discovery of new ones. Besides several earlier smaller papers, he communicated in the *Philosophical Transactions* for 1844 and 1850 the results of his examinations of several of the nebulæ observed by Sir John Herschel, and in this paper, among other interesting phenomena, announced the existence of spiral nebulæ. Further observations were published by him in 1860 and 1861. The astronomical labors of the Earl of Rosse have been worthily continued by his eldest son. Equally effective were the labors of Lassell, who by the establishment of a magnificent reflector of 4 feet aperture at Malta eontributed greatly to this branch of astronomy. The *Memoirs of the Royal Astronomical Society*, vols. xviii., xxxvi., contain his work on this subject, as well as that of his assistant Mr. Marth, who discovered about 600 new nebulæ. The great reflectors at Melbourne, Australia, and at Paris and Toulouse, France, are also devoted to the study of nebulæ.

While the British observers of nebulæ have preferred the use of large reflectors, those of other nations have been slow to adopt them; the most important observations made by others in whieh reflectors have been used, at least so far as yet published, are contained in the memoir of E. P. Mason, of New Haven, Conn., printed in the seventh volume of the *Transactions of the American Philosophical Society*.

The most eomprehensive list of nebulæ and clusters that has as yet been published is the General Catalogue of Sir John Herschel in the *Philosophical Transactions* of 1864, in which work he has combined in one catalogue all the observed positions of nebulæ accessible to him in 1863, to the number of 5,079, whieh by a comprehensive system of references and synonyms enables one to recognize by whom a given nebula was first observed, and what is its general appearance. Since the publication of this catalogue a great number of additional nebulæ have been observed, which are, however, so faint as to be visible only in the most powerful telescopes. Herschel classified both nebulæ and clusters into orders, defined by their actual shapes. Thus we have first, eireular; second, elliptic: third, annular; fourth, long or ray-like; fifth, spiral; and sixth, very irregular nebulæ.

FIG. 2.—The spiral nebula 51 M Canum Venaticorum (*Earl of Rosse*).

Evidences are at hand of slight variations in brightness, size, and form of a few nebulæ. The frequent occurrence of double nebulæ suggests the classification of these objects in this regard, and we find in the General Catalogue of Sir John Herschel, out of 5,079 objects, of which 4,050 are unresolved or true nebulæ, 229 double nebulæ, 49 triple, 30 quadruple, and 11 more or less complex multiple nebulæ. D'Arrest remarks that among nebulæ the double and probably binary nebulæ occur more frequently than do similar stellar combinations in comparison with the total number of fixed stars.

The application of spectrum analysis to these bodies affords another system of classifieation. This difficult branch of observational astronomy we owe to William Huggins, F. R. S., of London, who in Aug., 1864, first turned his delicate spectroscope and moderately powerful refracting telescope upon the planetary nebulæ. Secchi, d'Arrest, and, to a less extent, a few others, but especially Brediehin of Moscow and the younger John Herschel, have also contributed to our knowledge of this subjeet. It is apparent from the observations of these spectroseopists that among the nebulæ there are some whose spectra have the characteristics belonging to the spectra of gases, and this almost entirely irrespective of the apparent resolvability or stellar nature of the nebulous mass. Other nebulæ have the equally characteristie spectra peculiar to glowing solids. In a third and numerous class of nebulæ we place all those whose spectra combine the characteristies of both the preceding classes. The relative motions of the earth and some nebulæ are also indicated by Huggins's later observations. Photography has also been applied with success to the study of nebulæ, and has revealed peculiarities which were not otherwise observed. Foremost in this branch of research is Isaac Roberts, F. R. S.

FIG. 3.—The annular nebula 57 M Lyræ (*Earl of Rosse*).

The consideration of the imperceptible gradation that exists as we pass from the faintest, most diffuse, and most irregular, by insensible gradations, down to the well-defined, brightest, and smallest of the planetary nebulæ, led Sir William Herschel to imagine, most naturally, that the fixed stars, our sun, and the planets of our solar system were but the results of the systematic operations of evolution by means of which inhabitable worlds endowed with warmth, light, and life were brought forth out of primitive and gaseous matter; and, however much of hypothesis may be inherent in such a sys-

tem as this, or however little ground there may have been for belief in the nebular hypothesis as first advanced by Herschel, and subsequently elaborated by Laplace, there

Fig. 4.—The great nebula in Andromeda (*G. P. Bond*).

would seem at the present day to be no reason to reject all of its propositions. See Nebular Hypothesis.

Cleveland Abbe.

Nebular Hypothesis: the modern theory of the formation of stars and planets. The idea that the earth was, in some way, formed or created by the collection and arrangement of matter originally in a chaotic state seems to have been a part of the heritage of our race, being familiar even in prehistoric times. The first verse of the book of Genesis may be cited as an indication of this; but it was impossible to form any scientific basis for such a theory until after the discovery of universal gravitation. Perhaps Swedenborg has as good a right as any other to be regarded as first to suggest the modern theory. The accord of his work with recent ideas, however, was more in his description of the succession of the phenomena than in his reference to the theory of gravitation, for although Sir Isaac Newton published his *Principia* before Swedenborg wrote, it does not appear that gravitation played a prominent part in the speculations of the latter.

The German philosopher Kant is very generally regarded as the actual founder of the nebular hypothesis, because he reached it both inductively, by a study of the structure of the solar system, and deductively, by showing how gravitation could have resulted in the formation of the system from nebulous matter. He was the first to show that the hypothesis explains the fact that the orbits of the planets and satellites are all very nearly in the same plane, and that the revolutions both around the sun and on their axes are all in the same direction. We now know that this is not true of the satellites of Uranus and Neptune, but Kant was not acquainted with those bodies. To explain this common direction of motion, Kant assumes that all the materials out of which the bodies of our solar system were formed were, in the beginning of things, resolved into their original elements, and filled all that region of the universe in which these bodies now move. Kant, however, was too little acquainted with the laws of mechanics to show clearly how this condensation of the original matter would have resulted in the planets performing revolutions both around the central body and on their own axes. He did not confine himself to the solar system, but pointed out that the whole galaxy seemed to be a system somewhat of the same kind, thus assigning to the hypothesis the widest possible scope.

Herschel reached the same conclusions in an entirely different way, by his telescopic examinations of the nebulæ. He found that no sharp line could be drawn between the nebulæ properly so called, which seemed to be composed wholly of glowing vapor, and clusters of stars. These two classes of bodies seemed to shade into each other by insensible gradations. He therefore conceived that the stars are formed by the actual condensation of nebulæ.

The author to whom the hypothesis has been most frequently referred is Laplace, the fact that he was anticipated by Kant having been very generally overlooked. Like Kant, he concluded that the remarkable uniformity in the directions of the rotation of the planets could not have been the result of chance. He had the great advantage over Kant of being a master of the mathematical theory of the rotation of bodies, and therefore better qualified than his predecessor to show how such rotations might originate. He begins, however, not with an assumed uniform nebulous mass, as Kant and others did, but with the sun itself, surrounded by a fiery atmosphere, which extended beyond the present limits of the solar system. This atmosphere consisted of the elements which now form the planets and satellites; and he showed how, by its gradual cooling and condensation, combined with a slow axial rotation, successive rings would be formed which would themselves gradually condense into planets and satellites. The zone of asteroids between Mars and Jupiter is explained by supposing that, owing to the general uniformity of the particular ring which formed these bodies, it did not condense around a single nucleus, but contracted into a great number of small bodies.

Since then the most eminent writer on the subject is Herbert Spencer, who has made the hypothesis a part of his general theory of evolution, and shown how the process by which nebulous matter condensed into planets was analogous to that which is seen in the generation and growth of animals, and in the whole tendency of progressive natural changes.

The most interesting question suggested by the hypothesis is as to what extent it can be considered as proved. The most we can say is that a number of natural phenomena point to it, or are explained by it, but that no one of them can be considered as actually proving it. It must, however, be admitted that if we are to explain the origin of the solar system otherwise than by the arbitrary fiat of the Creator, this is the only explanation that can be offered. It explains the fact that the Earth (*q. v.*) is an intensely hot body, only the surface of which has cooled off. It explains also the origin of the sun's supply of heat, and shows why our central luminary did not, like the earth, cease to give off heat ages ago. See Energy.

S. Newcomb.

Nece'dah: village; Juneau co., Wis. (for location of county, see map of Wisconsin, ref. 6–D); on the Yellow river, and the Chi., Mil. and St. P. and the Chi. and N. W. railways; 19 miles N. of Manston, the county-seat, and 147 miles N. W. of Milwaukee. It is built up around a high bluff, in an agricultural and lumber region; contains four churches, public, high, and graded schools, and a weekly newspaper; and is engaged in general farming, cranberry cultivation, milling, and the manufacture of pine and hardwood lumber. Pop. (1880) 1,475; (1890) 1,708; (1900) 1,209.

Editor of "Republican."

Necessity [viâ O. Fr. from Lat. *neces'sitas*, deriv. of *neces'se*, necessary, unavoidable]: in philosophy, the name of a doctrine which treats of the essential relation which a being has toward another. It has importance theologically, morally, and scientifically. On it hinge the questions of God, freedom, and immortality, their solutions being determined affirmatively or negatively according to the type of necessity which is assumed as predominant in the universe. Three kinds or species of necessity may be enumerated as including the manifold distinctions under this head: (*a*) *Physical or causal necessity*, whereby a somewhat is subject to external constraint, determined to be what it is by another outside it. This necessity is founded on causation, and is known also under such designations as fate (*εἱμαρμένη* of the Stoics), destiny (*necessitas consequentis* of the Schoolmen), natural selection (as understood by the ancient Epicureans and atomists; the Darwinian meaning of this term implies various degrees of self-activity and reaction against the environment, and thus suggests freedom rather than necessity); and such epithets as material, natural, blind, brute are given to it. (*b*) *Logical or substantial necessity*, called also ideal or formal, absolute, "metaphysical or mathematical" (Leibnitz), *necessitas consequentiæ* (Schoolmen), is variously defined as "that which can not but be in the nature of things"; "connection between parts of mental or verbal propositions"; "that the opposite of which implies contradiction." This form of necessity is founded on substantiality, "the connec-

tion of existence and essence," and is first a subjective necessity, the opposite of which is inconceivable, and, secondly, the condition also of objective reality. It is exemplified in "necessary truths" or "necessary ideas," the contrary of which can not be conceived. (*c*) *Moral or teleological necessity* is defined as "connection of end and means," "moral obligation or conscience," "that of motives," "that of rational determination or freedom." It is called in its various phases "categorical imperative" (Kant), "hypothetical necessity" (applied by Leibnitz to the divine predetermination), "overruling Providence" (*πρόνοια* of the Stoics). It is founded on Final Cause, and embraces phases of manifestation within the consciousness of man, as well as those based upon the divine will; hence the wide differences in the above definitions and epithets. Logical necessity, as the distinctive characteristic of *a priori* truth, was first enunciated by Leibnitz (*Nouveaux Essais*), and afterward made the basis of the critical system by Kant. In his *Critic of Pure Reason* Kant places the category of Necessity after those of Possibility and Reality, as forming their identity. A reality which has unrealized possibilities is contingent (this is Kant's thought), while a reality that has realized all of its possibilities is a necessary being, and can not be otherwise, having no other possibilities; this makes the sphere of reality coextensive with the sphere of possibility. They who set up physical or material necessity as the highest principle, if consistent, make God to be a blind force, mind to be an emanation from matter, and deny freedom and immortality. They who make moral or teleological necessity the first principle hold God to be personal, and interpret nature and history as stages in the realization of free, personal beings. Logical necessity is held to be identical with God's moral necessity by some. Psychologically, the perception of necessity marks the entrance into the stage of reflection. Sense-perception perceives no necessity; to it all is contingent. Each individual is to it independent and valid by itself. Without transcending experience one can not perceive necessity (although this is denied by Occam, the great nominalist). Reflection throughout all its stages is dominated by the idea of necessity. Each thing is dependent upon others —upon all others. In this principle are contained antinomies or unavoidable contradictions which it is the object of philosophy to solve. The process of their evolution and solution is called *dialectic*. By it the subsidiary character of physical necessity may be shown. It proves to be only a phase in the process of moral or teleological necessity, which is implied in free will. The following is an outline of the dialectic statement of the attitudes successively assumed by consciousness toward necessity: (*a*) All things are necessitated; each is necessitated by the totality of conditions; hence whatever is, must be as it is, and under the conditions can not be otherwise. (This is the standpoint of complete fatalism; its incompleteness and inadequateness is seen when applied to explain change.) (*b*) Things change—something new begins and something old ceases; according to the principle of necessity, the new must be necessitated by the totality of conditions, just as the old was. If the same totality of conditions necessitates both states (the new and the old), it follows that it is adapted to both, and hence indifferent to each; it allows one to pass into the other, and therefore does not absolutely condition or constrain either. Hence there must be two totalities of conditions, or indeed a new one for every change in the world, for the totality of conditions includes the reality of each thing, and therefore changes whenever anything changes. (*c*) Since every change involves change in the totality of conditions according to the principle of necessity, and inasmuch as all external necessity is included within the totality of conditions, it follows that this totality is its own internal necessity, moves or changes itself, originates its own action, is *causa sui*, spontaneity, freedom. The presupposition lying behind any form of physical necessity is therefore self-determination, which is discovered to be moral necessity (divine or in God) when carefully considered. WILLIAM T. HARRIS.

Necho, or **Neco** (Egypt. *Nekau*): the second king of the twenty-sixth Egyptian dynasty: son and successor of Psammetichos I. He ruled from 610 to 594 B. C. Herodotus (ii., 158; iv., 42) relates his attempt to join the Nile with the Red Sea by a canal through the Wadi Tumilat, which apparently followed the line of a previous waterway, natural or artificial, that existed under Seti I. and Ramses II., and coincided generally with the fresh-water canal used during the construction of the Suez Canal. Herodotus (iv., 42) also tells of the first circumnavigation of Africa during the reign of Necho. Necho continued the internal policy of his father by encouraging Greek colonization and trade. Taking advantage of political complications in the East, he attempted to restore Egyptian power in Asia, and in 608 B. C. he marched through Palestine to Megiddo, where he met the army of Josiah, King of Judah (2 Chron. xxxv. 21–24). He also intervened in the political affairs of the Hebrews (2 Chron. xxxvi. 1–4). With the rise of Babylonian power he saw his sway in Asia threatened and marched to Carchemish, where he met Nebuchadnezzar in 604, and was routed. In spite of subsequent appeals for aid from the Hebrews, he remained in Egypt during the rest of his reign, and there he died in 594 B. C. The threatened invasion of Nebuchadnezzar was deferred till the reign of Hophra (Apries), in 567 B. C. CHARLES R. GILLETT.

Neckar: a river of Germany; rising in the Schwarzwald Mountains, on the frontier of Würtemberg and Baden. It flows with a tortuous course of 210 miles through a beautiful tract of land between low, vineclad hills, and joins the Rhine at Mannheim. It receives from the left the Enz and from the right the Jaxt, but it is shallow and difficult of navigation. Its basin contains 4,980 sq. miles.

Necker, JACQUES: French statesman; b. at Geneva, Sept. 30, 1732; went in 1747 to Paris as a clerk in a banking-house; established afterward a business of his own, and accumulated a great fortune during the Seven Years' war. In 1764 he married Suzanne Churchod, by whom he had one daughter, afterward the celebrated Mme. de Staël. Encouraged by his wife to mark out for himself a public career, he retired from his business, secured the position of syndic or director in the French East India Company, and subsequently became the diplomatic representative of Geneva in Paris. He acquired great authority in financial matters by his *Éloge* on Colbert and *Essai sur la Législation et le Commerce des Grains*, the latter work being an attack on the economic policy of the far abler Turgot. After the removal of Turgot in 1776 Necker was called to take part in the administration of the finances, and after the short administration of Clugny he was appointed director-general of the finances in 1777. Under his direction the financial condition was in some respects greatly improved. The administration was systematized; taxation became more equitable and public confidence was restored, though his persistent borrowing added greatly to the national debt. His wife, in the meanwhile, made his home the rendezvous of the political and literary celebrities of the time, and rivaled the famous Mme. Geoffrin as the mistress of a salon. A certain vanity in his bearing, however, made him disliked by the courtiers; he lost the favor of the queen by thwarting her wishes, and after the publication of his *Compte Rendu au Roi sur les Finances de l'État* in 1781, revealing the condition of the treasury, he was suddenly dismissed. He returned to Geneva, and bought Coppet, an estate in its vicinity, where he resided for several years, and wrote his *Administration des Finances*, which was published in 1784. He returned to Paris in 1787, but was soon banished for an attack which he published on the financial policy of Calonne. Meanwhile the administration of Fleury, Calonne, and Loménie de Brienne had brought financial matters in France to a crisis, and in Sept., 1788, Necker was recalled and made comptroller-general and Minister of State. He was regarded as the savior of France, and when the king once more dismissed him, on July 11, 1789, because he declined to participate in a royal measure by which the constitution of the third estate as a national assembly was to be annihilated, Paris rose in insurrection, and he returned to his office in triumph after a brief absence. He was, however, a good banker rather than a great financier, and as a statesman he was wholly unequal to the task set before him. In the National Assembly he was completely outshone, not only in political but even in financial questions, by Mirabeau and others, and when he resigned (Sept. 4, 1790) he had entirely lost not only his popularity as a hero of freedom, but also the respect he enjoyed as a financial authority. He lived afterward at Coppet, and died there Apr. 9, 1804. His *Œuvres Complètes* were published in Paris in 1822 (revised ed. 1833). See Mme. de Staël-Holstein, *La Vie privée de M. Necker*, and Auguste de Staël-Holstein, *Notice sur la Vie de M. Necker* in his edition of the collected writings in 1833. See also d'Haussonville, *Le Salon de Mme. Necker* (1882).

Revised by F. M. COLBY.

Necker de Saussure, ADRIENNE A.: See the Appendix.

Necromancy: See MAGIC.

Necro'sis [Mod. Lat., from Gr. *νέκρωσις*, a making dead, deriv. of *νεκροῦν*, make dead, mortify, deriv. of *νεκρός*, corpse]: the death of a large piece of bone or of a whole bone in the living subject, as distinguished from *caries*, the ulceration or molecular death of bone. Necrosis may result from injury, from periostitis, from phosphorus-poisoning, and from syphilis. It may be superficial, central, or total. Necrosis almost always calls for surgical interference for its complete cure. The dead bone finally separates as a *sequestrum* from the living bone, and until it is quite detached it is worse than useless to attempt to operate. The sequestrum is usually inclosed in a case of new bone, which must be cut through before the removal can take place. If the patient be young and otherwise healthy, the removal of the sequestrum is usually followed by recovery. In all cases a generous diet, with appropriate tonic treatment, is called for.

The term necrosis is also used to designate a variety of destructive diseases of the soft parts, of which caseation and gangrene are typical examples.

Nectanebo I. (Egypt. *Necht-Hor-Heb*): the first king of the thirtieth Egyptian dynasty, reigning from 386 to 368 B. C. In spite of the Persian wars he left his name on many monuments and buildings. The extant evidence points to this as a brilliant season in Egyptian history. Greek influence was felt in all departments of life, and the warlike operations of the period were carried on largely by the aid of Greek mercenaries. Early in his reign he assisted the King of Cyprus against the Persians under Artaxerxes II., but upon the failure of the allied arms he was compelled to defend himself against a Persian invasion which was only checked when high Nile flooded the whole country. The conflict was continued under Teos, or Tachos, his successor, and also during the reign of NECTANEBO II. (361–349 B. C.), the last native King of Egypt. Ochus, the Persian king, marched to Pelusium and thence to Memphis after having defeated the allied forces of Cyprus, Phœnicia, and Egypt. Seeing the futility of further resistance, Nectanebo II. gathered what valuables he could and fled, probably to Ethiopia, some say to Macedon. From his reign we possess evidences of the working of the mines of Hammamat and of considerable architectural activity. The Persian rule, which succeeded, gave place (332 B. C.) to that of Alexander the Great. C. R. G.

Nectarine [from Old Fr. *nectarin*]: a tree and its fruit, differing from the peach, from which it is derived, mainly in having a smooth skin instead of a downy one. There are numerous sub-varieties, of which some are freestones. The nectarine is much grown in California, and can be grown wherever the peach thrives. Nectarines have sprung from the peach by bud-variation and from seeds. L. H. B.

Nectariniidæ: See SUN-BIRD.

Nedjed: an Arabic word signifying elevated land or plateau. The Arabs use the term in connection with other names, as Nedjed-el-Hedjaz, or Nedjed-el-Oman. By European writers the term is specially applied to the vast, vague interior territory of Northern and Central Arabia. No reliable description of this region exists, but Palgrave's various works concerning it are of interest. E. A. G.

Needle-gun [transl. of Germ. *zündnadelgewehr*; *zünden*, to light, fire + *nadel*, needle + *gewehr*, gun]: a form of breech-loading small arms designed for military use, and for a long time the regulation weapon of the German infantry. It is the invention of Nicolaus Dreyse, and was extensively manufactured at Sömmerda, Prussia, his native town. Its efficiency was demonstrated in the war of 1866 between Prussia and Austria. As in the chassepot, the cartridge is exploded by means of a needle thrust into the detonating mass along the bore of the piece. See SMALL ARMS.

Needles and Needle-making [*needle* is from M. Eng. *nedle* < O. Eng. *nœdl*: O. H. Germ. *nādal* (> Mod. Germ. *nadel*). Cf. Germ. *nähen*, sew < O. H. Germ. *nājan*]: I. NEEDLES.—A needle is an instrument used by hand or in machinery for the purpose of carrying the thread in sewing or the making of hosiery. The principal kinds are: (1) The sewing-needle used by hand, which is a small piece of steel wire pointed at one end and pierced at the other so as to receive the thread. (2) Needles used by hand in knitting, crocheting, etc. The former are straight, slender rods with rounded ends, while the latter have a hook at one end. (3) Needles used in knitting-machines and sewing-machines; they are of a considerable variety of forms. Historically, the needle in its earliest form was doubtless a strong thorn or a sharp splinter of bone, wood, or stone, with which the skins intended to be joined were perforated along their edges, these being afterward laced together by hand. The next step was to make an eye in the splinter, so that one operation should pierce the material and carry the thread through it; and by degrees needles came to be smoothed and finished with much neatness, as is shown by excellent prehistoric specimens to be seen in the British Museum. Many bronze needles have been found, varying in length from 1 to 8 inches, the longest having probably been used for hairpins; those discovered in Egyptian tombs are invariably coarse, though Wilkinson (*Ancient Egyptians*, iii., 384) assures us that finer kinds must have existed.

Judging by the delicate embroidery handed down to us, all through the Middle Ages fine needles must have been used. We read of their manufacture at Nuremberg during the fourteenth century. They were introduced into England under Queen Elizabeth, and the manufacture seems to have flourished, for about 1597 the "Pinners and Needlers" petitioned against the importation of foreign pins and needles. Knitting-needles were first used in the fifteenth century; and about the middle of the nineteenth century the peculiar kind of needles used in machinery were first made.

Knitting and Crochet Needles.—Knitting-needles, for use by hand in pairs or sets of four or five, are made of steel, ivory, bone, or wood; they are of various lengths, and of cylindrical shape with rounded ends. They are of such simple construction and so well known that they need no further description. Much skill has been displayed in the production of hooked needles for crocheting, and much ingeniously constructed machinery and many special appliances have been employed for the purpose. The hand-used needles, however, do not possess the greatest interest in comparison with those used in automatic machines, by which knit goods are produced.

Needles Used in Machinery.—These are chiefly employed in knitting and sewing-machines. (1) *Spring and Latch Needles.*—Spring needles of steel for hosiery or stockinet work are made by reducing the working end on a taper to an approximate point and bending the reduced portion over upon itself so as to form an open loop, a groove having been previously made so as to come opposite the point. In the operation of this needle the point stands out at the proper time for the yarn to be taken, which is to be carried through the loop to form the stitch. As the forward motion continues, the point is depressed into the groove by coming in contact with mechanism arranged for the purpose, and thus the passage through the loop without catching is insured.

FIG. 1.—Latch needle.

In the latch needles, instead of the spring barb, there is a short rigid hook, formed by tapering the working end nearly to a point and bending in combination with the latch. The latter is contained in a groove milled in the body of the needle and pivoted upon a rivet which passes through the walls of the groove. The latch, the walls between which it is riveted, and the diameter of the rivet are each only about one-hundredth part of an inch in thickness, so that extreme delicacy is required in the manufacture of these needles. The latch must work with the utmost freedom, resting at each stitch with its point toward the hooked end and the opposite or shank end alternately. Its office is to prevent the yarn from being caught under the hook except at the proper times, thus aiding in forming and casting off the stitch.

(2) *Sewing-machine Needles.*—Of these there is such variety as to preclude the possibility in limited space of describing each in detail, but broadly they may be described as having either an eye, hook, or barb, at the pointed end, and are used with a single thread in making a single loop-stitch both with eye and with barb. The needle best known to the public is the one with the eye at the pointed end, with a long groove on one side and a short groove on the opposite side. It is used in connection with a shuttle, or other device, for carrying a second thread which is passed through a loop of the thread in the needle, thus forming the double-lock stitch. The grooves are of importance in protecting the thread from wearing or being cut off in passing through the fabric operated upon.

Besides the ordinary needles for use on cloth are the wax-thread needles for use on leather, including many shapes for the different machines. These needles, in place of having an eye, are formed with hooks by which the thread is pulled through a hole made by an awl, or by the needle itself in some cases. They are used for difficult leather-work once considered impossible of accomplishment by machinery. Among these is the needle used in the Goodyear welting-machine. It is a segment of a circle in shape. (See Fig. 3.) It puts welts upon boots and shoes with a rapidity and accuracy unapproachable by handwork.

Fig. 2.—Sewing-machine needle.

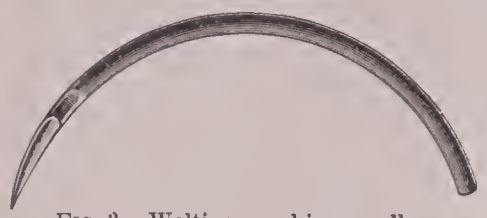


Fig. 3.—Welting-machine needle.

II. Needle-making: (1) *The Sewing-needle.*—The manufacturer buys his wire in large bundles, each containing several coils. The coils are first cut into two-needle lengths by a guillotine shearing-machine. The cut wires, technically called *blanks*, having been taken from a round coil, are slightly bent; the next process, therefore, is to straighten them. The blanks are inclosed in two strong iron rings (Fig. 4), then heated red in a furnace, and allowed to cool gradually. When cool they are removed to an iron plate and rubbed backward and forward with an instrument called a *smooth file*, consisting either of one broad curved bar which is introduced between the two rings or of three narrow bars joined at the ends, into the intervals of which the rings fit (Fig. 5). The blanks are next pointed at both ends, which was formerly done by hand on a grindstone. The blanks are withdrawn, one following another, from a hopper, by a pulley revolving at right angles to the grindstone, and are held to the face of the pulley by an India-rubber band. Between the pulley and the grindstone the blanks revolve on their axes and become pointed at one end, and the process is repeated for the other end. The wire blanks are next fed automatically into a belt-driven machine, in which a punch and dies form the prints for the eyes. Then oval holes are punched through the two prints of each blank by a vertical belt-driven punching-machine (Fig. 6). The needles are now strung or "spitted" upon two fine wires (Fig. 7), the "burrs" or projections caused by stamping are filed off, and the double needles are divided between the eyes by being gently bent to and fro. Each row, still strung on its wire, is grasped by the points in a sort of vise (Fig. 8), and the heads are laid upon a raised plate of metal and filed into shape. Now begin the tempering processes. The needles are heated red in a furnace, then cooled suddenly in cod oil, and so rendered excessively brittle. They are next tempered by exposure to slow heat, during which they are stirred about with a shovel until a blue oxide forms on them, when they are removed and allowed to cool gradually. Each one is next examined by being rolled with the finger on a smooth steel slab, and any that do not roll truly are weeded out. In parcels of about 50,000 they are next washed and scoured with soap, to remove any of the oil which adheres. The eyes are then blued and polished. According to one method the polishing is done by threading the eyes loosely on wires carried by standards fixed to a tray which moves quickly with an alternating motion in a horizontal plane. In about an hour, with the use of a little emery and oil, the swinging of the needles on the wire smooths their eyes so that they may not cut the thread; but the eyes of the best needles are hand-polished with fine emery on flax threads. The heads are next ground and the points set by hand on a revolving stone of fine grain. The shanks are then polished by machinery. The needles, in rows one deep, are fed longitudinally between transverse leather-covered rollers with holding rollers above them. Besides revolving on their axes the rollers have a lateral alternating motion, thus giving a high polish to the needles.

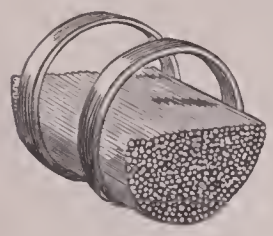


Fig. 4.

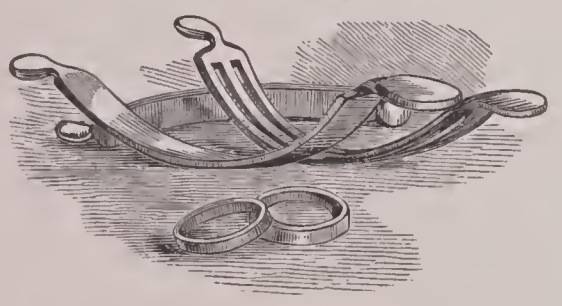


Fig. 5.

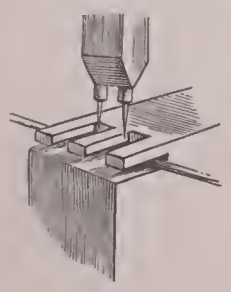


Fig. 6.

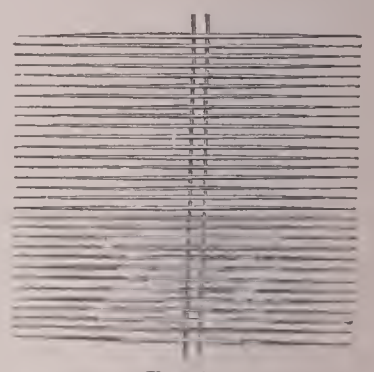


Fig. 7.

The older method of polishing needles is to put several thousands of them, first along with sand and emery-powder, and afterward with oil and putty-powder, in canvas bundles wound round with cords. A number of these then are put in a kind of mangle and rolled backward and forward for at least fifty hours. It is now necessary that the needles should be laid with their heads one way. A gun-metal disk revolving in a vertical plane takes up each needle by a groove in its circumference, and drops it on an inclined glass plate. Owing to their shape the needles describe an arc in falling, so that those with their heads in one direction go to the right, and the others to the left. As the finished needles differ slightly in their lengths, those of one size require to be separated from the others by the sorting process, in which gauges are used. Finally the needles are papered, either by being spitted on cloth pasted to paper or by being made up in packets. There are many sorts and sizes, including large needles used in sail-making, and special kinds employed for upholstery, surgical purposes, etc.

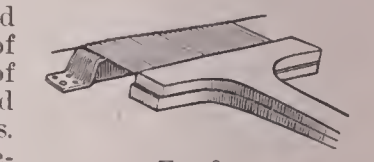


Fig. 8.

(2) *The Sewing-machine Needle.*—To reduce the blade from the size of the shank to the required size, and at the same time to put in the grooves, the wire was formerly stamped between dies. This threw out the superabundant material at each side as a flash or fin. These fins at the very first were cut off by hand-shears; later, with a die and punch in a press; then the needles were rounded up and pointed by filing. As the demand for sewing-machine needles gradually ran up into millions, step by step the methods changed. Stamping gave way to rolling, grinding, turning, and milling, until a machine was invented by O. L. Hopson and H. P. Brooks, and improved by E. J. Manville. It swages down the wire from the original size so as to produce any size of blade required, and as the reduction is made by compression, it effects a saving of material. The length being increased by the swaging process, in some cases there is a saving of half the material over the old methods.

The blades are cylindrical and true to the intended size to a degree hitherto unknown. Simultaneously there have been improvements in the methods of grooving. Automatic groovers have come into use, which clamp and hold the needle, start in with the short grooves and withdraw the cutter at the proper time, after having proceeded the right distance, while the cutter on the opposite side goes on until the long groove is completed. Machines also for pointing, polishing the eyes, etc., have been devised to perform automatically what was formerly done by hand.

S. W. Goodyear.

Needles, The: a cluster of rocks on the west extremity of the Isle of Wight, which take their name from their pyramidal shape. Five in number, they are composed of chalk, dotted with thin strata of flint. The violent wave-action here is constantly changing the form of these rocks, only three of which now rise to any considerable height above the water. The Needles Light is situated on the outer part of the farthest of these celebrated rocks, which was previously leveled nearly to the water's edge to receive it. The name is applied by British navigators to many similar structures elsewhere. Revised by M. W. Harrington.

Nee'nah: city (founded in 1836 as a Government post); Winnebago co., Wis. (for location of county, see map of Wisconsin, ref. 5–E); on the Fox river, at the outlet of Lake Winnebago, and on the Chi. and N. W., the Chi., Mil. and St. P., and the Wis. Cent. railways; 14 miles N. of Oshkosh, the county-seat. It contains 15 churches, 5 schoolhouses, a commercial college, 3 public parks, 2 national banks with combined capital of $140,000, manufactories of paper, flour, and stoves, and 2 daily and 4 weekly newspapers. The city has abundant water-power, and has become a popular summer resort. Pop. (1880) 4,202; (1890) 5,083; (1900) 5,954. EDITOR OF "TIMES."

Neesima, nee'shĕ-maă, JOSEPH HARDY: preacher and educator; b. in Tokio, Japan, in the year 1843. Anxious for a foreign education, he obtained a passage in a U. S. brig, and finally landed at Boston, where he found a patron in the gentleman whose name he assumed. An academic course at Andover and Amherst was followed by a theological course at Andover. He attached himself in 1872 as secretary to Viscount Tanaka, commissioner of education, then at Washington, with whom he visited Europe. Neesima's name is inseparably associated with the founding of the Dōshisha College at Kioto, of which he became president. D. Jan. 23, 1890. He was held in high esteem by all classes of his countrymen. See his *Life and Letters*, edited by Arthur S. Hardy (Boston, 1892). J. M. DIXON.

Nees von Esenbeck, nās'vŏn-ā'zen-bek, CHRISTIAN GOTTFRIED DANIEL: botanist; b. at Reichenberg, Westphalia, Feb. 14, 1776; studied medicine at Jena, and was Professor of Botany at Erlangen 1818–30, and at Breslau 1830–52. His principal works are *Das System der Pilze und Schwämme* (1816); *Systema Laurinarum* (1836); *Agrostologia Brasiliensis* (1829); *Die Entwickelung der Pflanzensubstanz* (1819); *Die Naturphilosophie* (1841). D. at Breslau, Mar. 16, 1858. Revised by CHARLES E. BESSEY.

Ne Ex'eat Reg'no [Lat., let him not go out of the kingdom], **Writ of**: a writ used at present only in legal proceedings to restrain a person from departing from the jurisdiction of the court. The exact date when, and the circumstances under which, this writ was first issued are involved in obscurity, but it is known that according to the rules of early English law the king by virtue of his prerogative might issue a writ prohibiting a subject from going abroad without license; but it has been thought that this was not a rule of the common law. A section of King John's Great Charter allowed subjects to depart from the kingdom at their pleasure. In later charters this provision was not found, and it came to be understood as law that a subject did not possess the right of leaving the realm without the king's license, and writs could be issued to enforce the law. This rule of law has become practically obsolete, subjects being allowed freely to leave the kingdom except in time of war and public danger.

At the present time the writ of *ne exeat* is used simply as a judicial proceeding in the ordinary administration of justice. It is issued by a court of chancery (or equity) to prevent a party to a suit from withdrawing from the jurisdiction of the court, and thus rendering its decree ineffectual. The substance of the matter is that the defendant becomes liable to give bail or security that he will not withdraw himself from the power of the court to compel him by its process to abide its order, in default of which he will be imprisoned. It can only be resorted to for the purpose of enforcing equitable demands, except in the case of alimony and of an action for an account. Alimony in the case of a partial divorce was granted in England by the ecclesiastical court, which had no power of exacting bail, and the courts of equity, to prevent a failure of justice in such a case, aided the plaintiff by means of this writ. In the case of mutual account the court of equity has concurrent jurisdiction with the courts of law, and is thus, having jurisdiction, not debarred from issuing the *ne exeat*, though a court of law also has power over the case. It should be added that the claim must be pecuniary in its nature, and so far mature that present payment or performance can be rightly demanded. All that is necessary to give the court jurisdiction is the presence of the defendant, whether citizen or alien.

In the U. S. the equity courts of the respective States assume the same power over this subject that is exercised by the English courts of chancery, except where their inherent authority has been taken away by statute, or where the writ has been expressly abolished, as in the State of New York. Where this remedy exists it may be granted in the form of an order as well as of a writ. For further details, see Beames's *Brief View of the Writ of Ne Exeat Regno* (London, 1812); the works of Daniell and Barbour on *Chancery Practice*; and Story's *Equity Jurisprudence*.

Revised by F. STURGES ALLEN.

Negative Quantity: a quantity taken in a sense opposite to that which we have agreed to call *positive*. The terms *positive* and *negative* are correlative; if we agree to consider a quantity taken in any sense as positive, it will be negative when taken in a contrary sense. Thus if we agree to call distance estimated to the right of some point *positive*, then distance estimated to the left of that point will be *negative*. See IMAGINARY QUANTITIES.

Negau'nee: city (founded in 1865); Marquette co., Mich. (for location of county, see map of Michigan, ref. 2–F); on the Chi. and N. W., and the Duluth, S. Sh. and Atlantic railways; 12 miles W. of Marquette. It is on Iron Mountain, at an elevation of 900 feet above the level of Lake Superior, and is principally engaged in iron-mining and lumbering. There are 5 churches, graded and convent schools, a national bank with capital of $50,000, and a weekly newspaper. Pop. (1880) 3,931; (1890) 6,078; (1900) 6,935.

EDITOR OF "IRON HERALD."

Negligence [from O. Fr. < Lat. *negligen'tia*, deriv. of *negli'gere*, neglect; *neg-*, not + *le'gere*, gather]: as a legal cause of action, has been defined to consist "in the neglect of the use of ordinary care or skill toward a person to whom the defendant owes the duty of observing ordinary care and skill, by which neglect the plaintiff, without contributory negligence on his part, has suffered injury to his person or property." (Brett, Master of Rolls, in *Heaven* vs. *Pender*, 11 Queen's Bench Division 503.) The elements of the wrong, it will be observed, are (1) a legal duty to use care; (2) the neglect to perform such duty; (3) legal damage caused by such neglect to the person to whom the duty was owed.

(1) *Legal Duty.*—In order that negligence amount to a tort, the duty which has been neglected must be other than a contract duty, although it may arise out of contract. A person who negligently fails to pay his promissory note at maturity, and thereby causes the payee to lose a profitable bargain which he could have obtained had the money been paid, is liable for the breach of his contract, but not to an action in tort for negligence. A common carrier, however, who contracts to transport goods safely, and who negligently injures them, may be sued by the shipper, either in tort or for the breach of contract. In such a case "the contract creates a relation, out of which relation springs a duty independent of the mere contract obligation."

Extent of Duty.—A person's conduct may be very careless on a particular occasion, without subjecting him to an action for negligence on behalf of one damaged by such carelessness. Whether his carelessness is actionable negligence will depend upon whether he was under a duty to the injured party to exercise care. A farmer leaves maple-sirup in uncovered buckets in an open shed. His neighbor's cow wanders from her owner's premises into the shed, and dies from drinking the sirup. He is not liable in damages to the neighbor, for he was under no duty to guard trespassing cattle against a harmful beverage; but had he given his neighbor the legal right to turn the cow into the lot surrounding this shed he would have incurred a duty toward the neighbor to make the place reasonably safe, and his carelessness in dealing with the sirup would have been actionable negligence. (*Bush* vs. *Brainard*, 1 Cowen (New York) 78.) A trespasser who suffers damage from the mere carelessness of another has no cause of action in negligence, because the other is under no duty to exercise care toward such an one. The only duty is to refrain from willful or wanton misconduct toward him.

The duty to exercise care is at times very broad in its sweep, extending to those with whom the subject of the duty has no contract or personal relation; while at other times it is confined within narrow limits. One who deals in dangerous instruments or poisonous substances, or explosives, is bound to use reasonable exertions to prevent their doing harm to others. This obligation is not confined to his customers, but extends to strangers whose use of these articles is the natural and probable consequence of his parting with them. Hence a wholesale druggist who sends out the extract of belladonna carelessly labeled as the extract of dandelion is liable in damages to one who takes it as a medicine, though the injured party buys it from a

dealer who bought it from a purchaser of the wholesale druggist. (*Thomas* vs. *Winchester*, 6 New York 397.) So a tradesman who sells gunpowder to a young child is liable to third persons who are injured by the child's use of it. The tradesman's duty was not confined to his purchaser, but extended to all who, he reasonably might have contemplated, would suffer from his carelessness. The same doctrine has been applied by some courts to the manufacturer of chattels, who carelessly sends them into the trade with defects which render them dangerous to their users. (*Schubert* vs. *Clark Co.*, 49 Minn. 331.) Other courts have refused to apply it in such cases, declaring that "if a contractor who erects a house, who builds a bridge, or performs any other work; a manufacturer who constructs a boiler, a piece of machinery, or a steamship, owes a duty to the whole world that his work, or his machine, or his steamship, shall contain no hidden defect, it is difficult to measure the extent of his responsibility, and no prudent man would engage in such occupations upon such conditions." These courts confine the duty of the contractor or the manufacturer to the parties with whom he deals. *Curtin* vs. *Somerset*, 140 Penn. 70; *Heizer* vs. *Kingsland, etc., Co.*, 110 Mo. 605.

Degrees of Care.—After it has been determined that a particular person was under a duty to exercise care toward another, it becomes important to inquire what amount of care was incumbent upon him. Upon this topic various theories have been maintained. One is that the law recognizes three degrees of care: Great care, or that which is usually bestowed upon the matter in hand by the most competent and prudent class of persons. Ordinary care, or that which is usually bestowed upon the matter in hand by the average person. Slight care, or that which is usually bestowed by persons of average prudence, having no special knowledge of or experience in such matters. (Shearman and Redfield on *Negligence*, 4th ed., § 47.) According to another theory there are but two degrees of care—that required of one who is not and does not profess to be a good man of business, or an expert in the affairs under consideration, and that required of one who is or professes to be such an expert. (See Wharton on *Negligence*, bk. i., chap. ii.) A third theory, and the one generally accepted at present, recognizes but one legal standard of care for all cases, and that is the care usually exercised by the ordinarily prudent person in like circumstances. Whether an oculist has been negligent in operating upon an eye and whether a carrier has been negligent in transporting a barrel of apples are to be determined by the application of the same test. Each has failed to use ordinary care, and hence has been negligent if he has fallen below the standard of reasonable skill and attention which the ordinary man of his class would exercise in dealing with the like matter in like circumstances. According to this theory the legal standard of care remains constant; but the amount of care which that standard requires in a given case varies with its facts.

Amount of Care.—The manner in which this varies with the circumstances surrounding the one who is bound to use due care is well illustrated by the case of the occupier of land or buildings. We have seen that he is under no duty of care toward a trespasser. His only obligation is to refrain from inflicting willful or wanton injury upon such wrongdoer. Toward licensees (see LICENSES), including guests who are enjoying gratuitous hospitality, his duty does not extend beyond warning them of any secret danger, known to himself, but not reasonably apparent to them. Indeed, one who for his own benefit uses the property of another under a bare permission must take it, as a rule, with all its faults. All that he has a right to expect is that the owner will use reasonable care not to subject him to new perils without notice. In case the occupier of land or buildings invites others to enter or use them in connection with his business, his duty is "to make the place as little dangerous as such a place could reasonably be, having regard to the contrivances necessarily used in carrying on the business." (*Indermaur* vs. *Dames*, Law Reports, 1 Common Pleas 274.) If the property abuts on a highway, the risk of harm from its defective condition or its improper use is very great; consequently the owner is bound to use an amount of care and skill to protect passers-by from injury which is commensurate with the danger. If he is constructing a building on the line of a city street, he is bound to know that materials will probably fall and injure passers-by unless special safeguards are provided. His failure to take such precautions may well amount to a want of reasonable care—"an omission to do something which a reasonable man, guided upon those considerations which ordinarily regulate the conduct of human affairs, would do." (*Jager* vs. *Adams*, 123 Mass. 26.) Similar considerations determine what is reasonable care on the part of passenger-carriers. A railway company, to be free from negligence, must inspect its road-bed and rolling stock more frequently and thoroughly than a stage-coach proprietor is bound to do.

Duty to Insure Safety.—In some cases the English common law requires one who brings upon his land that which exposes his neighbor to extraordinary risk "to insure his neighbor against any consequent harm, not due to some cause beyond human foresight and control." Thus the owner of animals is bound to keep them on his own land at his peril. If they escape and trespass upon a neighbor's land, the owner is liable for the natural consequences of that trespass, without regard to the care he has taken to keep them at home. So the keeper of a mischievous animal, having knowledge of its propensities, is bound to keep it securely. He does not perform his duty by using reasonable care to prevent its doing harm. Again, one who starts a fire on his premises for any purpose is bound to keep it there at his peril. The same doctrine has been applied by the English courts to one who constructs a reservoir on his land. In the leading case on this subject, decided in 1868 (*Rylands* vs. *Fletcher*, Law Reports, 3 House of Lords 330), it was declared that "the true rule of law is that the person who for his own purposes brings on his land and collects and keeps there anything not naturally there, and likely to do mischief if it escapes, must keep it in at his peril; and if he does not do so, is *prima facie* answerable for all the damage which is the natural consequence of its escape. He can excuse himself by showing that the escape was owing to the plaintiff's default; or perhaps that the escape was the consequence of *vis major*, or the act of God." Later cases have recognized exceptions, where the escape was caused by the act of a stranger; where the source of danger was maintained for the common benefit of the plaintiff and the defendant; and where its existence was authorized by law.

The doctrine of *Rylands* vs. *Fletcher* has been adopted without qualification in some of the U. S. (see *Baltimore, etc., Co.* vs. *Ranstead*, 28 Atlantic Reporter 273, Md. Court of Appeals, 1894), but in most jurisdictions it has been repudiated (*Marshall* vs. *Welwood*, 38 New Jersey Law 339), and the liability of one who constructs a reservoir on his land, or brings upon it a steam-boiler, or kindles a fire, is confined to damages caused by his failure to exercise reasonable care; that is, a care proportioned to the manifest risk to which his use of his land exposes his neighbor. Even in the case of trespassing animals the common-law doctrine has been greatly modified by statute in the various States, or has been declared by the courts inapplicable to the conditions and habits of the people. *Morris* vs. *Fraker*, 5 Colorado 425.

(2) *Breach of Duty.*—In an action for negligence the plaintiff must show not only that the defendant owes to him the duty of exercising reasonable care, but also that the duty has been violated. A person driving along a street must use reasonable care in selecting and controlling his horse. If, however, the animal becomes unmanageable through no fault of the driver, and runs away and injures the person or property of another, the latter has no cause of action for damages against the former. The harm results not from the driver's negligence, but from inevitable accident. Whether a person has failed to use reasonable care in a particular case is generally a question of fact for the jury. At times a positive duty is laid upon him by contract, by statute, or otherwise. Here the only question will be whether he has done the act required, or has abstained from that which was prohibited. Accordingly, if a statute or ordinance forbids the suspension of signs over a street, or of awnings over a sidewalk, or requires boats moving at night to display head-lights, or the owners of buildings having elevator-wells to protect them by rails, a person who inadvertently violates any of these provisions fails to use due diligence. Such positive requirements represent the minimum of reasonable care, but as a rule the question of reasonable care is one of fact. This does not mean that the court is bound to submit every action for negligence to the jury. On the other hand, it may dispose finally of the whole case wherever the only inference that can fairly be drawn by reasonable men from all the evidence is that there was no negligence. The respective functions of the court and jury have been stated briefly as follows: "The judge has to say whether any facts have been established by evi-

dence from which negligence may be reasonably inferred; the jurors have to say whether from those facts, when submitted to them, negligence ought to be inferred. It is a question of law for the judge whether there is evidence which, if it is believed, and the counter evidence, if any, not believed, would establish the facts in controversy. It is for the jury to say whether and how far the evidence is to be believed."

The common law does not presume negligence, but requires the one who bases a claim upon it to establish its existence by a fair preponderance of proof. He is not bound to prove it beyond a reasonable doubt, and he makes out a *prima facie* case by showing that the harm done was such as would not have occurred in the ordinary course of things had the defendant used reasonable care. Where one is injured by a building falling into the street without apparent cause, or by a barrel rolling out of a warehouse window to the sidewalk, or by a railway train jumping the track, or by a bridge breaking under an ordinary load, the very circumstances of the injury raise the presumption of negligence, and require an explanation from the defendant. This doctrine has been extended by statute in England and in some of the U. S., so that in certain cases, chiefly those of damages resulting from the operation of railways, proof of injury sustained by the plaintiff makes out a *prima facie* case, which the defendant is required to overcome.

(3) *Damage Caused by the Defendant.*—A breach of duty to use care must cause legal damage to the object of that duty in order to amount to actionable negligence. Whether physical suffering consequent upon a nervous shock caused by another's negligence constitutes legal damage is a subject of judicial disagreement. It was carefully considered by the Privy Council in *Victorian Railways Commissioners* vs. *Coultas* (13 Appeal Cases 222), and the conclusion was reached that no English decision treated such an injury as legal damage. It was thought unwise to extend the liability for negligence to this class of cases, because of the great difficulty that would ensue in determining whether the alleged injuries had been caused by the negligent act, and of the wide field that would be opened to imaginary claims. The same view has been taken by courts in the U. S. (See *Ewing* vs. *Pittsburg Railway Co.*, 147 Penn. 40.) On the other hand, it has been held that if the fright or nervous shock produced by defendant's negligence causes the victim's person to collide with some object, or even causes nervous convulsions and illness, the defendant is liable. (*Purcell* vs. *St. Paul Railway Co.*, 48 Minn. 134.) In some jurisdictions mental suffering, although neither an incident nor a producer of physical injury, has been adjudged to constitute legal damage; as when a child has been prevented from attending his parent's funeral by the negligence of a telegraph company in transmitting a message. The weight of authority, however, is against this view. See *Kester* vs. *Western Union Co.*, 55 Federal Reporter 603.

Not only must the defendant's negligence sustain the relation of cause to plaintiff's harm, but it must be the proximate cause. Between the negligence complained of and the injury there must be an unbroken connection. If a new and independent cause intervenes, this and not the remote cause bears the whole legal responsibility for the harm. "The rule is difficult of application; but it is generally held that, in order to warrant finding that negligence or an act not amounting to wanton wrong is the proximate cause of an injury, it must appear that the injury was the natural and probable consequence of the negligence or wrongful act, and that it ought to have been foreseen in the light of the attending circumstances." In applying this rule it has been held that the proximate cause of the loss of goods, which had been negligently delayed by a common carrier, and destroyed by an extraordinary freshet while thus delayed, was the flood, and not the negligence. (*Railroad Co.* vs. *Reeves*, 10 Wallace (U. S.) 176.) Consistently with this holding, it has been decided that the negligence of the State in permitting a bridge to remain in an unsafe condition was the proximate cause of the death by drowning of a father, who plunged into the canal to save his child upon the latter's falling into the water by reason of the defect in the bridge. (*Gibney* vs. *State*, 137 N. Y. 1.) In the former case the destruction of the property by the flood was not the natural and probable consequence of the carrier's delay. In the latter case the father's desperate efforts to save his child were the natural and probable result of the danger to which the defendant's negligence had subjected him.

Concurring Causes.—It is not necessary that the defendant's misconduct be the sole cause of plaintiff's damage. One who is injured by a collision of the trains of two railway companies can maintain an action against either, or both, if both are in fault. If but one was negligent, he must look to that one for redress. Even though it be shown that defendant was negligent at the time of the harm, if such fault was simply a condition of the injury, while its immediate cause was the independent wrongful act of a third person, the latter will be treated as solely responsible therefor. If, however, such act by a stranger might have been foreseen as a reasonably probable result of defendant's negligence, it will not relieve him from liability.

Contributory Negligence.—If one of the concurring causes of plaintiff's injury is his own lack of proper care, he can not recover, although but for defendant's negligence the harm would not have happened. However, it is to be remembered that plaintiff's want of care must be a cause of the injury, in order to defeat his recovery. If it is a condition only, it will have no such result. This is illustrated by a case where the plaintiff was put to work on a platform surrounding the defendant's building, and was warned not to go on a certain part which was not railed, because of the danger of slipping on the ice and falling off. While on the forbidden part he was knocked to the ground by bricks falling from the building by reason of defendant's negligence, and concerning which he had not been warned. It was held that plaintiff's going upon the slippery part of the platform was not the proximate cause of his injury. By passing to that part he took the risk of dangers pointed out, but not the risk of different perils to which he was subjected by defendant's negligence. (*Southwick* vs. *Hall*, 59 Conn. 261.) Moreover, the plaintiff may have been negligent with respect to the very source of the injury, and yet if the defendant might have avoided inflicting the harm by exercising reasonable care, after the occurrence of plaintiff's negligence, the defendant is liable. While in one sense the carelessness of the plaintiff contributed to the harm, it was not its proximate cause. Hence one who recklessly drove against a donkey, which had been carelessly turned into the highway by its owner with its forefeet fettered, was held liable for the injury. It is the duty of one who has been harmed by the negligence of another to use reasonable efforts to make the damage as small as possible. If he has sustained a personal injury, he is bound to take proper care of himself, and this may include suitable medical treatment. When, however, he uses proper care in selecting a physician, and the latter aggravates the injury by unskillfulness, the original wrongdoer is liable for the increased damages. They are an incident, a natural and probable consequence, of the defendant's wrongful act. *Pullman Palace Car Co.* vs. *Bluhm*, 109 Ill. 20.

A person is not chargeable with contributory negligence who acts without deliberation, and as the event discloses, unwisely, in the attempt to extricate himself from a peril brought upon him by another's fault. In such a case the defendant must show that the plaintiff's conduct was unreasonable under the circumstances, and reckless. Nor is it contributory negligence for one, in the discharge of duty, to remain in a situation made dangerous by the negligence of another. An engineer who remains at his post in the attempt to save his train from disaster is an example. So a person who, without recklessness, exposes himself to danger to save a human life imperiled by another's negligence, and is injured, may recover damages. *Pennsylvania Co.* vs. *Langendorff*, 48 Ohio 316.

While contributory negligence is a bar to the plaintiff's action for damages at common law, it is not in ADMIRALTY (*q. v.*), although his willful, gross, or inexcusable fault will defeat him. If both parties are negligent the damages are divided between them, though not always equally. (*The Max Morris*, 137 U. S. 1.) As this doctrine applies to all maritime torts, a person injured by the negligence of another will often find it to his advantage to bring his suit in admiralty rather than in a common-law court.

Imputed Negligence.—The fault of one may be imputable to another when the former occupies the relation of servant to the latter. (See MASTER AND SERVANT.) In some jurisdictions this rule has been extended so as to charge a passenger with the negligence of his carrier, and a child with the negligence of his parent or guardian. The leading case in support of the first view is *Thorogood* vs. *Bryan* (8 Common Bench Reports 115), which held that a passenger in an omnibus was to be considered so far identified with the owner that negligence on the part of the owner or his serv-

ant was to be deemed the negligence of the passenger. The case has been overruled in England (*The Bernina*, 13 Appeal Cases 1), and is generally repudiated in the U. S. (*Little* vs. *Hackett*, 116 U. S. 366.) Its doctrine is clearly unsound. Neither the owner nor his servant is under the control of the passenger. If the carrier's negligence is imputable to the passenger so as to defeat his recovery against a negligent third person, it ought to be imputable to him, so as to render him liable to a third person injured by the carrier's negligence. Equally unsound is the doctrine that a parent's negligence is imputable to his infant child. The legal right and duty of the parent to protect the child exist for the infant's benefit, not for his detriment. It is true that the parent's negligence may be the proximate cause of the child's injury in a particular case, and the third party's negligence only the remote cause. When such are the facts, the parent and not the third party is responsible; but if their negligent acts concur to produce the harm, there is no reason why the parent's misconduct should protect the third party from liability to the infant. *Newman* vs. *Phillipsburg Co.*, 52 N. J. Law 446.

Death by Negligence.—At the common law, if an injury occasioned by negligence caused death, no civil action could be maintained. It is plain that no action could be brought in the name of the person killed. Other persons, it is said, are not pecuniarily damaged, as they could only claim compensation on the ground of loss of service, and the *relation* of master and servant, whether expressly created or implied from that of husband and wife or parent and child, is at an end. This defect in the law was remedied in England by "Lord Campbell's act" (9 and 10 Vict., c. 93; see also 27 and 28 Vict., c. 95), the provisions of which have been substantially re-enacted in most of the U. S. The substance of the statute is that the action is to be brought by the executor or administrator of the person killed, for the benefit of the husband or wife or next of kin. The amount to be recovered depends upon the pecuniary damages sustained, and is generally limited to a specified amount. It has been held both in England and the U. S. that the rule upon this subject in admiralty is the same as at common law. (*The Harrisburg*, 119 U. S. 199.) In Scotland the surviving lawful children or parents, husband or wife of the deceased, "acquire a claim in their own right to damages and *solatium*, founded partly on the nearness of relationship, partly on the existence during life of a natural obligation of aliment." *Bell's Principles*, § 2030, 9th ed.

Criminal Negligence.—Where a particular intent is necessary to constitute a crime, as in larceny or perjury, it can not be committed by mere carelessness. Negligence, however, may satisfy the requirements of the law for a general criminal intent, where a person, being under a public or private duty, neglects to perform it, and thus causes an injury to society or to particular persons. Though there is no positive intent to do wrong, there is culpability in the failure to discharge the duty. Thus a public officer, being under a public duty to keep a prisoner safely, is criminally liable if he by neglect permit him to escape. Statutes sometimes declare that official neglect in specified cases shall constitute a crime of a particular grade. The same general rule would be applied to a violation of a private obligation causing a wrong to society. Thus a neglect to scour the bed of a river, whereby adjoining lands are overflowed, may constitute a public nuisance. It is a well-known rule in the law of HOMICIDE (*q. v.*) that an act of neglect causing death may amount to the crime of MANSLAUGHTER (*q. v.*), while a positive intent to kill will constitute MURDER (*q. v.*). In case of criminal homicide by negligence, contributory negligence on the part of the deceased is no defense. The plaintiff in criminal prosecutions is the State, not the injured party nor any one in privity with him. In addition to the authorities cited above, see Bevans's *Principles of the Laws of Negligence* (London, 1889); Pollock on *Torts*; Bishop's *New Criminal Law* (Chicago, 1892). FRANCIS M. BURDICK.

Negotiable Instruments: written contracts which are transferable by indorsement or delivery, so that the transferee can enforce them in his own name, and free from any equities against prior holders, provided he takes them before maturity, for value and without notice. In these respects they differ from an ordinary chose in action. An assignee of such a claim can not maintain a suit upon it in his own name at common law; the assignment does not bind the debtor until notice thereof is given to him, and the assignee gets no better title than that of his assignor. (See ASSIGNMENT.) If negotiable paper is payable to order, it is regularly transferable by indorsement—that is, by the payee's writing and signing on the back of the instrument a direction for its payment to his transferee, followed by delivery. If it is payable to bearer, it is transferable by delivery only. Even if the paper is payable to order, its transfer by the payee, without indorsement, will pass all his interest in it, and will give the transferee the right to compel an indorsement. By statute, in many of the U. S., he can maintain a suit in his own name on the paper, although only an assignee. In such case, however, even when a purchaser without notice, he gets no better title, until he obtains an indorsement, than his transferrer had; so that if the paper becomes due, or he has notice of equities before the indorsement, he will be subject to all the defenses that existed against his transferrer.

Defenses.—These are of two kinds: (1) legal or real, and (2) equitable or personal. The first class is sometimes called legal defenses, because they rest on fixed legal rules, and exclude all consideration of equities between the parties. They are also termed real defenses, because they attach to the *res*—the instrument—and are thus available against any holder, without regard to his merits or demerits. This class includes the defense that the instrument never had an inception, as when a bill or note fully executed by the defendant is stolen from him before delivery, or when it is obtained from him by an imposition as to the contract he is making; it includes defenses based upon the incapacity to make a binding contract, as in the case of an infant or an insane person; those based on illegality, which by statute renders the instrument absolutely void, as usurious bills and notes in some of the U. S.; and those based on the extinguishment of the contract, by alteration or cancelation. The second class has received the appellation of equitable, because its basis is the equities between the parties. It is also called personal, from the fact that a defense of this class is available only against the party whose conduct renders it inequitable for him to recover, or against one in privity with such person. It includes the case of negotiable paper obtained by ordinary fraud, or by duress, or for which there was no consideration, or which was illegal but not declared void by statute, or which has been paid or discharged but not taken up. This class is not available against a *bona-fide* holder—that is one taking the paper before due, for value and without notice of defects.

Forms of Negotiable Instruments.—Negotiable paper ordinarily takes the form of a BILL OF EXCHANGE (*q. v.*), a CHECK (*q. v.*), or a PROMISSORY NOTE (*q. v.*), but is not limited to these. Commercial usage is constantly evolving new forms, many of which have received judicial sanction, and thus have been added to the list of negotiable instruments. The earliest kind of negotiable paper recognized by the English courts was the foreign bill of exchange, that is a bill between an English and a foreign merchant. During the latter part of the seventeenth century, domestic or inland bills between traders gained recognition, followed very soon by inland bills between non-traders. Next came promissory notes, which, after receiving the sanction of several judicial decisions, were held non-negotiable by Lord Holt, only to be declared by act of Parliament "to have the same effect as inland bills of exchange." (3 and 4 Anne, ch. 9, 1704.) Then followed goldsmiths' or bankers' notes, checks, exchequer bills, bonds of corporations, whether public or private, and government scrip. (*Goodwin* vs. *Roberts*, Law Reports, 10 Exchequer 337; 1 Appeal Cases 476.) It is not necessary that the instrument contain an order or a promise to pay money. In the case just referred to, the writing, called government scrip, bound the Russian Government to deliver a bond in exchange for the scrip; and yet the court held that "the usage of the money-market has solved the question whether scrip should be considered security for and the representative of money by treating it as such."

A promissory note of an individual or of a corporation under seal is held generally non-negotiable, because of the radical differences at common law between an ordinary contract and a BOND (*q. v.*) Corporate bonds, however, are treated in almost every jurisdiction as negotiable, if, containing words of negotiability, they are issued as marketable securities, and are regarded by the mercantile community as such. The Supreme Court of the U. S. has declared: "There is nothing immoral or contrary to good policy in making them negotiable, if the necessities of commerce require that they should be so. A mere technical dogma of the courts or the common law can not prohibit the commercial

world from inventing or using any species of security not known in the last century. Usages of trade and commerce are acknowledged by courts as parts of the common law, although they may have been unknown to Bracton or Blackstone; and this malleability to suit the necessities and usages of the mercantile world is one of the most valuable characteristics of the common law." (*Mercer County* vs. *Hackett*, 1 Wallace 83.) In a number of the U. S. the common-law rule as to the negotiability of instruments under seal has been abrogated, and the English Bills of Exchange Act of 1882 (§ 91) authorizes corporations to issue negotiable paper under corporate seal.

Some forms of debentures, dividend warrants, certificates of stock, and receiver's certificates have been declared by the courts non-negotiable. See BILL OF LADING, LETTERS OF CREDIT, and WAREHOUSE RECEIPTS. See Daniels, *Negotiable Instruments* (New York, 1891); Chalmer, *Bills of Exchange* (London, 1891). FRANCIS M. BURDICK.

Negri, ADA: poet; b. in 1871 of peasant parents at Lodi, in Lombardy, Italy. Her youth was spent in extreme poverty, and when she was eighteen she became a teacher in the communal school of the remote hamlet of Matta-Visconti. Here she began to write verses, which for some time appeared, almost unnoticed, in the columns of the *Illustrazione Popolare* and the *Corriere della Sera* of Milan. In 1892 these were collected in a volume entitled *Fatalità*, which at once attracted general interest in Italy. They are verses of poverty, toil, regret for the hard conditions of the life of the poor, passionate longing for a state of society in which such things shall be impossible. They brought upon their young author charges of revolt, socialism, and anarchism, but they also secured recognition for her remarkable talents. She was given a money prize that is awarded to Italian women who distinguish themselves in literature, and she was also transferred from her lonely post to the normal school for women at Milan, where she taught Italian literature. A. R. MARSH.

Negri, nā′grĕ, PAOLO: obstetrician; b. in Verona, Italy, Dec. 28, 1853; educated at the University of Padua; assistant in the Milan School of Obstetrics 1879–82; professor and director of the School of Obstetrics in Novara 1882–86, and since 1886 has held the same position in the School of Obstetrics in Venice. Among his many published works are *Intorno al parto per il fronte* (Milan, 1882); *Studj e ricerche di Ostetricia* (1885); *Di una gravidanza extrauterina* (Venice, 1880); *Sulla idrocefalia ripetuta del feto* (1890); *Cinquanta laparotomie* (1892).

Negrillos, Negritos [Span. dimins. of *ne'gro*, black, a Negro], **Arafuras, Alfooroos**: names given to the various black or Negro-resembling peoples of the Pacific area. Some of the hill-men of Farther India, and possibly the Andaman islanders, are of this stock. The wild men of the Philippines are the typical Negrillos. They have woolly hair, longer and less crisped than the Negroes. The hair of some tribes grows in patches, like that of some South Africans. The features of most are of a decidedly African cast, but their languages are clearly not African. The skin is sometimes perfectly black. It seems generally but not universally admitted that the straight hair and less uniform features of the black Australian natives, with their peculiarities of language, separate them from the true Negrillo stock. The whole race are referred by Latham to the "Oceanic Mongolidæ." Their languages seem to have some verbal roots in common with the Malays. (See ARAFURA.) See Wallace, *Malay Archipelago; Asiat. Researches* (iv., 393; x., 218).

Negri-Sembilan (i. e. the nine states): a confederation of six small states in the S. W. of the Malay Peninsula, now under British protection. There were originally nine, but by political vicissitudes they were reduced to six. See MALAY PENINSULA and STRAITS SETTLEMENT. M. W. H.

Negro [from Portug. or Span. *negro*, black: Fr. *noir*: Ital. *nero* < Lat. *niger*, black]: a term employed in ethnology to designate one of the five races or varieties of the human species. As synonyms, African, Aust-African, and Melanic have been used by writers.

Location.—The purest types of the Negro or black race are found in Africa, S. of the Sahara Desert, and especially in the Sudan (in Arabic, *Beled es Sudan*, Land of the Blacks); but numerous tribes, as dark in color as the blackest Africans, reside in India and the islands of Melanesia, where they are believed to be the descendants of the earliest human inhabitants. These, however, differ in other physical traits from the African Negro, and for that reason are called *Negritic*. The eastern portions of Africa are peopled by tribes usually very dark in color, but with features and hair of intermediate racial character, and they are therefore known as *Negroids*; while in the center of the continent a number of small-sized, dark-colored tribes are grouped together as *Negrillos*, a Spanish word meaning small Negroes.

Physical Traits.—There are no physical traits strictly peculiar to the African Negro, but he presents in a larger degree than any other race a series of characteristics which are incomplete, arrested, or fetal in their origin. The skull is usually long (dolichocephalic), its bones thick, and its sutures ossified in comparatively early life. The face is prognathic—that is, the lower jaw-bone and often the alveolar processes of the upper jaw protrude; the chin is not prominent; the teeth are usually strong and regular, and have the third molar, or wisdom tooth, better developed than in the white race. The nose is flat and wide, the lips thick and everted. The pelvis is narrowed—that is, its antero-posterior diameter is greater in proportion to its transverse than in other races. In the long bones, the femur and the humerus are unusually long, and the latter is less twisted upon its axis than in other varieties. The convolutions of the brain are simpler, and its average weight a few ounces less than in persons of the same height in the white race. A further comparison shows in the Negro a larger liver and proportionately smaller lungs; the muscular strength is about the same, but the muscles of the calf of the leg are less developed. The sole of the foot is flatter, the heel-bone (os calcis) projects farther backward, and the articulation of the great toe is more oblique, bringing it more into opposition to the remaining toes, and thus conferring upon it a higher prehensile power. The skin is soft to the touch, slightly cooler, and furnished with numerous odoriferous glands which exhale the well-marked and peculiar odor belonging to the race. The color of the skin is rarely completely black. Usually it is a more or less dark brown, and this is true of some of the purest Sudanese types. The eyes are black or dark brown. The hair is dark and frizzly or woolly, sometimes to such an extent that it will felt like the wool of a sheep, a peculiarity rarely or never found in other branches of the species. This depends upon the unusual narrowness of its transverse section. It is generally distributed equally over the head, but sometimes grows in isolated patches or bunches (lophocomic). The beard is generally deficient, but by no means always, and the distribution of hair on the surface of the body is ordinarily less than in the white, but greater than in the Asiatic races. To some of these peculiarities, especially to those relating to his viscera, we may attribute the general immunity of the Negro from certain diseases, as yellow and miasmatic fever, hepatitis, dysentery, and calculus, and his unusual liability to others, as pneumonia and phthisis.

Intellectual Traits.—In no part of its extensive territory does the Negro race appear to have developed an independent culture beyond the stage of barbarism. Wherever in Africa we find traces of such, we also discover relics which assign it unquestionably to some branch of the Semitic or Hamitic stocks, who from the dawn of history have occupied large portions of the African continent, and extended their influence by war and commerce throughout it. Where such influence did not exist the native Negroes lived in savagery. They developed no important food-plant, they domesticated no animal for draft or burden, they constructed no walls of stone. Many of their tribes are agricultural, but the plants which they principally cultivate—the sorghum, millet, rice, yams, manioc, and tobacco—were all introduced from Asia, Europe, or America. Other tribes are pastoral, but their cattle and sheep are descended from the ancient stocks domesticated by the Egyptians; their horses are from the same source; and the ass, indigenous to Africa, appears to have been tamed first by the Semites. The towers and walls of cut stones discovered in Southeastern Africa—the "Great Zimbabwe"—like the more modern brick-built cities of the Sudan, were constructed under the direction of Semitic and Hamitic invaders. The knowledge of smelting and forcing iron is of ancient date throughout Africa, but a long acquaintance with this most useful metal has helped the Negro little toward civilization. Many tribes are skilled in weaving, in pottery, in dyeing, and in the preparation of salt and soap. As a rule, they are fond of music, and the invention of some simple instruments, as the mandolin and marimba, is attributed to them. Their governments are generally the crudest despotisms, and slavery

has been everywhere prevalent. Woman generally, though not invariably, is little more than a slave, and polygamy is universal. Cannibalism in its most abhorrent forms is still prevalent. Their religions are generally fetichisms, inculcating childish superstitions and cruel rites. During the nineteenth century, however, Mohammedanism has made rapid strides in Central Africa, and has exercised a beneficial effect on the native morals.

Divisions.—1. True Negroes. Tribes of the true Negro type are rarely found in Africa outside of the area bounded on the N. by the tropic of Cancer and on the S. by the equator, and lying between the head-waters of the Nile and the Atlantic Ocean. Within this territory we have in the Central Sudan the important Negro monarchies of Bornu, Bagirmi, and Wadai, the two former located in the fruitful depression which surrounds Lake Tchad. Farther to the W., in the basin of the Niger, are numerous kingdoms and some cities of magnitude, as Sansandig, with 30,000 inhabitants, and the better known Timbuctoo, with about 20,000. In Senegambia are the Mandingoes and Wolofs, the latter especially presenting a very pure instance of the Negro type. On and near the coast of Guinea are the petty kingdoms of Ashantee, Dahomey, and Fanti, which were long the purveyors of the slave-trade to America. 2. The Negroids. Most of the African continent S. of the equator and its eastern shores were and are yet largely peopled by tribes of dark hue, but lacking some of the most prominent traits of the true Negro. In color they are a deep brown, the hair is crisp but not woolly, the nose is straight rather than flat, the features assimilate closer to the European type, and the peculiar odor of the Negro is absent, or but slightly noticeable. In these Negroids we recognize the products of an intermixture of blood between true Negroes and members of the Semitic and Hamitic stocks, an intermixture which has been going on for 10,000 years or more. In the North it has formed the Nubian group, in the South the Bantus. The former embraces the Nubas proper, the Nyam Nyams, the Monbuttus, and many tribes of less note. Their occupations are pastoral and agricultural, but as a rule they are in the condition of savagery, and some of them are notorious cannibals. The Bantu group occupies the whole of Africa S. of the equator, except the territory of the Bushmen and Hottentots. It includes the Suahelis and Kaffirs on the east coast, the Sakalavas of Madagascar, the Zulus, the Bechuanas, and the numerous tribes of the Congo basin and east coast. They are generally pastoral and agricultural, and slightly higher in the scale of development than the Sudanese Negroes. 3. The Negrillos. These are the African pygmies, a curious little people, averaging in the adult males about 4½ feet high. Their color is brown, the face prognathic, chin retreating, lips protruding, ears large, nose flat, hair woolly and well distributed over the body, which exhales a strong and offensive odor. They have no settled abodes, do not cultivate the soil nor domesticate animals, and depend on hunting and fishing for a livelihood. They are unerring marksmen, and use poisoned arrows. By many writers the Bushmen and Hottentots of South Africa are believed to be a branch of these Negrillos.

Negroes in America.—The deportation of Negroes from Africa to become slaves in America began early in the sixteenth century, and was continued to such an extent and for so long a time that it is estimated that at present there are on the American continent over 20,000,000 persons of Negro ancestry, about one-third the number being within the area of the U. S. The slaves were chiefly derived from three sources—the coast tribes about the Gulf of Guinea, captives obtained by these from the Mandingoes and other nations of the interior, and from the Bantu tribes of the Congo basin and S. of it. The languages of these mixed masses were soon lost, and English, Spanish, or Portuguese adopted by them. In spite of the rigors to which they were often subjected, the rate of their increase was high and in some instances remarkable, as in the slave population of the U. S. during the twenty years before the civil war, when it far surpassed that of the whites. Where opportunities of education have been afforded them they have often shown considerable capacity for learning, and in some instances Negroes of pure blood have obtained creditable positions in the learned professions. Naturally, there has been in all parts a frequent intermixture of blood, almost invariably between white men and Negro women. This has led to crossings, which have been legally defined into as many as sixteen degrees—mulattoes, quadroons, octoroons, etc. The higher the percentage of white blood the more intelligent as a rule is the individual; but often this intelligence is accompanied by perversity and indolence, and a feeble physical constitution. Crossings with the American Indian have also been frequent, especially in Spanish countries. These are said to develop a physically powerful variety, combining the best qualities of both the parent races. In Brazil they are known as Cafusos.

D. G. Brinton.

Negropont: See Eubœa.

Negro, Rio: See Rio Negro.

Negros (in Span. *Isla de Negros*, or Negro island): one of the larger of the Philippine islands; near the center of the group, in lat. 10° N., lon. 123° E.; somewhat rectangular in form, 140 miles long by 40 broad; area, 4,700 sq. miles. It has two or three active volcanoes and many extinct ones. The streams are little else than mountain torrents; the interior is heavily wooded. It was discovered by Goyti in 1565, who gave it the name of Negro island because of the number of negritos seen by him, but in 1848 Arenas found only 3,475. The most of the inhabitants are Visaya Malays, now generally professing Christianity. Pop. about 250,000.

M. W. H.

Negruzzi, nā-groot'sĕe, Constantin: poet; b. in Jassy, Roumania, about 1809; was taken to Bessarabia by his father in 1821 on the outbreak of the Greek revolt under Ypsilanti, and became acquainted with the poet Pushkin. His writings include translations into Roumanian from Pushkin and Victor Hugo, an historical poem, *Aprode Purice*, and lyric poems published under the title *Sins of Youth*. His works were published in 1873. D. Aug. 25, 1868.

E. S. S.

Negruzzi, Iacob: poet; son of Constantin Negruzzi; b. at Jassy, Jan. 11, 1843; was in Berlin 1852–63, afterward becoming professor at Jassy, and in 1880 at Bucharest. In 1867 he established the useful literary periodical *Convorbiri literare*, of which he has since been the editor, and in which his verses were first printed. He is a member of the Roumanian Academy. He has published *Poesiĭ* (1872); the idyl *Miron şi Florica*; the novel *Mihaiu Vereanu*: *Copiĭ după natura* (Copies from Nature); comedies, satirical verse, translations from Schiller, etc.

E. S. Sheldon.

Nehemi'ah [from Heb. *Nehemyāh*, liter., whom Jehovah comforts]: the latest of the Jewish leaders in the return from the Babylonian exile. Nehemiah's first administration seems to have extended from 445 to 433 B. C., and his second began after an unknown but not very long interval (Neh. xiii. 6–7). Probably he was a very young man in B. C. 445, and probably in his second administration at Jerusalem he lived to be a very old man. Josephus says: "He came to a great age, and then died" (*Ant.* xi. vi. 8). According to Neh. xii. 26, 23, cf. 2 Mac. i. 23, his "days" extended "to the days of Johanan the son of Eliashib," who became high priest between 380 and 370 B. C., or earlier.

The works attributed to Nehemiah are the fortifying and peopling of Jerusalem, the suppressing of extortion, and the carrying into permanent effect of the reforms that had been previously attempted by Ezra. These reforms mainly consisted in the enforcement of the laws of Moses, the establishment of the temple-worship on a creditable basis, and the breaking up of intermarriages between the Jews and people of other races. Later traditions assign to him two other important works, the collection of a library (2 Mac. ii. 13), and the completion of the books of Chronicles, and thus of the Old Testament (Baba Batra fol. 14, a; cf. 2 Mac. ii. 9–13, where 1 Chronicles is cited, apparently, under the title *The Memoirs according to Nehemiah*).

Willis J. Beecher.

Nehemiah, The Book of: one of the canonical books of the Old Testament. It has a title, and by its very form must always have been a separate piece of composition; but Ezra and Nehemiah are counted as one book in the scheme which groups the Old Testament writings into twenty-two books. It is now commonly said that the book was written by some later scribe, in part from memoirs made by Nehemiah. In proof of this, it is alleged, first, that the book mentions events later than Nehemiah's time; and, second, that it is in a confused state, the different parts speaking of Nehemiah sometimes in the first person singular, sometimes in the first person plural, and sometimes in the third person; but no one can prove that the book mentions any event later than the early part of the pontificate of Johanan (xii. 23), when Nehemiah was still living (xii. 26, 2 Mac. i, 23); for Jaddua (xii. 22, 10) may have been registered in his father's lifetime, and the Darius of the same verse, "upon"

whose reign the registration was begun, is most naturally Darius Nothus; and, further, the book, supposing it to have been written by Nehemiah in his old age, is capable of an analysis in which the alleged confusion of the pronouns vanishes.

On this hypothesis, it consists of two parts: first, an account of the first months of Nehemiah's first administration, with supplementary notes (i. 1–xii. 26); and, second, an account of certain events in Nehemiah's second administration (xii. 27–xiii.). The second of these two parts is simply a narrative by Nehemiah, in which he speaks of himself in the first person singular, except in xii. 47, where he uses, officially, the third person. The main portion of the first of the two parts is likewise a narrative written by Nehemiah in the first person (i. 1–vii. 5). In vii. 6–viii. 1 it incorporates matter quoted from Ezra ii. 1–iii. 1. Then follows an official account of the great convocation (viii.–x.). The first sentence of the official account blends curiously with the closing sentence of the passage quoted from Ezra. Then Nehemiah takes up his narrative (xi. 1–2), at the point where he left it in vii. 4, but continues it for these two verses only. He then finishes what he has to say touching his first administration by appending to it the long genealogical note—(xi. 3–xii. 26), which is in part a duplicate of 1 Chron. ix. 2, *seq.*, and covers a period of six generations, from the grandfather to the great-grandson of Eliashib, who was high priest when Nehemiah's first administration closed. With the facts thus accounted for, we must hold Nehemiah to be the author of the book, and not merely of some of its materials. WILLIS J. BEECHER.

Neher, BERNHARD, von: painter; b. at Biberach, Würtemberg, Germany, Jan. 16, 1806; received his first instruction in painting from his father, and finished his studies in the academies of Stuttgart and Munich and in Rome. The first great work he executed after his return to Munich was the immense fresco on the Isarthor representing the entrance of the Emperor Louis the Bavarian into Munich. In 1841 he went to Weimar, where he decorated the Goethe and Schiller galleries with frescoes. In 1844 he was made director of the art-school in Leipzig, and in 1854 of that in Stuttgart. Besides historical subjects, he painted several of a religious nature. D. at Stuttgart, Jan. 17, 1886.

Neidhart von Reuenthal: a Bavarian knight and poet who lived during the first half of the thirteenth century. He took part in the crusade of Duke Leopold of Austria (1217–19), previous to which he had already gained the reputation of a poet, according to the testimony of Wolfram von Eschenbach. For unknown reasons he incurred the enmity of Duke Ludwig of Bavaria and lost his fief in Bavaria. He turned to Austria and was given a house at Melk by Duke Frederic. No further historical traces of him are found after the year 1236. Although Neidhart is classed with the minnesingers in mediæval manuscripts, he can not properly be placed among those poets. His poems may be divided into *Sommerlieder* (*Reigen*), and *Winterlieder* (*Tanzlieder*). While the former were presumably composed for the amusement of the villagers, the latter, which are mostly satirical in contents and ridicule the bragging peasants, were chiefly delivered before the court circles, who seem to have enjoyed their boorish caricatures. In many of Neidhart's poems, especially in the *Sommerlieder*, we notice traces of old popular songs, which he with great skill and excellent effect adapted to his artistic purposes. He found a great many imitators, but most of their imitations are coarse, and lack Neidhart's gracefulness and humor. The fact that Neidhart during the following two centuries became a legendary hero in the popular songs is sufficient proof of the impression he made on his contemporaries. See *Neidhart von Reuenthal*, edited by M. Haupt, 1858, and by Fr. Keinz, 1889; R. M. Meyer, *Chronologie der Gedichte Neidharts von Reuenthal* (1883); Bielschowsky, *Gesch. der d. Dorfpoesie im 13. Jahrh.* (1891); *Die Neidhart-Legende*, *Zeitschrift f. deutsches Alterthum* (31, 64). J. GOEBEL.

Neilgher'ry (or **Nilgiri**) **Hills**: an almost isolated group of mountains in Southern Hindustan, between lat. 11° 10′ and 11° 38′ N., and between lon. 76° 30′ and 77° 10′, and covering an area of 700 sq. miles. They consist of granite, covered with a layer of rich black soil 10 feet deep, and rise in the highest peak, Dodabetta, to the height of 8,760 feet. Their sides are covered with impenetrable jungles of tropical forests, hot, unhealthful, and swarming with wild animals; but at an elevation of about 5,000 feet they form a table-land remarkable for its healthful climate, and on this account much frequented by Europeans. The native population comprises, besides the Badahars and other Hindu tribes, the Todas, who differ much from all other races in India, being tall and well formed, with strongly marked Semitic features.

Neill, EDWARD DUFFIELD, D.D.: author; b. in Philadelphia, Pa., Aug. 9, 1823; educated at the University of Pennsylvania, Amherst College, and Andover Theological Seminary; was a Presbyterian minister in St. Paul, Minn., 1849–60; chancellor of the University of Minnesota 1858–61; chaplain of the First Minnesota Regiment and hospital chaplain 1861–64; private secretary to President Johnson 1865–69; consul to Dublin 1869–70; president of Macalester College, Minneapolis, 1873–84; Professor of History and Literature there from 1884; and pastor of the Reformed Episcopal church of St. Paul 1884–89. D. there Sept. 26, 1893. Author of *Annals of the Minnesota Historical Society* (1856); *History of Minnesota* (Philadelphia, 1858); *Terra Mariæ, or Threads of Maryland Colonial History* (1867); *The Fairfaxes of England and America* (1868); *History of the Virginia Company* (Albany, 1869); *English Colonization of America during the Seventeenth Century* (London, 1871); *Founders of Maryland* (Albany, 1876); *Virginia Vetusta* (1885); *Virginia Carolorum* (1886); and *Concise History of Minnesota* (Minneapolis, 1887).

Neillsville: city; capital of Clark co., Wis. (for location of county, see map of Wisconsin, ref. 4-C); on the Black river, and the Chi., St. P., Minn. and Omaha Railway; 60 miles N. E. of La Crosse. It is in an agricultural, dairying, and stock-raising region, with considerable tracts of heavy timber; contains 6 churches, high, ward, and Roman Catholic and Lutheran parochial schools, 2 State banks with combined capital of $50,000, and 3 weekly newspapers; and has manufactories of furniture, staves, spokes, wagons, flour, and lumber. Pop. (1880) 1,050; (1890) 1,936; (1900) 2,104.
EDITOR OF "TIMES."

Neilson, LILIAN ADELAIDE: actress; b. near Saragossa, Spain, Mar. 3, 1850; went to England when a child and appeared in Margate as Julia in *The Hunchback* in 1865. In July of the same year she played the part of Juliet at the Royalty theater, London, and from this time appeared in various parts with considerable success, but did not arouse much enthusiasm till 1870–71, when her *Amy Robsart* brought her into high favor with the public. She was equally successful in the U. S., where she made a tour in 1872, appearing at Booth's theater in New York as Juliet and elsewhere as Beatrice, Lady Teazle, and her other favorite characters. She was again in the U. S. in 1877 and in 1879, and at each time was received with enthusiasm. In 1872 she married a Mr. Philip Lee, from whom she was divorced in 1877. D. in Paris, Aug. 15, 1880.

Neiva, nā'ee-vă'a: a city of the department of Tolima, Colombia; on the right bank of the river Magdalena, above the junction of the Neiva. This point is the head of navigation for light craft, and is sometimes attained by steamers during exceptional floods; much of the commerce of Popayan and the southern departments passes through it. The district is noted for its cacao, and has an active trade in cattle. Formerly large quantities of cinchona were obtained in the neighboring mountains, but most of the trees have been destroyed. Neiva was founded in 1550 at the mouth of the river of that name; after it had been destroyed by Indians it was rebuilt on its present site. It was the capital of Tolima until about 1888. Pop. 9,000; with the district (1892) 15,000. HERBERT H. SMITH.

Nekra'sov, NIKOLAĬ ALEKSEEVICH: poet; son of an army officer; b. in a village in Podolia, Russia, Nov. 22, 1822. At sixteen he was sent to St. Petersburg to enter a military academy, but gave it up for the university and a literary career. In 1840 appeared a volume of verses. Five years later he wrote the first of his celebrated poems. In 1847, with A. P. Panaev, he founded the *Sovremennik* (Contemporary), which he conducted until it was suppressed in 1866. To it almost all the great Russian writers of the day contributed. In 1868 he became editor of the *Otechestvennyĭa Zapiski* (National Annals), which continued the success of his former journal. D. Dec. 27, 1877. Nekrasov belongs to the realistic school. Whether he describes the daily round of the peasant's existence or the dark sides of St. Petersburg, or whether he reveals his own experiences and sentiments, his tone is one of melancholy. Frequently, as in *A Moral Man* (English trans., *Cornhill Magazine*, Mar., 1863),

he lashes the upper classes with savage irony. The form of his verse is at times far from perfect, but the substance often glows with intense feeling and wonderful descriptive power. His two longest poems are *Moroz Krasnyĭ Nos* (Red-nosed Frost; anon. trans., 2d ed., Boston, 1877), perhaps his masterpiece, and *Komu khorosho zhit v Rossiĭ* (To Whom is Life good in Russia?), which he did not live to finish. There have been several editions of his works (5th complete ed. St. Petersburg, 1890). A few of his pieces have been rendered into English, with scant success in *Russian Lyrics in English Verse*, by C. T. Wilson (1887); rather better in *Rhymes from the Russian*, by J. Pollen (1891). See the chapter on Nekrasov in *Studies in Russian Literature*, C. E. Turner (1882); also an article in the *Revue des Deux Mondes* for Dec. 15, 1858, by M. H. Delaveau, and one in *Regards Historiques et Littéraires*, by F. M. de Vogüé, originally prefixed to the French translations of Nekrasov's works.

A. C. Coolidge.

Nélaton, nā′lăă′tōn′, Auguste: surgeon; b. in Paris, France, June 18, 1807; graduated M. D. from the Paris school in 1836; became Associate Professor of Clinical Surgery in 1839 and professor in 1851; became a fellow of the Academy of Medicine in 1863, a member of the Institute in 1867, and a Senator of the empire in 1868; invented a new method of extracting calculi from the bladder, which he applied with great success. D. Sept. 21, 1873. He wrote *Éléments de Pathologie chirurgicale* (5 vols., 1844–60; 2d ed., 6 vols., 1868–85). Revised by S. T. Armstrong.

Neligh: city; capital of Antelope co., Neb. (for location, see map of Nebraska, ref. 9–F); on the Elkhorn river, and the Fremont, Elkhorn and Mo. Valley Railroad; 33 miles W. by N. of Norfolk, 160 miles N. W. of Omaha. It is the seat of Gates College (Congregational, chartered in 1881), and contains a national bank with capital of $50,000, a State bank with capital of $30,000, and four weekly newspapers. Pop. (1880) 326; (1890) 1,209; (1900) 1,135.

Nellore, nĕl-lor′: town of British India, Presidency of Madras; capital of the district of Nellore; on the Panar, near its mouth, in lat. 14° 27′ N. (see map of Southern India, ref. 5–E). It is ill built, but is clean, airy, and healthful. Pop. about 30,000.

Nelson: province of New Zealand. Area, 10,269 sq. miles. Pop. (1891) 34,770. The capital, Nelson, on the northern extremity of Middle island, at the head of Blind Bay, has a good harbor. It is well built, and its surroundings are very fertile and beautiful; pop. (1896) 6,659.

Nelson, David, M. D.: clergyman; b. near Jonesboro, Tenn., Sept. 24, 1793; graduated from Washington College, Virginia; studied medicine in Danville, Ky., and in Philadelphia; was surgeon with a Kentucky regiment in the war of 1812; and after the war was a physician in Jonesboro. In early life he professed Christianity, but relapsed into infidelity; becoming convinced anew of the truth of Christianity, he left a lucrative practice to enter the Presbyterian ministry, and was licensed in 1825. For nearly three years he preached in Tennessee, and was connected with *The Calvinistic Magazine*, published at Rogersville. In 1828 he succeeded his brother in the Presbyterian church at Danville, Ky.; in 1830 removed to Missouri, established Marion College, 12 miles from Palmyra, and was made president; in 1836, being forced by his zeal for emancipation to flee from Missouri, he removed to the vicinity of Quincy, Ill., and established there an institution for the education of young men. D. in Oakland, Ill., Oct. 17, 1844. In addition to articles for the press and the hymn *My Days are gliding swiftly by*, he published the widely used and formerly much admired *Cause and Cure of Infidelity* (New York, 1836; republished in London and elsewhere). C. K. Hoyt.

Nelson, Henry Addison, D. D.: professor and editor; b. at Amherst, Mass., Oct. 31, 1820; was educated at Hamilton College (1840) and Auburn Theological Seminary (1846); was a teacher in Eaton and in Homer, N. Y., 1840–43; pastor of the First Presbyterian church of Auburn, N. Y., 1846–56; of the First Presbyterian church of St. Louis 1856–68; Professor of Systematic and Pastoral Theology in Lane Seminary 1868–74; pastor of the First Presbyterian church of Geneva, N. Y., 1874–85; and since 1886 he has been the editor of *The Church at Home and Abroad*. In 1867 he was moderator of the General Assembly at Rochester, N. Y. He has published *Seeing Jesus* (1869); *Sin and Salvation* (1881); and *Home Whispers* (Philadelphia), besides contributing to religious papers. C. K. Hoyt.

Nelson, Horatio: Viscount Nelson of the Nile, Duke of Bronté; b. at Burnham Thorpe, Norfolk, England, Sept. 29, 1758; the fourth son of Rev. Edmund Nelson, rector of the parish. He attended school at Norwich and at North Walsham; obtained at the age of twelve an appointment as midshipman; accompanied Capt. Phipps's Arctic expedition 1773; served in the East Indies 1775–76; became lieutenant Apr. 8, 1777, and post-captain in 1779; was given command of a man-of-war, with which he proceeded to San Juan del Norte, Nicaragua; took Fort San Carlos in the San Juan river; cruised in the North Sea 1781–82; served again in the West Indies 1782–87, where he gained much ill-will by his vigorous attempts to prevent smuggling between the U. S. and the British colonies. On the recommendation of Lord Hood he was made captain of the Agamemnon in 1793, and was dispatched to the Mediterranean; commanded a small squadron on the coast of Corsica which co-operated with Paoli, and took Bastia May, 1794; aided in the siege of Calvi, where he lost an eye; participated in Admiral Hotham's victory over the French squadron Mar. 15, 1795; took the island of Elba; blockaded Leghorn Apr. to Oct., 1795; was made commodore 1796; distinguished himself under Admiral Jervis in the naval victory over the Spanish fleet off Cape St. Vincent Feb. 14, 1797; was appointed rear-admiral Apr., 1797; took part in the blockade and attempted bombardment of Cadiz May to July, and in the unsuccessful attack upon Santa Cruz, Teneriffe, July, 1797, where he lost his right arm; was made a Knight of the Bath and received a pension of £1,000. In May, 1798, he took command of the Mediterranean squadron off Toulon; followed Napoleon's expedition to Egypt and destroyed the French fleet at the Bay of Aboukir (generally called the battle of the Nile), being wounded in the engagement, Aug. 1, 1798, for which victory he was made Baron Nelson of the Nile, and received an additional pension of £2,000; proceeded to Naples in September; occupied Leghorn in November; aided the Government of Naples in resisting the French invasion and in recovering the capital after it had been taken, but stained his reputation by violating the capitulation concluded June 23, 1799, and hanging Caraccioli, the insurgent admiral; was made Duke of Bronté (Sicily) by the King of Naples; aided in the siege of Malta; returned to England in company with Sir William and Lady Hamilton Nov., 1800; was received with unbounded popular enthusiasm. He was made vice-admiral Jan., 1801; was second in command of the Baltic fleet in the naval battle of Copenhagen, Apr. 2, for which he was made viscount; took command of the squadron for the defense of England against the contemplated French invasion in July; attacked the French flotilla off Boulogne, Aug. 15; resided with the Hamiltons at their seat in Merton, Surrey, during the Peace of Amiens, 1802–03; was appointed commander of the Mediterranean fleet on the resumption of hostilities May, 1803; blockaded Toulon; unsuccessfully pursued a French fleet to the West Indies May, 1805; returned to England in July; again took command of the Mediterranean fleet, and inflicted a total defeat on the combined French and Spanish squadrons off Cape Trafalgar, losing his life in the engagement, Oct. 21, 1805. Lord Nelson was buried with much pomp in St. Paul's Cathedral, Jan. 8, 1806. He had learned his tactics from Napoleon, "plunging headlong into the enemy's fleet, and doubling upon a part of their line, in the same manner as Napoleon practiced in battles on land." See *Life*, by Southey (2 vols., 1828); his *Letters and Dispatches*, edited by Sir N. Harris Nicolas (7 vols., 1844–46); E. de Forgues, *Histoire de Nelson* (1860); *Lady Hamilton and Lord Nelson* (2 vols., 1888); and *The Queen of Naples and Lord Nelson* (2 vols., 1889), by J. C. Jeaffreson.

Nelson, Samuel, LL. D.: jurist; b. at Hebron, N. Y., Nov. 10, 1792; graduated at Middlebury College in 1813; was admitted to the bar in 1817; became a successful lawyer of Cortland co., N. Y.; judge of the circuit court 1823–31, of the State Supreme Court 1831–37, its chief justice 1837–45; in 1845 was appointed a judge of the U. S. Supreme Court, from which he retired in 1872; was a member of the joint high commission to settle the Alabama claims 1871. D. at Cooperstown, N. Y., Dec. 13, 1873.

Nelson, Thomas: Governor of Virginia; b. in York co., Va., Dec. 26, 1738; was educated at Trinity College, Cambridge, and before his return, when just twenty-one, was chosen to the house of burgesses of Virginia; was a member of the Williamsburg convention 1774, of the convention of

1775, and of the Virginia constitutional convention of 1776; was in Congress 1776–77 and 1779; signed the Declaration of Independence; served as colonel, and afterward as a general officer, in the army; was Governor of Virginia in 1781; expended his great fortune for the cause of liberty, and at the siege of Yorktown directed the artillery to play upon his own mansion, the supposed headquarters of Cornwallis. D. in Hanover co., Va., Jan. 4, 1789.

Nelson, Thomas L.: See the Appendix.

Nelson River, Canada: See Saskatchewan River.

Nelsonville: See Cowansville, Quebec, Canada.

Nelsonville: village; Athens co., O. (for location, see map of Ohio, ref. 7–G); on the Col., Hock. Valley and Toledo Railway; 14 miles N. W. of Athens, 62 miles S. E. of Columbus. It is in the great coal-belt of Ohio, and is principally engaged in coal-mining and shipping. It has 2 private banks and 3 weekly newspapers. Pop. (1880) 3,095; (1890) 4,558; (1900) 5,421.

Nelum'bo (the Ceylonese name): a genus of water-lilies (*Nymphæaceæ*), containing only two or three species. The *Nelumbo speciosa* (the Egyptian bean, lotus of Tibet and India) furnishes in China and the East much food. Its seeds, roots, and stalks are cooked, and are very palatable, abounding in starch. This plant is nearly or quite extinct in Egypt, where it was once worshiped. The *N. lutea* of the U. S. has pale-yellow flowers (those of the *N. speciosa* generally are rose colored). Its roots and seeds (water-chinquapins) are edible. It grows in shallow waters of the Western and Southern States, but is rare in the Middle States.

Nelumbo lutea.

Revised by Charles E. Bessey.

Nematel'mia: same as Nemathelminthes (*q. v.*).

Nemathelmin'thes [from Gr. *νῆμα*, thread + *ἕλμινς*, parasitic worm]: a large group of "worms," most of which are parasitic, and which from their cylindrical shape receive their systematic name as well as the common terms of "roundworms" and "threadworms." They may be recognized by their cylindrical, unjointed bodies. Externally they are covered by a thick cuticle, and no traces of appendages can be found. The peculiarities of internal structure can best be mentioned by treating the two groups of round worms separately.

In the first, the Acanthocephali (spine-headed worms), there is no digestive tract, nourishment being absorbed through the skin. The body ends anteriorly with a "proboscis" covered with spines, by means of which the parasite anchors itself to the walls of the intestines of its host. The sexes are separate, and the eggs, passing out, require to be eaten by some arthropod before beginning their development. In the bodies of these new hosts they partially develop, but not until they are again eaten by some fish, bird, or mammal do they complete their history. The order contains but a single genus, *Echinorhynchus*, the adults of which occur only in fishes, birds, and mammals. The pig is quite frequently infested with these parasites, and recent investigations have shown that the intermediate hosts in this instance are the larvæ of "June bugs" and similar beetles. The eggs are passed with the droppings of the pigs to the ground, they are eaten by the larvæ, and these latter are devoured by the pig as he roots them from the ground.

The second order, Nematoda or Nematoidea (nematode worms), contains those more numerous forms in which the alimentary canal is present, while the proboscis never occurs. In most the sexes are separate, and frequently the male differs in appearance (especially in size) from the female of the same species. A few forms occur either in the water or in moist earth, but most are parasitic, and some attain great importance (e. g. Trichina, *q. v.*), from the serious results which follow their invasion of the animal. Space will permit the mention of but few forms. *Tylenchus* injures wheat by boring into the kernel, while the species of *Heterodera* live in turnips and other root crops. *Anguillula* furnishes the "vinegar eels," those small worms which occasionally occur in vinegar or stale paste, and which are introduced with the wort. Most of the species of *Fitaria* are injurious to various vertebrates, one, *Filaria medinensis*, being the much-dreaded Guinea-worm (*q. v.*) of the tropics. *Dochmius duodenatis*, occurring in the warmer regions of the Old World, has recently appeared in Brazil. This form lives in the duodenum of man, and, sucking the blood, causes the disease known as Egyptian chlorosis, which sometimes results in death. To the genus *Ascaris* belongs the larger roundworm, *Ascaris lumbricoides*, which reaches a length of a foot or more, being the worm most often affecting children. Allied to this is the much smaller *Oxyuris vermicularis*, or "pinworm," which lives in the rectal region of children, causing an intolerable itching.

Differing considerably from the ordinary nematodes are the hairworms (*Gordiaceæ*), which are frequently regarded as horse hairs turned into worms by soaking in water. In these the body is long and thread-like, and in the adult either the mouth (*Gordius*) or the vent (*Mermis*) is lost. There are yet many unsolved points in the history of these forms. *Gordius* lays its eggs in the water, and from these there hatches out a short larva with spiny proboscis which lives in the body of aquatic insects. When these are eaten by other insects the metamorphosis takes place, and after feeding for a while on the new host the worm bores its way out and lays its eggs. In *Mermis* the history is much the same, except that the eggs are laid in moist earth, and the forms infested by it are moths, crickets, grasshoppers, and beetles.

The principal papers on round worms are European in origin. Among these may be mentioned Diesing, *Systema Helminthum* (Vienna, 1850–51); Leuckart, *Die menschlichen Parasiten* (Leipzig, 1876); Villot, *Monographie des Dragonneaux* (*Gordius*) (Paris, 1874). J. S. Kingsley.

Nematisti'idæ [Mod. Lat., named from *Nematis'tius*, the typical genus; Gr. *νῆμα*, *νήματος*, thread + *ἱστίον*, web, sail]: a family of teleocephalous fishes, related to the mackerels and dolphins. The family is represented by a single species, *Nematistius pectoralis*, an inhabitant of the Pacific coast of Mexico. It is especially distinguished as the type of a family by the composition of the ventral, as well as structure of the other fins.

Nemato'da, or **Nem'atodes**: See Nemathelminthes.

Nematog'nathi [Mod. Lat.; Gr. *νῆμα*, *νήματος*, seam, thread + *γνάθος*, jaw]: the "catfishes," an order of teleost fishes distinguished by many peculiarities of the skeleton and brain. The skull has a nearly rectilinear dorsal outline, there being no anterior geniculation; the supra-occipital is confluent with the parietals; the pterotic bone is simple; no symplectic bone is differential; the intermaxillary bones are attached to the inferior surface of the ethmoid; the supra-maxillaries are styliform, articulated at their bases, and inclosed in filamentous extensions of the skin, developed as the supramaxillary barbels; the suboperculum is wanting; in the branchial apparatus (according to Cope) the third superior pharyngeal bone is wanting or small, and resting on the fourth, the second directed backward; one or two pairs of basibranchihyals and two pairs of branchihyals are developed; the branchiæ are pectinated; in the scapular arch the coracoid elements are soldered with the proscapula (clavicle of some), and the mesocoracoid is represented by a bridge-like arch; "interclaves" are developed; the post-temporal (supra-scapula of some) is co-ossified with the skull; no postero-temporal or supra-clavicle is represented; the four anterior vertebræ are greatly modified and more or less perfectly coalesced; the brain has an immense cerebellum, which extends forward over the optic lobes; the optic lobes are quite peculiar in their thalami; the heart has no bulbus arteriosus; the air-bladder connects by a duct with the roof of the œsophagus. These and other characters unite to distinguish the catfishes and related forms from all other types as an independent order. The

order is represented by numerous species, most of which are found in the fresh waters of almost all warm and temperate countries, but some are also marine. Although, apparently, in many respects, an ancient type, no forms that can be certainly referred to it have been found in the older rocks. The order has been differentiated into the families: (1) *Trichomycteridæ*, (2) *Siluridæ*, (3) *Chacidæ*, (4) *Plotosidæ*, (5) *Clariidæ*, (6) *Callichthyidæ*, (7) *Argiidæ*, (8) *Loricariidæ*, (9) *Lisoridæ*, (10) *Hypophthalmidæ*, (11) *Aspredinidæ*. Of these, the first ten have a well-developed operculum, while in the eleventh the operculum is wanting. The first, sixth, seventh, eighth, tenth, and eleventh families are peculiar to South America; the third, fourth, fifth, and ninth are peculiar to the fresh waters or seas of the tropical parts of the eastern hemisphere; and the second is cosmopolitan. All the North American species belong to the SILURIDÆ (*q. v.*).

THEODORE GILL.

Nematoi'dea: See NEMATELMINTHES.

Němcová, nyem'tsō-vâă, BOŽENA: novelist; b. at Vienna, Feb. 4, 1820; was educated at Skaliee; married an official at Kostelee in 1837, and in 1842 settled in Prague. At Kostelec she wrote two stories, *Chudí lidé* (Some Poor People) and *Dobrý člověk* (A Good Man); her first poems appeared in 1843, in the *Květy*. In 1845 she removed to Taus, an ancient Bohemian town, where she wrote her sketches, *Obrazy z okolí Domažlického*, and novels *Karla* (Charlotte) and *Pohorská vesnice* (The Village in the Mountains, Prague, 1856), two pictures of Bohemian country life. *Národní báchorky a pověsti*, a collection of Bohemian folk-tales, was published at Prague 1845–46. It was followed by her masterpieee, *Babička* (The Grandmother, Prague, 1855), a novel of Bohemian country life, since translated into many languages (English by Frances Gregor, Chicago, 1891). She visited Northern Hungary several times, gathering material for her new works: *Slovenské pohádky a pověsti* (Slovák Folk-tales, Prague, 1858), *Uherské město* (A Hungarian City), etc. D. Jan. 21, 1862, at Litomyšl. Her collected works, *Sebrané spisy*, were published in 8 vols. at Prague and Litomyšl in 1862–63.

J. J. KRÁL.

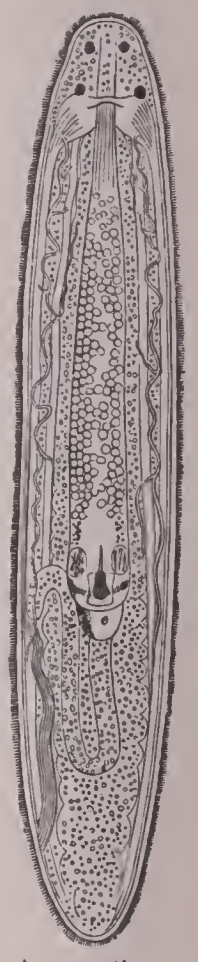
Ne'mea: a valley situated in Argolis, Greece, between the cities of Phlius and Cleonæ, and celebrated in Grecian story as the site where Argos was slain by Mercury, and where the Nemean lion was overcome by Hercules. Nemea owes its later celebrity entirely to the renown of the games held there. It was merely a stretch of pasture-land, measuring about 4 miles by 1, and hemmed in by Mts. Trikaranos, Apesas, and Tretos. On Mt. Apesas Perseus, King of Argos, had sacrificed to Zeus; on Mt. Tretos the cave of the Nemean lion was anciently shown, with its double issue, a feature common to many grottoes now visible on Mt. Tretos. There remain at Nemea three remarkably slender Doric columns and a heap of ruins of the Doric temple of Nemean Zeus, under whose patronage the biennial games were conducted. The structure, to judge by its style, was erected only in the third century B. C., and was early destroyed, presumably by an earthquake. Nemea is now a way station 20 miles distant from Corinth on the Nauplia division of the Peloponnesian Railway, but continues uninhabited. Compare Leake, *Travels in the Morea*, iii., pp. 326–336; Curtius, *Peloponnesos*, ii., pp. 505–510; Baedeker's *Greece*, p. 357.

ALFRED EMERSON.

Ne'mean Games: the third of the Panhellenic or national athletic and musical festivals of ancient Greece, celebrated biennially at Nemea in Argolis. Like other similar Grecian celebrations, they originated as a funeral festival, established in prehistoric times in honor of Opheltas or Archemorus. The death of this young prince, witnessed by the leaders of the Argive expedition against Thebes, and his funeral pomp celebrated by them with games of physical prowess, after the fashion of heroic times, presaged the failure of their expedition. The historic games occurred, alternately in spring and autumn, in the second and fourth year of each Olympiad. The first Nemead was an autumn festival coincident with the fifty-first Olympiad (575 B. C.). The greatest popularity of the Nemean games was from about 500 to 350 B. C. The contests were athletic, equestrian (horse-races), and musical. Probably there was little difference between the athletic system of Nemea and that of Olympia. The only contests recorded, however, are the foot-race or stadion (200 yards dash), wrestling, pentathlon, and pankration (see GRECIAN GAMES), in each case for men and boys; the double course, the long run, and the race in armor also occurred, to which the famous adventure of Kreugas and Damoxenus at Nemea adds the boxing-match. Damoxenus having intentionally killed his adversary, the judges awarded the victor's wreath to the dead body of Kreugas, amid loud acclamations. Among the winners in chariot-races was Alcibiades of Athens, who allowed himself to be painted seated in the lap of the nymph Nemea. Among the musical contests was one for flute-players. The prize in every case was a wreath of wild celery, on a bed of which plant Archemorus had expired. The twelve judges wore gray robes in sign of mourning for Archemorus. Participants in the games and official embassies enjoyed safe conduct during the sacred month. The conduct and protection of the games lay at first with Cleonæ, after 573 B. C. with Argos. This city refused even to recognize games held at Nemea under the auspices of Cleonæ and the Archæan League, when the fortune of war compelled the Argives to hold their own at Argos. On this occasion Aratus, the Arehæan general, sold the contestants in the Argive celebration into slavery, a good illustration of the real necessity for the sacred truce. In Græco-Roman times the Nemean games were regularly held at Argos, and imitations of them, also called Nemean, were instituted elsewhere. It is not known when the festival was abolished. The stadion and theater used in the games are still recognizable. Compare J. H. Krause, *Pythien, Nemeen. und Isthmien.* pp. 119–132, and in Pauly's *Realencyclopädie des klassischen Alterthums* (Stuttgart, 1848), under *Nemeen.*

ALFRED EMERSON.

Nemer'tines [Gr. Νημερτής, a nereid]: a group of low worms, almost exclusively marine, in which the usually flattened elongate body is without a body-cavity, the mouth is near the anterior end, and the usually sacculated intestine terminates in a posterior vent. In front, above the mouth, is a slit-like opening from which an extremely extensile proboscis can be protruded. This is the means by which the worm obtains its food, the proboscis coiling around the prey. The larger forms live in the mud of the shores, the smaller ones swim freely. It is difficult to say what the size of a large nemertean is, one of the species of the U. S., *Cerebratulus ingens*, measuring about a foot in length in its contracted condition, but yet being able to extend to a dozen feet or more. In some cases the nemertine development is direct, but in others a peculiar larval stage is introduced, inside of which the worm is gradually formed, and from which it later escapes, leaving the old skin. The nemertines are subdivided into four orders; in the first, the *Hoplonemertini*, the proboscis bears a couple of spines. In the others these spines are lacking. The *Schizonemertini* have a pair of grooves on the sides of the head which are doubtless sensory (? olfactory) in function. In the *Palæonemertini* these grooves are lacking. The last group, the *Malacobdellini* differ from all the rest in having a sucker on the posterior end of the body, and the members live in the gill cavities of certain clams. The presence of this sucker led to their being formerly regarded as leeches.



A nemertine.

The literature of the group is small. The various papers of Hubrecht stand first. M'Intosh (Ray Society) has described the British species, while Verrill has catalogued those of New England.

J. S. KINGSLEY.

Nemesia'nus, MARCUS AURELIUS OLYMPIUS: a Latin poet; b. at Carthage in the middle of the third century of our era; flourished at the court of the Emperor Carus, and wrote didactic poems on hunting, fishing, etc. We possess only the first 325 verses of the *Cynegetica* and four eclogues (*Bucolica*), whose author was for a long time identified with Calpurnius. These eclogues are full of reminiscences of Vergil, Ovid, and other poets, and are less correct in form than the seven eclogues of Calpurnius. See Baehrens, *Poet. Lat. Minores*, iii., pp. 174–202 (Leipzig, 1881); H. Schenkl, *Calpurnii et Nemesiani Bucolica* (Leipzig. 1885; also with introduction, commentary, and appendix by C. Keene, London, 1887).

M. WARREN.

Nem'esis [= Lat. = Gr. Νέμεσις, personification of *νέμεσις*, righteous anger, anger rightly allotted, orig. an allotment, deriv. of *νέμειν*, distribute, allot]: originally the abstract idea of strict divine retribution, in which sense alone Homer uses the word. In Hesiod she is a goddess, the daughter of Night (*Theog.* 223), and sister of Fraud, Love, Old Age, and Strife. Properly speaking, Nemesis deals out to men, according to their deserts, good or ill fortune. She takes cognizance only of man's past deeds, while the FATES (*q. v.*) are appointed to man before his birth, and spin his fate without reference to his merit or demerit. In the classical period, however, Nemesis has become a goddess who deals out mostly ill-fortune; she avenges pride and chastises the wicked; she brings low the very fortunate and restores to him his proper measure of felicity. She therefore is the goddess who watches over *measure* in the abstract, the *just measure*. In art she is represented as a maiden holding her right fore-arms in front of her breast, so that the fore-arms from elbows to finger-tips gave the just measure of the *ell*. The *bridle* in her left indicates that she keeps man within the just measure of fortune. The Temple of Nemesis at Rhamnus gained importance after the Persian wars. The Persians, the story goes, brought with them to Marathon a block of Parian marble, in order to erect a trophy worthy of their victory, but after their defeat at Marathon carved from the block a colossal statue of Nemesis, which was placed in the temple at Rhamnus. By some the statue was ascribed to Agoraeritus, a pupil of Phidias. What is supposed to be the head of this statue is now in the British Museum. See Posnansky, *Nemesis und Adrasteia*, p. 92 ff.; Rossbach, *Zur Nemesis des Agorakritos* in *Athen. Mittheil.*, xv., p. 64 ff.; Brunn, *Griechische Künstler* (Brunswick, 1853), i., p. 240 ff.; see also the article *Nemesis* in Baumeister's *Denkmäler*. J. R. S. STERRETT.

Nemichthy'idæ [Mod. Lat., named from *Nemichthys*, the generic name; Gr. *νῆμα*, thread + *ἰχθύς*, fish]: a family of fishes of the order *Apodes* or eels, distinguished by its thread-like body and snipe-like bill. The body is extremely elongated and band-like, with the tail tapering into a point, and the anus not far behind the throat, the abdominal cavity, however, extending much farther back; the head is very much elongated, and the jaws extended into a long and slender bill. Several species are known, most of them inhabiting great depths in the ocean.

Nemours, *ne-moor'*, LOUIS CHARLES PHILIPPE RAPHAEL D'ORLÉANS, Duc de: second son of King Louis Philippe; b. in Paris, Oct. 25, 1814. He served with his elder brother at the siege of Antwerp, and in 1836 and 1837 in the two expeditions against Constantine, in Algeria, in the latter of which he commanded one of the three brigades upon which fell the heaviest part of the short but bloody siege; commanding also the rear-guard on the return march, during which great ravages were made in the ranks by the cholera, the prince endeared himself to his soldiers by his self-exposure and devotion to the sick. His marriage the year after with a princess of Saxe-Coburg became the cause of the deposition of the Soult ministry, one of the earlier ominous signs of incipient discontent with the reigning family. On the abdication of the king he assumed command of the troops then in the court of the palace of the Tuileries, and protected the widowed Duchess of Orleans and her children. After the fruitless and hazardous appeal by her personal presence in the Chamber of Deputies, he took measures for the safe withdrawal from France of herself and all the members of the royal family, after which he succeeded himself in reaching England. His life of exile in England was passed in great seclusion, and was marked by devotion, during the continuance of their lives, to the ex-king and queen. After the abrogation of the decree of exile he was restored (as likewise the Duc d'Aumale) to his former rank of *général de division* in the French army, but his name was removed from the army list in June, 1886, according to the law excluding from military service the members of once reigning families in France. D. June 25, 1896.

Nencioni, ENRICO: poet and critic; b. in Florence, Italy, in 1840. He was educated in his native place, and early became a member of the group of young men of letters known as *gli amici pedanti*, to which Chiarini, Cavaciocchi, and Targioni-Tozzetti also belonged. He engaged in private teaching at first, but in 1869 he began to write critical articles for Bargoni's *Italia Nuova*. In 1878 his first volume of poems, *Poesie*, appeared, and this has been followed by *Medaglioni* (Rome, 1885). As a poet he shows everywhere the influence of Carducci and his school. The volume of his verse, however, is small compared with that of the critical articles he has contributed to the Italian literary periodicals. Well acquainted with English and French literature, as well as Italian, he has served as an interpreter of the chief modern poets of all three nations to his countrymen. Owing to his literary successes, he has been given a professorship in the Istituto Normale Femminile at Florence. A. R. MARSH.

Nen'nius: the supposed author of the *Historia Britonum* or *Eulogium Britanniæ*, a Latin history of Britain from the arrival of Brutus the Trojan, grandson of Æneas, to A. D. 655. According to several passages of this work, the writer was a monk of Bangor, Wales, but no particulars of his career are known, and it is even disputed whether he belonged to the seventh or the ninth century. Dr. Guest (1849) assigns the work which bears the name of Nennius to the eighth century, but supposes the preface to have been written in the ninth or tenth century. The best edition of the text is that edited for the English Historical Society by Rev. Joseph Stevenson (1838). Bohn's Antiquarian Library (1848) contains a translation by Gunn. See *Monumenta Historica Britannica* (1848) and *L'Historia Britonum*, by de la Borderie (Paris, 1883).

Ne'ocene Period [*neocene* is from Gr. *νέος*, young + *καινός*, new]: the division of geologic time following the Eocene period and preceding the Pleistocene; the middle part of the Cenozoic era. The animals and plants of this period include those regarded as the immediate ancestors of existing species, and to a considerable extent are identical with living forms. The greatest differences are found in the vertebrates, especially in the mammals. The strata, as compared with those of other periods, are characterized by the abundance of lacustrine beds.

In the U. S. Neocene rocks occupy a broad belt along the Atlantic and Gulf coasts from New Jersey to the Rio Grande, covering nearly the whole of Florida and Mississippi, approximately half of Delaware, Maryland, South Carolina, Georgia, Alabama, and Louisiana, and smaller portions of Virginia, North Carolina, Tennessee, Arkansas, and Texas. These beds are marine, as is also a fringe of deposits along the coasts of Washington, Northern Oregon, and Southern California. Fresh-water strata, recording the existence of Neocene lakes, cover the Llano Estacado of Texas and New Mexico, broad districts of the great plains in Oklahoma, Kansas, Nebraska, Colorado, and Wyoming, and smaller areas in Utah, Nevada, Montana, Idaho, and Oregon. The beds include many valuable deposits of marl and phosphates. See GEOLOGY and CENOZOIC, and consult *Bulletin No. 84* of the U. S. Geological Survey, by Dall and Harris. G. K. GILBERT.

Neo-Darwinians: See EVOLUTION.

Neodesha, *nĕe-ō-de-shaa'*: city (founded in 1869); Wilson co., Kan. (for location of county, see map of Kansas, ref. 7–1); at the junction of Fall and Verdigris rivers, and on the St. L. and San Fran. and the Mo. Pac. railways; 14 miles N. of Independence. It has 5 churches, high and graded schools, public hall owned by the city, natural-gas and petroleum wells, railway repair-shops, and 2 weekly newspapers. It is in a fertile agricultural region, has exceptional water-power, and is principally engaged in general farming, stock-raising, and milling. Pop. (1880) 924; (1890) 1,528; (1900) 1,772. EDITOR OF "REGISTER."

Neodymium: See DIDYMIUM.

Neo-grammarians: a translation of the German term *Junggrammatiker*, first applied by Friedrich Zarncke to the new school of comparative philologists which arose in Leipzig about 1877–78, and was distinguished by its enunciation of a stricter method of historical tests in linguistic research. This method recognized two leading principles: (1) That the laws of sound operate uniformly, i. e. with like results in like conditioned materials; (2) that the apparent exceptions to the laws of sound are to be explained by the operation of the psychological principle of analogy. The completest statement of these principles may be found in Osthoff-Brugmann, *Morphologische Untersuchungen*, vol. i., introd. (1878), and in Paul, *Principien der Sprachgeschichte* (1st ed. 1880; 2d ed. 1886).
BENJ. IDE WHEELER.

Neo-Lamarckianism: a term introduced for that school of evolutionists, especially strong in the U. S., which believes with Lamarck that use and disuse are important fac-

tors in the development of new organs, but which differs from Lamarck in admitting that natural selection may also be an efficient element in variation. For the principles involved, see EVOLUTION and HEREDITY. J. S. K.

Neon: See the Appendix.

Neo-Pla'tonism: in the more limited sense of the word a philosophical school which originated in Alexandria in the third century after Christ, was professedly founded on the doctrines of Plato, but, as has been shown by Hegel, is more indebted to the ideas of Aristotle than to Plato, and denotes the last attempt of the speculative spirit of the Greek civilization to establish a scientific basis for its development. The school was founded by Ammonius Saccas (175–241 A. D.), further developed by Plotinus (205–270), and continued by Porphyrius (233–305), Iamblichus, Proclus (412–485), and others. In a wider sense, the name is applied to the whole speculative tendency which grew up in Alexandria from the amalgamation of Greek philosophy, Oriental theosophy, and Jewish and Christian theology, and of which the above-mentioned philosophical school is only one individual manifestation, while it produced most remarkable intellectual characters in the most different fields of speculation. Thus Philo Judæus (42 A. D.), Clemens Alexandrinus (220), Origen (185–254), and the Gnostics are severally representatives of systems akin to the Neo-Platonic form of speculation. In the celebrated commentary of Alexander of Aphrodisias on Aristotle's psychology there are to be found many of the leading ideas which form the foundation of Neo-Platonism. For the general character of this tendency and the special ideas of the school, see PHILOSOPHY and the special articles PLOTINUS, PROCLUS, etc.

Revised by W. T. HARRIS.

Neo'sho: city (incorporated in 1846, seat of the Legislature which adopted the ordinance of secession in 1861); capital of Newton co., Mo. (for location of county, see map of Missouri, ref. 7–D); on the St. L. and San Fran. and the Kan. City, Pitts. and Gulf railways; 73 miles S. W. of Springfield, 315 miles S. W. of St. Louis. It is in a lead-mining and agricultural region, has a number of valuable mineral springs, and is principally engaged in lead-mining and manufacturing. It is the seat of Scarritt Collegiate Institute (Methodist Episcopal South, chartered 1888), and has a U. S. Fish Commission station, with extensive building and grounds. There are 12 churches, a State bank with capital of $40,000, a private bank, and 3 weekly newspapers. Pop. (1880) 1,631; (1890) 2,198; (1900) 2,725.

EDITOR OF "TIMES."

Neosho River: a stream which rises in Morris co., Kan., flows generally S. S. E., enters the Indian Territory, and joins the Arkansas near Fort Gibson. It is some 300 miles long. Its chief tributary, the Cottonwood, is much larger and longer than the Neosho above the junction.

Neotropical Region: See AMERICA, SOUTH.

Nepal, Nepaul, or Nipal: an independent state of Hindustan, situated between Tibet and British India, and between lon. 80° 6′ and 88° 14′ E. Area, 54,000 sq. miles. Pop. estimated at 2,000,000. The southern part of the country consists of a belt of low land covered with tropical forests, which yield many sorts of valuable timber; the climate is hot, and utterly unhealthful, and wild animals, such as elephants, tigers, and leopards, abound. From this low land the ground gradually rises, first into hills, where rice, maize, millet, sugar, indigo, and coffee are cultivated, mostly on artificial terraces along the hill-sides; then into mountains, in whose elevated valleys wheat, oranges, walnuts, grapes, and other kinds of fruits are grown; and then into alps, among which are the highest peaks of the Himalaya—as, for instance, Mt. Everest—on whose pastures large herds of cattle, sheep, and goats are reared. Iron, copper, lead, tin, zinc, and salt have been found and are mined; cotton cloths and earthenware are manufactured; timber, hides, ivory, fruits, sheep, cattle, and elephants are exported. The inhabitants consist of several tribes, of which the Gurkhas, who are of Rajput descent and faith, form the warrior caste and hold the government, while the Newars, who are of Tibetan origin and are Buddhists, make the artisans of the country. Between the various tribes there exists a great difference, not only in character and religion, but even in language; they all have succumbed to the conquering tribe of the Gurkhas, which invaded the country in the latter half of the eighteenth century. The government is a military oligarchy, with a titular sovereign, who is a mere figurehead, the real power being in the hands of a prime minister, called the mayor of the palace. Capital, KHATMANDU (*q. v.*).

Revised by M. W. HARRINGTON.

Nepen'thes [Mod. Lat., from Gr. *νηπενθής*, banishing pain or sorrow; *νη-*, not + *πένθος*, suffering, sorrow]: a remarkable genus of pitcher-plants (the sole type of a peculiar family, *Nepenthaceæ*) of over thirty species, all natives of the southern tropical region of which the Indian Archipelago is the center, ranging from Madagascar to New Caledonia. They are all woody climbers, with apetalous and inconspicuous dicœcious flowers. Their peculiarity is in the leaves; these are rather long and narrow, traversed by a very strong midrib, which is prolonged into a tendril serving for climbing, the apex of this developed into a tubular or oblong pitcher, closed with a hinged lid. Until the pitcher is full grown the lid closes the orifice. A watery liquid, having a slight acid reaction, is secreted in the pitcher in small quantities. At maturity the lid opens, and remains so, more or less elevated on its hinge: the watery secretion still continues, especially if animal matter is introduced, but it may now escape by evaporation. About the rim of the pitcher a sweet secretion forms under favorable circumstances, which is attractive to insects; and dead insects are generally found in the pitcher. The researches of Dr. Hooker go far to prove that the liquid within possesses digestive properties, and that its powers of dissolving animal matter are augmented by a peculiar secretion which is only poured out in quantity when insects or other animal substances are introduced. *Nepenthes distillatoria* of Ceylon was the earliest known species, and together with *N. phyllamphora* and *N. ampullaria* of the Archipelago has been long known in cultivation. Some species found in Borneo have pitchers a foot or two in length.

Portion of a plant of *Nepenthes distillatoria* (much reduced).

Revised by CHARLES E. BESSEY.

Ne'pheline [from Gr. *νεφέλη*, mist, cloud]: a silicate of alumina, soda, and potash, crystallizing in the hexagonal system and allied to the feldspars. It occurs in volcanic rocks; in some instances so completely taking the place of feldspar as to form a nepheline rock. *Davyne* and *elæolite* are varieties of nepheline.

Nephi: city; capital of Juab co., Utah (for location, see map of Utah, ref. 5–L); on the Union Pac. and the San Pete Valley railways; 90 miles S. of Salt Lake City. It is in an agricultural, sheep-raising, gypsum, marble, and salt region, and has a national bank with capital of $50,000, an incorporated bank with capital of $50,000, and a weekly newspaper. Pop. (1880) 1,797; (1890) 2,034; (1900) 2,208.

Nephrid'ia [from dimin. of Gr. *νεφρός*, kidney]: a term introduced by Lankester for those excretory organs which can be reduced to the type of ciliated funnels connecting the body-cavity (cœlom) with the exterior. To this category belong the excretory organs of most worms, molluscs, crustacea, and vertebrates. The excretory organs of insects are entirely different.

Neph'rite [from Gr. *νεφρός*, kidney. Named from being formerly worn as a remedy for kidney diseases]: See JADE.

Nephritis: See BRIGHT'S DISEASE.

Nephthys [Egypt. *Neb-ḥat*, mistress of the house]: an Egyptian goddess, daughter of Seb and Nut (sky) and sister of Osiris, Isis, and Set. She is usually represented as the wife of Set, but also as the mother, by Osiris, of Anubis, the jackal-headed god of the dead. She appears principally as the companion of Isis, with whom she is represented as mourning the dead, being painted on burial-chests at the head of the chest, with wings extended for the protection of the departed. When represented alone, she appears with the signs ("house" and "bowl") which express her name ideographically. CHARLES R. GILLETT.

Nepigon [from Cree *Aminipigon*, deep, clear lake]: a large lake in the Thunder Bay district of Ontario, Canada,

30 or 40 miles N. of Lake Superior, with which it is connected by Nepigon river, emptying into Nepigon Bay of Lake Superior. It measures about 70 miles N. and S. by 50 E. and W., is thickly studded with islands and has deeply indented shores. It is a much-praised region for summer hunting and especially fishing. The January mean temperature is about 7° F., or that of Godthaab in Greenland. In July the mean temperature is that of San Francisco. The region about the lake appears to be as favorable for agriculture as Manitoba or Quebec. M. W. H.

Ne'pomuk, JOHN: a saint of the Roman Catholic Church and the patron saint of Bohemia; b. at Pomuk, Bohemia, about 1330; studied at the University of Prague; became rector of the Church of St. Gall in that city, and was appointed court preacher to the Emperor Wenceslas in 1378. In this position he opposed and reproved with undaunted courage the suspiciousness and cruelty of Wenceslas, who had demanded that John should reveal to him the secret confessions of his wife, the Empress Sophia, daughter of Albert, Duke of Bavaria. On John's refusal, he was imprisoned, cruelly tortured, bound hand and foot, and cast into the Moldau in 1393. His body was found and buried; many miracles were wrought at his grave; legends gathered around his name, and on Mar. 19, 1729, he was canonized by Pope Benedict XIII. The Cathedral of Prague contains a magnificent monument of marble and silver to his honor. His festival is held on May 16. See Abel, *Die Legende des heiligen Nepomuk* (1855); Frind, *Der geschichtliche Johann von Nepomuk* (1861); and *Der heilige Johann von Nepomuk* (1879).

Ne'pos, CORNELIUS: a Roman historian from Upper Italy, of whose life nothing is known but that he was a friend of Atticus, Cicero, and Catullus, and that he lived between 99 and 24 B. C.; wrote various works, all of which have been lost with the exception of parts of his *De Viris Illustribus*, which originally contained at least sixteen books. The extant lives of Cato and Atticus were from the book *De latinis historicis*. The work *De excellentibus ducibus exterarum gentium*, now commonly used as a school-book, and generally ascribed to Cornelius Nepos, was first printed in 1471 under the name of Æmilius Probus, an obscure writer of the fourth century, but in a new edition of 1569 Dionysius Lambinus claimed the authorship of the book for Cornelius Nepos, and identified it as a part of his lost *De Viris Illustribus*, chiefly on the ground that the purity of the language and the simplicity of the style would be impossible with a writer of the fourth century; and this opinion, modified by various hypotheses, has been generally accepted, although Unger (*Der sogenannte Cornelius Nepos*, Munich, 1881) attributes it to Hyginus. Editions and translations are very numerous. Among the most useful editions are those of Van Staveren, revised by Bardili (2 vols., Stuttgart, 1820), of Bremi (Zurich, 1827), of Siebelis (11th ed. 1885), and of Nipperdey (9th ed. 1885), and a larger edition revised by Lupus (Berlin, 1879). Revised by M. WARREN.

Neptune [from Lat. *Neptu'nus*]: in Roman mythology, the god of the sea. In sharp contrast to the seafaring Greeks, the Romans reveal by their mythology and language very little early familiarity with the sea. Words pertaining to the sea or seafaring are for the most part borrowed from the Greek, and a native sea-god independent of the Greek Poseidon can hardly be said to have existed. The name Neptune was common to Etruscans and Romans, and perhaps originally indicated a god of all water or moisture. There is practically nothing left, however, to indicate the attributes and character of this original god, for at an early date he is completely identified with the Greek sea-god Poseidon. Only one early temple to Neptune is reported. It was located near the Circus Flaminius, and contained a famous marine group by Scopas, representing Neptune and his train. After the defeat of Sextus Pompey and the victory at Actium, the worship of Neptune was revived, and Agrippa erected in his honor the great temple in the Campus Martius, called either by the Greek name, the Poseidonium, or the Basilica Neptuni. G. L. HENDRICKSON.

Neptune [named from *Neptune*, a Roman deity]: the outermost planet of the solar system. Its discovery is justly regarded as the most remarkable astronomical achievement of the nineteenth century. Up to about the beginning of the century it was found that the motions of all the planets could be perfectly accounted for by the attraction of the sun and their mutual attraction on each other; but when, about 1820, Bouvard proceeded to construct tables of Uranus, then the outermost known planet, an apparent exception presented itself, and the observations could not be reconciled with the motions computed from the attraction of the sun, Jupiter, and Saturn. Although Uranus was discovered by Sir William Herschel in 1781, it was afterward found that a number of astronomers had actually seen it and observed its position before that time, supposing it to be a fixed star. One of these observations was by Flamsteed as far back as 1695. Bouvard, finding that he could reconcile the observations made after 1781 with the theory, omitted the older ones entirely, leaving it to the future to find why they could not be so reconciled; but it was soon found that the planet began to deviate from the tables far more rapidly than could be accounted for by the necessary uncertainty of the data on which the tables were founded. The cause of this deviation was the subject of consideration among astronomers, and it seems to have occurred to several that it might be due to the action of an unknown planet beyond Uranus; but the problem of finding this planet was one which for some time no one ventured to attack. In 1840, however, the deviations had become so wide, amounting to two minutes of arc, that they attracted more attention than before, and three astronomers took up the problem of tracing them to their cause. The first of these was the illustrious Bessel, of Königsberg, who began work about 1840 by making a critical examination of the correctness of Bouvard's computations, and setting one of his assistants, Fleming, at the work of making a careful reduction of the Greenwich, Paris, and Königsberg observations. The death of Fleming and the ill-health of Bessel prevented the work from being carried further.

John C. Adams was then a student at Cambridge. In the summer of 1841 he became acquainted with the state of this question by reading a report of Mr. Airy. It occurred to him that it ought to be within the power of mathematics to calculate the position and movements of the disturbing planet from the observed deviations of Uranus, and he determined to attack the problem as soon as his studies would permit. In the autumn of 1845 he had so far advanced as to have computed an approximate orbit of the hypothetical planet, and about the end of October of that year he communicated the position of the planet to Prof. Airy, within a degree and a half of the real position of Neptune. Had an expert astronomer pointed a telescope of 6 inches aperture in the direction indicated by Adams, and swept for the planet, he must have recognized it by its disk after a few minutes' examination; but Prof. Airy had so little confidence in the prediction that he did not take the trouble to look for the object.

In the meantime a third person entered the field. This was Urbain J. Leverrier, then a young man of little over thirty, who had proved his mathematical ability by a very important paper on the secular variations of the orbits of the planets. In June, 1846, he presented to the Paris Academy of Sciences a paper in which he assigned an approximate position of the planet, agreeing very nearly with that already found by Adams. When Airy heard of this he began to consider the planet worth looking for, and at his suggestion Prof. Challis, director of the Cambridge Observatory, began a search. Instead, however, of trying to recognize the planet by its disk, he began the work of preparing an extensive catalogue of the stars in a space of several degrees each side of the computed place of the planet, which would necessarily occupy a considerable time. Meanwhile Leverrier was engaged in determining more accurate elements, which he communicated to the Academy about the end of August. Being now entirely confident that the planet must be very near the assigned place, he wrote to Dr. Galle, of Berlin, requesting him to search for it. Galle received the letter on Sept. 23, 1846, and the same evening went to the telescope, and proceeded to compare the stars in the neighborhood of the assigned place with a star-chart of that region which had just been finished. He soon found a star of the seventh or eighth magnitude which was not on the chart, within a degree of the position sent by Leverrier. As it presented a sensible disk, there could be no reasonable doubt that it was the object sought; but, desirous of proceeding with caution, he waited till the following night, when he found that it had actually changed its position among the stars. There was no longer any doubt of the reality of the discovery. After considerable discussion astronomers in general agreed upon the name Neptune for the newly discovered planet.

Subsequent investigations of the motions of Neptune

have been made mostly by astronomers of the U.S. The first one in the field was Sears C. Walker, then astronomer at the Naval Observatory, Washington. He computed an accurate orbit of the planet from all accessible observations, and then proceeded to inquire whether it had not been observed as a star at some former time, as Uranus had been. Computing the place of the planet for those previous years in which its path was known to have been swept over by observers of catalogues of stars, he found that on May 10, 1795, Lalande had observed a star almost exactly on the path of Neptune, which was now missing from the heavens, and which must have been the planet. When the news of this discovery reached Europe, search was made among the original manuscripts of Lalande, and it was found that the planet had also been observed on May 8, but finding the two observations discordant, owing to the motion of the planet during the interval, he had rejected his first observation entirely. He thus missed the great discovery by not investigating the cause of the discordance between his observations. These observations have been very valuable in fixing the orbit of the planet. Neptune moves in an orbit nearly circular, having an eccentricity of only 0·00872; yet on account of the great dimensions of this orbit, the absolute eccentricity in miles exceeds 25,000,000, and the difference of its distances from the sun in aphelion and perihelion is more than 50,000,000. The inclination of the orbit to the ecliptic is 1° 47′, and its mean radius about 2,746,000,000 miles. The period of revolution of the planet is about 164⅔ years, and its diameter about 37,000 miles. Its bulk is therefore more than 100 times that of the earth, but its density is so much less (one-sixth) that it has only about 17 times as great a mass.

Neptune has a single satellite, discovered in 1847 by Lassell, of Liverpool. Its period is 5d. 21h. 2m. 44s., and its mean distance from the planet about 230,000 miles.

S. Newcomb.

Nerbudda: a river of Central India, and next to the Indus the largest river of India, emptying on the west coast. It rises in lat. 22° 40′ N. and lon. 81° 52′ E., crosses the peninsula with a course of 620 miles, flowing a little S. of W., and falls into the Bay of Cambay, forming a large estuary. It is narrow and deep, but serves as a commercial highway only for the last 90 miles of its course, on account of its rapid current and numerous waterfalls. C. C. A.

Ne′reids [from Gr. Νηρηΐδες, plur. of Νηρεΐς, a Nereid, liter., daughter of Nereus; Νηρεύς, a sea-god + femin. patronymic ending *-ις*, *-ίδος*, descended from]: the fifty daughters of the sea-god Nereus by Doris, his wife. They were genuine Greek goddesses, who lived in the depths of the sea in a grotto resplendent with gold and silver. They were friendly to mariners and often acted as pilots, notably to the Argonauts and the Greek expedition against Troy. They were represented in art as beautiful and youthful maidens, sometimes clothed and sometimes nude. They disported themselves on the waves of the sea along with various sea-monsters, and are often depicted riding on the backs of dolphins or seated in a chariot drawn by Tritons (*q. v.*). Among the most distinguished of the Nereids were Amphitrite, Thetis (the mother of Achilles), and Galatea. See the article *Nereïden* in Baumeister's *Denkmäler*.

J. R. S. Sterrett.

Nereids: See Sea-mouse.

Neri, nā′rĕē, Filippo, dei, known in English as St. Philip Neri: saint; b. at Florence, Italy, in July, 1515; was adopted by a wealthy uncle as his heir; secretly went to Rome to study theology and canon law; distributed his property to the poor 1538; devoted himself to the care of pilgrims and the destitute sufferers in hospitals, and in that work was associated with Ignatius Loyola; took holy orders 1551, and founded the order of Priests of the Oratory, approved by Gregory XIII. in 1575. D. at Rome, May 26, 1595; was canonized in 1622. See Oratory, Congregation of the, and Faber's *Spirit and Genius of St. Philip Neri* (1850).

Nerit′idæ [Mod. Lat., name from *Ne′rita*, the typical genus, from Lat. *ne′rita* = Gr. νηρείτης, sea-mussel, periwinkle, deriv. of Νηρεύς, a sea-god]: a family of Azygobranch mollusks (see Gasteropoda) containing some 200 species, characterized by having a solid semi-globose shell with a straight columellar lip, which may bear a prominent tooth near its middle. In one species (*Nerita peloronta*) the columella at the base of this tooth has a red blotch, whence the name, which signifies "bleeding tooth." The aperture is closed by a calcareous operculum, which locks into the columella. Most of the species are marine, but some extend into brackish and others into fresh water.

Ne′ro, Lucius Domitius (after his adoption by the Emperor Claudius called Nero Claudius Cæsar Drusus Germanicus): Roman emperor from 54 to 68 A. D.; the son of Cn. Domitius Ahenobarbus and the younger Agrippina, daughter of Germanicus; b. at Antium in 37 A. D. After the marriage of his mother to the Emperor Claudius (49 A. D.) he was adopted by the latter, and a few years later married the emperor's daughter Octavia. As early as his fourteenth year, on the assumption of the toga of manhood, the intrigues of his mother had caused his succession to the imperial dignity to seem assured, in spite of the fact that the emperor had a natural son of great promise, the young Britannicus. In 54 A. D. Claudius died (poisoned, our authorities agree, by Agrippina, in order to insure and hasten her son's succession), and, the claims of Britannicus being ignored, Nero was saluted as emperor first by the prætorian guard and then by the senate. At this time Nero was only seventeen years of age and still under the influence of his tutors, Burrus and the philosopher Seneca, who, during the first years of his reign, practically ruled the empire. The high hopes which had been raised by belief in the ability and noble nature of Nero were not at first disappointed, so long as the influence of Seneca kept the baser qualities of his nature in check; but the jealousy of Agrippina, who saw her influence over her son waning, gave the first impulse to the unparalleled series of crimes which make up the chief history of Nero's reign. His first victim was Britannicus, the son of Claudius, for whom Agrippina had threatened to secure the imperial throne in his stead. In 59 A. D. he caused the death of his mother, and from this time on he abandoned himself to a career of the wildest and most enormous profligacy and crime. Indeed, the record of the remaining years of his life is little more than a tedious enumeration of the victims of his fear and hate. The conflagration in 64 A. D., which swept away the greater part of the city, was attributed to Nero in his own time, and practically all authorities after Tacitus charge him with it; but Tacitus reports the rumor without giving it credence, and its truth may well be questioned. To avert suspicion from himself the deed was charged to the Jews and Christians of Rome, and some of the latter perished for it as the first victims of Roman persecution. The city was rebuilt by Nero in a more durable and better manner, with wider streets and more adequate precautions against fire. The chief feature of the reconstruction was the magnificent palace called "the golden house," which stretched over a vast area of the best portion of the city, from the Palatine across the intervening valley to the Esquiline. (See Middleton, *Remains of Ancient Rome*, London, 1892, vol. ii., pp. 145–153.) In the following year a conspiracy against the life of Nero was disclosed, and the leaders of it, as well as many innocent persons on whom suspicion fell, were punished. Among the latter was his former tutor and friend, the philosopher Seneca, whom he ordered to die. Nero possessed accomplishments as a singer, actor, and athlete of no common kind, and was fond of displaying himself. In the year 64 he appeared thus in public at Naples, and two years later he journeyed through Greece, where he found a more appreciative audience, taking part in the contests of the Greek festivals. On his return to Italy early in 68 he tarried long in Naples, and was finally recalled to Rome by the news of the revolt of Gaul under Julius Vindex. This movement was joined by Spain under the leadership of Galba, who had been saluted as emperor by his soldiers. Virginius, the governor of Upper Germany, lent his support to the insurrection, and the senate proclaimed Nero a public enemy and condemned him to death. At this Nero fled for refuge to the villa of a faithful freedman, but, as he was being overtaken by his pursuers, put an end to his own life. See H. Schiller, *Geschichte des röm. Kaiserreichs unter der Regierung des Nero* (Berlin, 1872).

G. L. Hendrickson.

Nero: See Claudius.

Nertchinsk: town of Eastern Siberia, province of Transbaikalia; 527 miles E. of Irkutsk, on the basin of the Amur; on the Nertcha river, 3 miles from its confluence with the Shilka. The town was founded in 1654. It was removed from the Shilka in 1812 to avoid the frequent inundations of this river, but in 1840 it was seriously injured by floods from the Nertcha. The country around abounds in good pasturage and in rich ores of many minerals, including gold,

silver, and precious stones. The richest mineral district lies between the Shilka and the Argun, and embraces 3,250 sq. miles belonging to the czar. Pop. 3,000. M. W. H.

Neruda, ner'ŏŏ-daă, Jan: poet and novelist; b. at Prague, Bohemia, July 10, 1834: studied law and modern languages at the University of Prague, adopted a literary career, and edited various journals: *Obrazy života* (Pictures of Life, 1859–60); *Rodinná kronika* (The Family Chroniele, 1863–64); *Květy* (Blossoms, 1865–66). In 1865 he became the regular feuilletonist to the *Národní Listy* (National Gazette), a position which he held until his death Aug. 22, 1891. Neruda must be considered the head of the new romantic school of poetry in Bohemia, which originated in the fifties in opposition to the old "national" school. In the production of short, witty discourses on timely topics he has no equal among Slavonic writers. He disseminated free thought, and was therefore calumniated by the priests. His first poems appeared in the *Lumír* (1854) and the almanac *Máj* (May, 1858). He published: poems, *Hřbitovní kvítí* (Flowers from the Churchyard, Prague, 1858), reflections on contemporary life; *Knihy veršů* (Books of Verse, 1868), epic, lyric, and occasional; *Písně kosmické* (Cosmic Songs, 1878), songs of the universe, highly praised by German critics; *Ballady a romance* (1883); *Prosté motivy* (Simple Motives, 1884); *Zpěvy páteční* (Friday Songs, left in manuscript), patriotic lyrics. Dramas: *Francesca di Rimini* (1860), a tragedy, and comedies *Prodaná láska* (The Sold Love, 1879) and three others. Novels, stories, and sketches: *Arabesky* (1864; 2d ed. 1880); *Různí lidé* (Various People, 1871); *Obrazy z ciziny* (Sketches from Foreign Lands, 1872); *Feuilletony* (1876, *et seq.*); *Malostranské povídky* (Little Side Stories, 1878, 1883), stories of Prague life, his masterpieee. His collected works, edited by Ignát Herrmann, were published at Prague (1892–94). J. J. Král.

Ner'va, Marcus Cocceius: Roman emperor from 96 to 98 A. D. As a member of the senate he had won a good name for prudence and integrity, and after the murder of Domitian he was declared emperor. Though not an administrator of great ability or force, he reformed many of the worst abuses of Domitian's rule, and sueeeeded in a measure in "blending things onee irreconcilable, sovereignty and freedom" (*Tacitus*). Feeling, however, that he was not strong enough alone to withstand the hostility of Domitian's former instrument of servitude, the prætorian guard, he adopted and associated with himself Trajan, then eommander of the army on the Rhine. After three months of joint rule Nerva died suddenly (at the age of sixty-six) and was succeeded by Trajan. G. L. Hendrickson.

Nerval, Gérard de: See Gérard de Nerval.

Nerves [plur. of *nerve*, viâ O. Fr. from Lat. *ner'vus*, sinew, tendon, fiber, nerve, akin to Gr. *νεῦρον*, sinew, nerve]: the cords of communication between the eentral nervous system and the peripheral parts—the skin, internal surfaees, museular apparatus, organs of speeial sense. These cords vary in diameter from a microseopic dimension to 10 millimeters, their lengths also vary widely, from a few lines to 2 feet and more. Every nerve, whether mieroscopic or larger in size, is a eompound structure made up of nervous and connective tissue. For the struetural details, see Histology (*Nerves and Nerve-centers*). The functions of nerves are general and special. As general functions or properties are recognized—(1) eonductibility, (2) excitability. By the former, sensory impressions are conveyed from peripheral parts through nerve-fibers centripetally to the nervous centers; the spinal cord and brain are thus affeeted by the external world. Again, conduetion takes plaee in a eentrifugal direction, motor excitations being sent from the nervous centers to peripheral apparatus; the aetivity of the organism is made externally manifest. Exeitability is the property whieh nerves have of reacting to impressions independently of the nervous eenters—a property whieh, after section of a nerve, survives for about three days in the distal portion. The special functions of nerves are treated of under other headings. (See Sensation, Eye, Ear, Taste, etc.) A very important function of certain nerve-fibers is that relating to nutrition. It is known that when eertain fibers of a nerve are cut atrophy and degeneration take plaee in the parts supplied by this nerve. These fibers, known as *trophic fibers*, are probably present in most nerves, but especially in certain ones. Another highly important set of nerves are those whieh govern the blood-vessels and regulate their state of contraction or distention. In this way these nerves are also closely concerned with nutrition. Nerves are liable to various diseases, such as inflammation (neuritis), or tumors (neuroma), and often reeeive injuries. See Histology. Revised by William Pepper.

Ner'vii: an aneient Belgie race, probably of Germanic or Dutch stock, who desperately opposed Cæsar in several bloody wars (57–52 B. C.). Their chief towns were *Bagacum* (Bavay) and *Camaracum* (Cambray).

Nervous Diseases: affections of the nervous system—that is, of the brain, spinal cord, or external nerves. They may be either functional or organie. By functional nervous diseases are meant such as present no anatomical alteration of nerve structure to the naked eye or to other means of examination at our command. Though this group has been materially lessened in number by the more accurate methods of study recently acquired, there is reason to believe that there will always be left a certain number in which the disorder of nerve action is possibly rather of a chemieal than of a structural origin. Whether this be true or not, for the present there are certain nervous diseases in which structural changes are not discoverable. These are often spoken of as *neuroses*. Many vague eonditions are included in this group, and in the course of many organie diseases of other parts of the body nervous disorders of a functional, probably often toxic, nature are developed. The term *nervousness* is applied loosely to many distinct conditions; bnt there is a form of unstable nervous equilibrium which has occupied much attention of late, and whieh is variously known as nervous exhaustion, nervous break-down, and neurasthenia. This disorder assumes many forms, aeeording to the part of the nervous system involved and the causes at work. It is of immense importance to reeognize it as a distinct affection as well as its influenee in furthering other and organic diseases. Overwork, excesses, and disease are at the bottom of this, which is really a condition of wasted nerve foree. Epilepsy, hysteria, certain forms of insanity, and neuralgia are among the more serious nerve disorders of the functional kind. In all of them heredity plays a part—not necessarily in every case, but in many. The vices as well as the diseases of the aneestor are visited upon the offspring: the child of a drunken father may be an epileptic; the ehild of an epileptic insane. Alternately, from generation to generation, one and another funetional nervous disease erops out in families with this neuropathic taint, slight exciting causes sufficing to upset the originally weak nervous organization. On the other hand, the most stable nervous system may suecumb to unusual and improper strains.

The organic affections of the nervous system may be classified, as are the diseases of other organs, by the nature of the struetural changes. These may be anæmia, congestion, inflammation, degenerative changes, malignant growths, and the like, as elsewhere. An ideal system of elassification would take these changes alone into consideration. Unfortunately, however, the knowledge of the physiology and pathology of the nervous system has not yet reached the point where this is possible. We are constrained to consider nervous diseases from the clinieal standpoint, grouping together diseases whose external manifestations or symptoms are the same when in reality their essential nature is probably widely different. Thus we recognize St. Vitus's danee by certain symptoms, yet it is probable that this is not essentially a disease, but a form of expression of various diseases, just as dropsy may result from heart disease or disease of the kidneys. The individual diseases of the nervous system are considered under the names of the diseases themselves. William Pepper.

Nervous System: See Histology, Nerves, and Anatomy, Comparative.

Nes'selrode, Karl Robert, Count von: Russian diplomatist; b. at Lisbon, Dec. 14, 1780, where his father was Russian ambassador; entered very early on a diplomatic career; gained the confidence of the Emperor Alexander; was made Minister of Foreign Affairs in 1812, and took a prominent part in all the important negotiations with France and the allies at the close of the Napoleonie wars. He represented Russia at the Congress of Vienna, and afterward at the congresses of the Holy Allianee, usually favoring a peaceful and moderate policy. At Aix-la-Chapelle in 1818 he showed great zeal in the interest of Franee, urging that the occupation of that country by the allies should cease. For this he was rewarded by the Freneh Government, whieh added enormously to his wealth. He became vice-chancellor of the empire in 1829, chancellor in 1844,

and governed the relations of Russia with foreign powers to 1856, when, after signing the Peace of Paris, he retired into private life, and died at St. Petersburg, Mar. 23, 1862. His relation to Alexander I. and Nicholas depended partly upon hypocrisy; he had a great talent for concealing his own superiority and making others embrace his ideas, in the belief that they themselves had produced them. His *Autobiography*, written in French, and somewhat disappointing as to its contents, was published after his death.

Nessler, Victor: opera-composer; b. in Alsace, Jan. 28, 1841; was a pupil of Theophil Stern at Strassburg; studied theology, but gave it up for music; conducted several singing societies in Leipzig, and also at the theater from 1870 to 1879. He lives at Strassburg. His operas are popular, and include *Dornröschens Brautfahrt* (1867); *Irmingard* (1876); *Der Rattenfänger von Hameln* (1879); *Der Wilde Jäger* (1881); *Der Trompeter von Säckingen* (1884). He has also composed several operettas, cantatas, etc. D. E. H.

Ness, Loch: a lake in the county of Inverness, Scotland; in the valley of Glenmore; 23 miles long and 1½ miles broad. It communicates with the Moray Firth by the river Ness.

Nestor, The Chronicle of: nearly, if not quite, the oldest chronicle we possess of the early history of Russia. It is supposed, on no very good evidence, to have been written, or at least compiled, by a monk named Nestor, who was born at Kiev in 1066 and died in 1113. However that may be, it is a document of the greatest importance for our knowledge of the time it describes. Although it has the faults of other mediæval histories, with little pretense to literary merit or critical insight, the wide knowledge of the chronicler and the general trustworthiness of his facts put the work above most others of its class. It begins with the creation, and comes down to the year 1113, describing many events that occurred during the lifetime of the writer or were related to him by older eyewitnesses. The language is one of transition from the old Church Slavonic to Old Russian. The most ancient manuscript extant, the so-called Laurentian (*Lavrentinskiĭ Spisok*, facsimile, St. Petersburg, 1870), dates from 1377, and was not known to the editors of the first printed text (1767). A revised edition was published at Vienna in 1860. The chronicle has been translated into Bohemian, Polish, German, and French. The last French version is by L. Leger (1884). See the works of Schlözer (5 vols., Göttingen, 1802–09), Miklosich (1855), Sukholimov, and others. Nestor also left a story of the lives of certain saints, called the *Paterikon*. A. C. Coolidge.

Nestor [= Lat. = Gr. Νέστωρ]: son of Neleus and Chloris and King of Pylus in Messenia. When Heracles captured Pylus and slew all the other sons of Neleus, Nestor escaped death because he was absent at Gerenia. For this reason he bears the epithet of *Gerenian* in Homer. In his youth he fought against the Epeans of Elis, against the Arcadians, and on the side of the Lapithæ against the Centaurs. He also took part in the Calydonian boar-hunt, and in the Argonautic expedition. When, as an old man, he was ruling over the third generation of his subjects, it became necessary for him to join the expedition against Troy because his son Antilochus had been a suitor of Helen. At Troy he was one of the foremost of the heroes both in the council and the fray, being distinguished for his wisdom, justice, and eloquence. After the Trojan war he resumed the reins of government at Pylus, where Telemachus, when on his way to Sparta, found him enjoying a peaceful and happy old age. His house at Pylus was shown as late as the time of Pausanias. His name is still applied to the oldest and wisest councilor of a class—e. g. the Nestor of Philologians. J. R. S. Sterrett.

Nesto'rians: a portion of the Oriental Church, adherents of Nestorianism (dioprosopysm, two-person-ism), a Christological theory which takes its name from Nestorius, who was not its first nor ablest, but became its most renowned, representative. I. Nestorius was a native of Germanicia in Syria, became a pupil of Theodorus of Mopsuestia (393–428), and from him received the views characteristic of the school of Antioch with which his own name was to be identified. First a monk, then a presbyter in Antioch, his ascetic piety and gifts as a preacher caused him to be chosen Patriarch of Constantinople, the great calamity of his life (428–431). Like no few of the great heresiarchs, he began as a zealot of orthodoxy and as a persecutor of hereties. The new patriarch and his presbyter, Anastasius, whom he had brought with him, heard in Constantinople on every hand the darling phrase of the school of Alexandria, "Mary, mother of God"—a phrase which, except with explanations and limitations which totally changed its meaning, the extreme wing of the school of Antioch would not tolerate. The presbyter (428) assailed this phrase and the theology it represented. Proclus, the unsuccessful rival of Nestorius for the patriarchate, eagerly caught at the opportunity of assailing Nestorius through his presbyter. Nestorius stood by Anastasius. Dorotheus, the court bishop, pronounced an anathema against those who should style Mary the mother of God. At the festival of the Annunciation (429) Nestorius and Proclus preached in the same church against each other. The monks and people rose in fury, renounced fellowship with the patriarch ("We have an emperor, but no bishop," they said), and treated him with such insolence that in his anger he had the monks scourged, and at a local synod convened in 429 anathematized his opponents as Manichæans.

II. There entered now into the conflict the most formidable foe encountered by Nestorius. This was Cyril, Bishop of Alexandria (412–444). His theology was antagonistic to that of Antioch, and his see was the rival of Constantinople. Nestorius afforded him the opening for dealing one decisive blow against both the objects of his dislike. It was a contest between a great theologian and a shallow popular orator, between a sagacious, unscrupulous man of the world and a monk whose excellences and defects showed the traces of the passiveness and the narrowness of the cloister. Worst of all for Nestorius, there was a statement, necessarily crude in certain aspects, yet in the main strong and sharply defined, of the logical result of the dominant movement of the mind of the Church for ages, over against a set of clumsy propositions, which never touch the real question in discussion, but persistently misstate it, and whose precise force in various respects is an object of dispute to this hour. Cyril charged Nestorius with making two persons, of two natures, and thus denying the proper personal deity of Christ, making him in one person God, in another person man, and not, as he was in truth, in one person, the God-man, so that every act and every passion was personal, though it were according to one or the other nature. Nestorius was charged with teaching a moral, ideal, voluntary *connection* (συνάφεια) of two persons, instead of the natural, real, and inseparable *union* (ἕνωσις) of two natures into one person. At the synod of Alexandria (430) Cyril issued twelve anathemas, to which Nestorius replied in the same form.

III. The third Œcumenical Council was convened by the desire of both parties at Ephesus (431). The Emperor Theodosius II., who called it, was friendly to Nestorius. After a delay of fifteen days, in consequence of the involuntary detention of John and the other Syrian bishops, the council proceeded in their absence, in a very hurried way, to condemn and depose Nestorius and fifty bishops who sympathized with him. It acknowledged the anathemas of Cyril as the true doctrine of the Church. The delayed bishops held a separate council, and made decisions reversing all that had been done by the other. Nestorius voluntarily retired to his old cloister. The emperor attempted to unite the parties at the Council of Chalcedon (432), but without success. The deposition of Cyril, Memnon, and Nestorius had been pronounced in form by the emperor, but only in the case of Nestorius did it take effect. The overthrow of Nestorius made it safe for Cyril to accept the advances of the emperor toward a settlement of the controversy. A formula was prepared by Theodoret (433) which confessed that there is, without confusion, such a union of the two natures in the one Christ as to justify the language that Mary is the mother of God. This was signed by Cyril on the one side, and on the other side John of Antioch concurred in the anathema pronounced on Nestorius. Many of the earnest men on both sides, but especially those of the school of Antioch, were dissatisfied with the compromise. The emperor urged it. Theodoret yielded on condition that he should not be required to sign the condemnation of Nestorius. Meletius and Alexander continued their resistance, and were deposed. Nestorius had now lost all favor with the emperor. Even the poor shelter of the cloister was denied him, and he was hunted from one place of exile to another until his death.

IV. The Nestorian party did not, however, become extinct. Their school at Edessa, a daughter of the school at Antioch, trained men for the priesthood of the Church in

Persia. Ibas, Bishop of Edessa (436–457), was one of its great names. Thomas Barsumas, Bishop of Nisibis (435–489), labored to secure a permanent place for Nestorianism in Persia. He established a patriarchate in Seleucia, and when the school at Edessa was destroyed by order of Zeno (489) he founded a school at Nisibis. It was the policy of the Persian kings to foster the division between their own Christian subjects and the Christians of the Roman empire. The Nestorians established a distinct church government, and called themselves not Nestorians—which was the title by which their enemies stigmatized them—but Chaldee Christians, with reference to their earlier home and the language which they employed in their church service. At the Council of Seleucia-Ctesiphon (498–99), a statement of their doctrine and of its divergency from what claimed to be orthodox was made, and the Church of Persia was formally separated, making its doctrinal basis the assertion that Christ consists of two substances. two natures, and of two persons or hypostases, in one "partsupo" of filiation, the natures continuing to subsist unchanged, and the persons also. The term "partsupo" (parsopa) has been the subject of a good deal of dispute, as more than any other determining the orthodoxy or heterodoxy of the Nestorians. There is no reason to doubt that it is formed from the Greek *πρόσωπον*. The Peshitto-Syriac uses it to render that word in its sense of face, appearance, outward appearance, manifestation of presence, person (in the popular sense), and in the Nestorian usage it often corresponds with Asseman's definition of it, "nature manifested to the senses;" but in connection with "filiation" it seems to correspond very nearly with what is called "hypostatical relation," and would mean that though there are two persons in Christ, there are not two sonships; but that the human derivative sonship coincides so far with the divine essential Sonship as to stand in the unity of the *relation* of the Son, though not in the unity of his *person*—in unity of the partsupo, but not in unity of the qitomo (chauma-hypostasis). The metaphysical difficulty running through the entire Christological controversies of the ancient Church connected itself with the identification or distinction of the ideas of nature and person. Nestorianism affirmed the concrete identity of the two. (See Christology, Monophysites, and Monothelites.) See Weismann, *H. N. J. I.*, 632; Schröckh, *K. G.*, xviii., 311; Badger, *Nestorians and their Rituals* (1852), ii., ch. vi.

V. In the sixth century Nestorianism spread into Egypt and Arabia, into India, and in the eighth in China. At the beginning of the eleventh century there were Nestorians in Tartary. (See Prester John.) The Nestorian patriarch Zesuzabes entered into a formal compact first with Mohammed, and subsequently with Omar. During the Arabian domination the high places of state were open to them. In the tenth century they were oppressed, and from that time there has been a decline in their intellectual and theological activity.

VI. The Nestorians remained under one ecclesiastical head until the sixteenth century. In the thirteenth Innocent IV. and Nicholas IV. had made attempts, which were not successful, to bring about a union of the Nestorians with the see of Rome. The influence of Rome, however, was sufficient to divide them in the choice of their iazelich (the catholic—their name for their patriarch) in 1551. One party favored Sulakas, who, under the name of John, had been consecrated by Julius III. The others adhered to Simeon Barmas. The partisans of John went over to the Church of Rome, and form the United Nestorians, or, as they are frequently named, giving them the title of the ancient undivided body, Chaldee Christians. They number about 90,000 souls, acknowledge the primacy of the pope and the seven sacraments, and observe the ritual of the Greek Church. Their patriarch has his see at Diarbekîr. The non-united Nestorians acknowledge three sacraments only—baptism, the Lord's Supper (in both kinds and without solitary masses), and ordination. They have been styled for these and other reasons "the Protestants of the East." They have no pictures or images. Their clergy are allowed to marry. They have a population of about 70,000. The internal energy which once marked the Nestorian churches has almost vanished. The Nestorians of India are called the Christians of St. Thomas, or Syrian Christians. Those on the coast were brought into nominal union with the see of Rome in 1599. These have nearly 100 churches, a population of about 150,000, and a theological seminary at Pulingunna. The Christians of St. Thomas in the interior declined the union with the pope, and when a renewed effort was made in 1653 to bring them into it they fled to the Ghauts, and placed themselves under the protection of the rajah. They have between sixty and seventy churches, and number about 70,000. The Nestorian monks and nuns observe the rule of St. Anthony. Their center is the cloister of Hormoz. Their vows are not strict. It is possible to be freed from them and to marry. In addition to their religious duties, the monks occupy themselves with manual labor; lay sisters provide their support. Some of the cloisters have the monks and nuns in separate cells, under one roof. Flesh, butter, and milk are forbidden. The costume of the brethren and sisters consists of a black upper robe and skirt. The brethren wear a blue turban, the sisters a black veil.

VII. Missionaries from the U. S. have labored among the Nestorians in Turkey and Persia. The most distinguished has been Rev. Dr. Justin Perkins, who began work in 1834. The Kurds and Turks waged a war of extermination against the Nestorians of the mountains in 1843, and as a result the Protestant missions were swept away in 1846. Mission efforts have since been renewed with success.

VIII. The older literature is given in Walch, *Bibl. Theol. Sel.*; Winer, *Handb.*; and Danz, *Univ. W. B.* See Smith and Dwight, *Researches* (1833); Grant's *Nestorians* (1841); Wiggers, *Statistik* (1842); Perkins (1843; also in 1861); Wingard, *Pres. State of the Church* (from the Swedish, 1845); Layard, *Nineveh* (1849); *Christian Year-book* (1868); R. Anderson, *History of Missions to the Oriental Churches* (1873); Laurie, *Woman and her Saviour in Persia* (1863); *Dr. Grant and the Mountain Nestorians* (1874); Gernan, *Die Kirche der Thomaschristen* (1877); Legge, *Nestorian Monuments in China* (1888). Revised by S. M. Jackson.

Nests of Birds [O. Eng. *nest*: Germ. *nest* < Teut. *nest-* < Indo-Eur. *nisdos* > Sanskr. *nīḍa-*: Lat. *nīdus*]: While nest-building species are found among all classes of animals, there is no other group whose members so universally construct nests and are such adepts at the art as birds. There are, however, many species which build no nest whatever. Some, like the murre (*Uria*) and razorbill (*Alca torda*), deposit their eggs on the rocky shelves of sea-washed cliffs; others, like some goatsuckers, lay their eggs directly on the ground; others occupy deserted nests or those from which they have driven away the rightful owners; while a few, including the European cuckoo and the cowbird (*Molothrus*) of the U. S., drop their eggs in the nests of other birds, and leave their young to the care of these adopted parents.

While the ends attained by building a nest are various, it may be said that primarily the object is to furnish a safe receptacle for eggs and young, a place where the former can be kept together in small compass, so that they can be readily covered by the parent, and where the latter will be measurably secure from accident until old enough to shift for themselves. Protection from enemies, either by concealment or inaccessible location, protection from the weather, and retention of heat are also among the advantages of a nest.

Attempts, more or less fanciful, have been made to group birds according to the structure or location of their nests, but such artificial systems have failed; birds nearly related often differ in their mode of nidification, while even one and the same species may, under varying conditions, alter the manner of building its nest.

In spite of these variations we may, however, keeping in mind that the division is largely artificial, divide birds roughly into two groups—tree-builders and ground-builders.*

The "ground-building birds," including all that occupy its surface or penetrate within it, and those that resort to high cliffs and to remote islands, comprise not far from one-half of all the species, including all the diving birds, nearly all the swimmers, and a large proportion of the shore-birds and waders. The ground-breeding birds that build within the earth are separated into a group by themselves, known as "miners." The latter include both those which dig out their own burrow and those that make use of natural cavities or of holes made by other animals. Prominent among the true "miners" is the common bank-swallow (*Clivicola riparia*). This familiar species, abundant in both the old and the new hemispheres, is found in large colonies, and excavates its burrow on the steep face of a sandbank or a gravel-bed. Its hole is usually not more than 2½ or 3 feet in depth, yet where its excavation has been dug through a bed of coarse gravel the channel has been known to be 9 or 10 feet deep; but this apparently inconsistent action is ac-

* The terms used in this article are those used by Prof. Rennie in his work on *The Architecture of Birds*.

counted for by the supposition that the swallow digs on until it finds a locality sufficiently safe for its nest, which is not the case where the gravel is large and coarse, and liable to fall down upon and break the eggs. Where the firmness of the sand permits, these holes are as circular as if planned with a pair of compasses. The galleries are usually more or less tortuous, and are at their termination enlarged into a chamber in which is placed a loose but soft and warm nest. The kingfisher (*Ceryle alcyon*), another typical miner, mines a long tortuous gallery about 5 feet in length, which is sometimes wholly in one direction, but usually turns at a right angle, to the left or right, when at the depth of 3 feet; at the end of the gallery it excavates a small chamber, in which it deposits its eggs on the bare earth. Occasionally, if the earth is damp, it makes a small floor of miscellaneous materials. The European kingfisher (*Alcedo ispida*) very commonly makes a nest of fish-bones, which, being indigestible, are rejected in good-sized pellets. The common fork-tailed petrel (*Thalassidroma leachii*) of the coast of the U. S. is a very interesting "miner" of peculiar habits. It digs a winding and sometimes intricately tortuous burrow, often of great length, at last causing its channel to descend and to double directly under its first gallery, and makes a large chamber at its terminus, which frequently is directly under the opening, though separated from it by the intervening floor of earth. It makes no nest, but lays its single egg on the bare soil.

The burrowing owl of North and South America (*Speotyto cunicularia*), though able to dig for itself when necessity compels, is usually a parasitic miner. There are two or three races, but their habits are identical. The northern sub-species is found W. of the Missouri valley from California to Mexico. It lives in communities, and is often very abundant. It takes possession of the burrows of several species of small quadrupeds where these offer, chiefly occupying those of the prairie-dog. The story that owl and prairie-dog dwell harmoniously together is a myth, the truth being that a large portion of the food of the owl is formed of young prairie-dogs, even the adults sometimes falling victims. In Texas it dwells in deserted rat-holes, and in Northern California in the burrows made by two large species of ground-squirrel. In South America, wherever the viscacha is found, this owl makes use of its burrows. In the Banda Oriental, according to Darwin, it depends upon its own labor, and excavates its own burrow on any level spot of sandy soil.

Another marked group of birds which occupy the ground are those which usually construct no nest. In this may be included birds of very different forms and habits. The whippoorwill (*Antrostomus vociferus*) and all the kindred genera, so far as is known, deposit their eggs on dry beds of leaves in the dark recesses of the forests; the more common nighthawk usually leaves its eggs, that resemble pebble-stones, on the bare rock, to which in color they are closely assimilated. In the vicinity of cities it sometimes deposits its eggs on the flat roofs of stores and dwellings. The loon (*Colymbus torquatus*) chooses a receptacle for its egg on the edges of islands in fresh-water lakes, so near the water that if disturbed it can plunge from its nest directly into and under it. Other divers, as the auks and the guillemots, nest in communities, using the bare surface of rocky cliffs or crevices in the rocks, but make no nest. The peculiar, pear-shaped egg of these birds has a direct relation to the places on which it is deposited, since, by virtue of its peg-top form, the egg when disturbed rolls about in a circle instead of rolling off the rock. The gannet, which also breeds on rocky ledges and lays an elliptical egg, builds just enough of a nest to keep the egg in place. A few of the *Alcidæ*, like the puffins, burrow into the ground in sandy places to shelter themselves and their eggs from birds of prey and gulls. The penguins breed in great colonies on low rocky or sandy islets, constructing a slight nest of pebbles, barnacles, seaweed, bits of wood, or almost anything that may offer. The gulls and terns nest on the ground, but differ in regard to nest, some building an elaborate one, and others having hardly more than a hollow in the bare sand. Nearly all the waders make their nests on the ground, and all or nearly all of these are usually a mere depression. They are usually situated near marshy grounds or water, though the plovers and a few other kinds prefer higher and dry situations. The grebes construct the foundation of their nests of fresh aquatic plants, which they obtain by diving, and finish with dead weeds, building quite a bulky structure. The nest is placed in marshes, sometimes on a mass of plants growing so low in the water that the nest is floated off by a flood. This has caused the impression that they purposely build floating nests, but this is not the fact. With very few exceptions nearly all the North American sparrows breed on the ground. All the species of the several genera of *Ammodromus*, *Junco*, *Plectrophanes*, *Zonotrichia*, *Melospiza*, etc., with only individual exceptions, nest on the ground, as also do nearly all the titlarks, true larks, buntings, and similar forms, the world over. The common house-sparrow and all its congeners nest in various manners, but not on the ground. Some species exhibit the singular peculiarity of always nesting on the ground in certain localities, and in other regions as invariably building in bushes or trees high above it. Thus the prairie lark-finch in Illinois and Wisconsin always nests on the ground. On the Pacific coast the same species usually nests in trees. The same is noticed in the black-throated bunting, which in the E. of the U. S. nests on the ground, but in the Mississippi valley usually a few feet above it. All the *Spizellæ*, with one marked exception, nest in trees or bushes. *S. monticola*, although known as the tree-sparrow, nests in bushes or on the ground.

Fig. 1.—Tree-sparrow (*Spizella monticola*).

A few of the slender-billed oscines always build on the ground, but some nest indifferently on the ground or in different situations. The common brown thrush of North America (*Harporhynchus rufus*) is a remarkable instance of this, in some localities usually nesting upon the ground, and in other districts always above it. The gray-cheeked thrush (*Turdus aliciæ*) nests sometimes on the ground, but occasionally in more or less elevated situations. The robin redbreast (*Erithacus rubecula*) of Europe nests naturally on the ground, but there are many instances recorded of striking deviations from these selections.

Among the American thrushes, *Turdus fuscescens*, *T. pallasi*, *Cinclus mexicanus* always nest on the ground. All the species of the genera *Myiodioctes*, *Oporornis*, *Seiurus*, *Mniotilta*, *Geothlypis*, *Helmintherus*, and *Helminthophaga*, except *H. luciæ*, build with rare exceptions on the ground. The large group of *Dendroicæ*, except *D. palmarum*, nest in elevated situations so far as is known. Many ground-building birds resort to ingenious means of concealment. The common quail, the meadow-lark, and other species sink their nests by the side of a high tussock of grass, and form an archway over the nest with the natural growth. The common snow-bird and the savanna-sparrow often build their nests on the steep side of an excavation under a projecting sod. The song-sparrow and the grass-finch often construct a covered approach to the nest, which is hidden in high grass or by bushes. The Canada fly-catcher, so far as is known, always selects a large tussock of grass in the midst of boggy and almost impassable ground.

The sea-ducks, swans, geese, the gulls, terns, albatrosses—in short, the marine birds in general—resort to the ground to construct their nests. A very few build in trees, either exceptionally as individuals or as species, and in the former class may be mentioned the North American herring-gull (*Larus argentatus smithsonianus*), which sometimes resorts to trees in localities where its nest on the ground has been repeatedly plundered. Wood-ducks of all kinds, and several of those that frequent lakes and rivers, nest in hollow trees. A few, like the dusky duck, nest indifferently on trees or on the ground, usually selecting the latter. Several kinds of sea-ducks are noted for adding to their nests a warm lining of the softest down plucked from their own breast. This is done by the long-tailed duck, by the smew, by the king-duck, the Pacific eider (*Somateria V.-nigra*), and by the common eider. Of these, however, the smew always nests in hollow trees. Owing to the commercial value and importance of its down, the eider (*Somateria mollissima*) is cherished and protected in Iceland and on the northwestern coast of Europe. It usually constructs in the first place a rough platform nest of various marine plants, both sexes working in concert, piling up a rude foundation of drift. Over this rough mattress the female spreads a bed of the finest down, freely taken from her own breast.

Sometimes two females make use of the same nest, each contributing a supply of down and five eggs. Birds of very different species sometimes make a common use of the same nest.

Very many shore-birds, waders, etc., and also birds which nest on the ground in swampy places, construct large and elaborate nests of reeds, rushes, and other water-plants in a moist and decaying state, chosen because of their pliable condition, and not because a moist nest is desired. On the contrary, notwithstanding the prevalent error, these nests are not used until they are dry, and are abandoned when, owing to rains or floods, they become so damp that they can no longer be occupied. Such nests as those of the willet and the bitterns are of this description. Very many of the land-birds of the U. S., as the song-thrush, the robin, etc., use moist materials in building their nest, but occupy it only when it has become dry. The robin (*M. migratoria*) works from preference in rainy weather. All or nearly all the *Gallinæ* occupy nests on the ground, some making a rude nest, others only using a hollow in the earth. The wild-turkey uses great precaution to conceal her nest alike from birds of prey and prowling animals, and from her own mate, hostile to his own progeny. When forced to leave them in search of food, she covers her eggs with leaves, and if approached when on the nest the mother will die sooner than leave her charge.

By far the most remarkable group of ground-nesting birds are the "mound-builders" of Australia and the eastern archipelagoes of Asia, known as the brush-turkey in Australia. All the species of this group belong to the family MEGAPODIDÆ (*q. v.*), and are all somewhat remarkable for the manner in which the hatching of their eggs is effected. The *Talegalla lathami* when about to deposit her eggs collects a large heap of decaying vegetable matter as their depository, and trusts entirely to the heat engendered by the process of decomposition for the development of her offspring. The *Megapodius tumulus* constructs large mounds of earth, varying from 20 to 60 feet in circumference and from 5 to 15 feet in height. In these the eggs are carefully buried to the depth of 6 feet. Of the other species of this singular family, some merely deposit their eggs in holes excavated on the seashore to the depth of 3 feet, but nearly all the members of this family are more unequivocally mound-builders.

Several species belonging to different genera have been grouped together in some systems as "masons," so called because they knead together, in the manner of the house-builder, a rude mortar of tempered earth or clay. It is not a well-marked group, and all its members might claim a place in other connections. The cliff-swallow (*Petrochelidon lunifrons*) of North America is a typical "mason," building a remarkably symmetrical nest of plastic earth or clay by the united efforts of several working in concert where they are in societies, sometimes by only the solitary pair. The normal shape of the nest is that of an inverted retort, the larger portion being attached to the cliff or side of a building. It is arched over at the top, and extends down in front in a covered passageway open at the bottom. In the wild state on the sides of high cliffs the nest is an elaborate and ingenious structure, sheltering its inmates from the weather and from their enemies. Under the shelter of man all this protection is not needed, and under the eaves of barns and other buildings these birds build a simpler and equally safe nest, but always of kneaded earth. The barn-swallow of

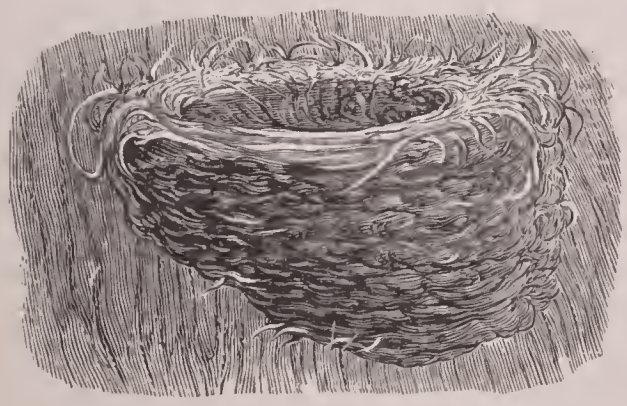


FIG. 2.—Barn-swallow (*Chelidon erythrogaster*).

North America, the house-swallow of Europe, and several other species of *Hirundines* are also true masons. The barn-swallow (*Chelidon erythrogaster*), which once nested only in caves or under overhanging cliffs, now attaches its elaborately wrought nest to the sides of rafters in barns, under the protection of their roofs, and even to the porches of dwellings. These are made of the finest mason-work, and put together in the most artistic manner, piece by piece, with an order and a regularity quite curious. Attached to the nest there is often an equally elaborate extra platform designed for the use of the mate, on which it can sit when not collecting food, and where, when the young no longer require the cover of a parent, the latter may stay and keep them company.

The term carpenters is applied to the members of a small but noteworthy group of birds, from the fact that with their chisel-like bills they hew for themselves holes in the trunks or limbs of trees. At the bottom of these holes, which may be more than 3 feet in depth, the eggs are laid without other nest than the few fine chips which have been left. The woodpeckers are typical carpenters, and conspicuous among them is the great ivory-billed woodpecker of the Southern U. S., a species now become very rare. This bird digs into some of the largest and hardest trees of the forests, being particularly partial to the cypress, and a pair have been known to cut into the living wood to a depth of 5 feet. The wrynecks (*Iunx*), the nuthatches, and some of the titmice are carpenters on a smaller scale.

Among birds which breed in holes of trees, but do not excavate these dwellings themselves, are the blue-bird, the tree-swallow, some of the titmice, owls, parrots (with one exception), and the great hornbills of the Old World.

Certain classes of birds build what are styled "platform nests." These are found among only a few families, and their character varies very essentially, some being remarkably large structures, others being of a frail description. Of the one kind are the huge platform structures of eagles; of the other, the slight nests of the doves and the American cuckoos. All or nearly all the eagles are true platform-builders, the only exceptions being those that use cliffs as substitutes for platforms and add little to their natural advantages. Others, like the white-headed eagle of the U. S., when they build in trees, construct large and massive structures of 5 or 6 cubic feet, and almost as solid as the natural rock platform of the golden eagle. In striking contrast with these are the slight nests of nearly all the *Columbidæ*, the cuckoos, etc. These are platforms of the frailest description, made of a few sticks loosely laid together, and as loosely crossed with other sticks, the whole rudely made and apparently not strong enough to hold together and preserve the egg from falling to the ground. An example is the nest of the Carolina dove. More substantial than these are the platform nests of nearly all the species of true herons, but not equal to those of birds of prey in size or strength, though like them having no cavity or depression in the center. The herons known as bitterns, however, are exceptional, and usually nest on the ground.

FIG. 3.—Carolina dove (*Zenaidura macroura*).

A large group of nest-makers are classed together by Prof. Rennie as "basket-makers." It is not very well marked, and its members are not always distinguishable from other

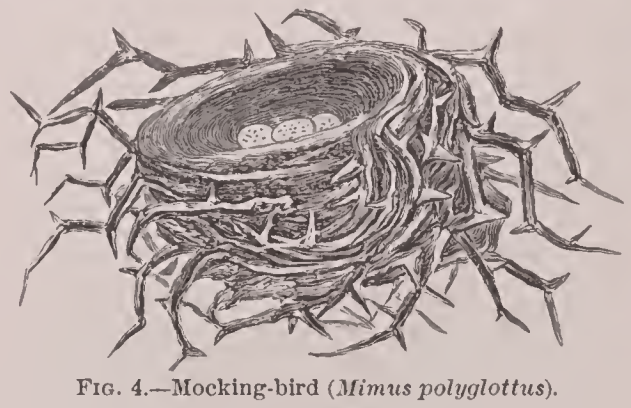


FIG. 4.—Mocking-bird (*Mimus polyglottus*).

groups known as "weavers," "tailors," and "felt-makers," but it is designed to include birds which, like the common mocking-bird of the U. S., the cedar-bird, the Bohemian chatterer, the European bullfinch, and others, construct a rude basketwork of sticks, resembling the common baskets of osier. In these are placed more carefully woven nests of

softer materials. Some of these are mere open baskets placed on a flat limb; others are interwoven with the smaller twigs of a branch. The mocking-bird builds as an outer framework for its nest a strong barricade of brambles and thorns, and places within this rude basket an elaborately woven structure made of the finest roots. The common bullfinch (*Pyrrhula vulgaris*) of Europe builds a typical open basket placed on a platform of her own rearing of birch-twigs, or on a flat branch of a spruce-tree she weaves a loose basket of flexible, fibrous roots. The yellow-headed blackbird (*Xanthocephalus xanthocephalus*) exhibits great ingenuity, variety, and skill in the construction of elaborate basket-like structures. The *Turdus bicolor* of Southern Africa unite in communities to build a huge basket-like structure, with numerous cells or apartments for the nests of different pairs. These are like an aggregation of smaller baskets, each a separate nest with a tubular gallery leading into it from the outer side. The number of these cells varies from six to twenty, and over all is woven an inverted basket for a roof, wrought of twigs. We include among basket-makers the remarkable nest of the Mexican fly-catcher (*Pitangus derbianus*), more striking for the use made of it by other and smaller species than for its own peculiarity of structure and disproportionate size. This bird, not larger than the king-bird, builds a structure sometimes 3 or 4 feet in length and about 2 in breadth. The cavity is on the side. The structure is loosely made of coarse materials, twigs, dried plants, leaves, etc. In its chinks and cavities smaller

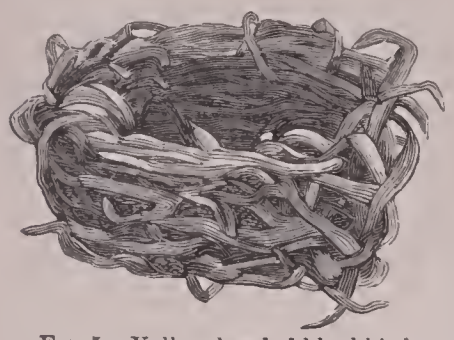


FIG. 5.—Yellow-headed blackbird (*Xanthocephalus xanthocephalus*).

FIG. 6.—Magpie (*Pica caudata*).

birds seek shelter, and are permitted to build their own nests in peace and safety, the warlike proprietor of the whole keeping all birds of prey at a distance. The magpies, both of Europe and America, build a curious basket barricade around their nest, evidently as shelter against birds of prey.

The "weaving" birds construct nests, for the most part, somewhat pensile, but of very various styles and shapes. Among the most familiar of these may be mentioned the orchard oriole and the Baltimore oriole of Eastern North America, and Bullock's oriole of the Pacific coast. All the orioles are first-class weavers, and their nests partake somewhat of the peculiarities of the basket-makers and the so-called tailor-birds, and are all conspicuous for the wonderful skill with which they are wrought, their beauty of design, and the strength with which the materials are intricately woven together. The vireos, of which there are in North America sixteen different species, all, so far as we know, construct a curious pensile nest, hemispherical in shape and peculiar to the genus. Simpler in design than the nests of the *Icteri*, they are still structures of remarkable beauty and ingenuity. They are wrought into the shape

FIG. 7.—Solitary vireo (*Vireo solitarius*).

of a deep cup, and are usually suspended from the fork of two twigs, around and over which the upper margin of the nest forms a continuous covering. Working down from this fold, the materials are neatly woven into a hemisphere truncated at the top. The pensile grosbeak of Africa (*Ploceus oryx*) suspends a very curious basket, woven of straw and reeds, from the end of a branch, usually over a stream of water. This is in shape like an oblong bag, with the entrance from below. Within and on one side of this is the real nest. These birds build in communities; Pringle, the African traveler, mentions seeing twenty together. Their obvious design is to secure the offspring from the dangers of the weather and from various enemies. The entrance, always from below, is through a cylindrical gallery 15 inches in length, that hangs from the spherical nest like the tube of a chemist's retort. The bottle-nest sparrows of India have nests constructed with equal ingenuity. These are made pendent to branches of trees by small loops, and are formed of a peculiar kind of long grass woven together in the shape of a bottle. These swing from the ends of long flexible branches, and effectually secure their inmates from harm. Their entrance is from below. Besides this curiously pensile nest, the male bird also constructs an elaborate covered roost, which is wrought of the same kind of grass. This is a bottle-shaped basket, having a thatched roof, which covers a perch open at the bottom and is suspended from the small end or neck of the bottle. This roost is occupied by the male, and hangs by the side of the real nest, in which are his mate and family. The object is protection from sun and rain, and from various kinds of enemies. Another remarkable species of the weaving grosbeaks (*Loxia socia* of Linnæus) greatly excel the remainder

FIG. 8.—Bottle-sparrow (*Ploceus bengalensis*).

of the family, at least in the extent of their workmanship. They build an enormous structure, in shape resembling an open umbrella, wrought, in the manner of a thatched roof,

FIG. 9.—Social weaver (*Ploceus socius*).

of Bushman's grass without any intermixture, and so completely woven as to be impervious to rain. Under the shelter of this canopy each pair builds its own particular nest, placed under the eaves. Each nest is 3 or 4 inches in diameter; they are all in contact with one another around the eaves, and each nest has its own individual aperture forming the entrance.

The tailor-bird of India, which enjoys a somewhat exaggerated reputation for ingenuity and skill, owing to accounts now believed to be more fanciful than real, is at least known to bend over one end of a leaf and to sew it securely to the stem-end, and to place its tiny nest in the hollow thus created. The parula warbler (*Compsothlypis americana*) constructs its nest of the long gray lichens of the northern forests of the U. S., gathering up and fastening together in a loop the long hanging branches of this

FIG. 10.—Yellow-throated warbler (*Dendroica dominica*).

moss to make its nest, often using no other material, and in this manner creating a beautiful structure, the entrance to the cavity being usually on one side. Even more strikingly beautiful is the nest of the yellow-throated warbler of the southern parts of the U. S. (*Dendroica dominica*), of which the cut presents a remarkable illustration. Here the long pendent moss of the swamps is carried up and fastened in loops; mosses 3 feet in length are fastened together into a woven bag of half the original length. In the center of this curious structure, the natural appearance of which is unchanged, is hidden the tiny nest wrought of the softest vegetable down.

FIG. 11.—Chaffinch (*Fringilla cœlebs*).

Another interesting group, styled by Prof. Rennie the "felt-makers," is distinguished not so much by the architectural peculiarities of the nests as by the remarkable changes made in the character of the materials used. These are included in only a few families, but the latter are individually very numerous. The group includes two kinds, the true felt-makers, who make a composite felt, and those that use only a single material. There is, however, very little difference in the appearance of the product, and many species indifferently use a single or a composite felting. The finches of both the Old and the New World are typical felt-makers. Of these the canary, the several goldfinches, and the chaffinches may be mentioned as examples. Fine wool, of either vegetable or animal origin, serves as the base of this felting, and with this various other substances, such as mosses, lichens, spiders' webs, bits of cotton, bark, etc., are intermingled, and with wonderful exactness felted and compacted together into a texture apparently homogeneous and uniform. With some, these felted nests are wholly composed of this single material, as in the nests of various humming-birds, where, besides an external covering of lichens, a means of concealment rather than an essential part of the nest, the whole is made of this one material. In the nests of the finches there is always an external framework, filled out and lined with felting. In these greater strength is given to the fabric by binding the whole with strong wiry grasses, fibrous roots, etc., and especially by binding the nest firmly into the fork by twining among the twigs bands of strong felting. The nest of the goldfinch (*Spinus tristis*) of the U. S. is a striking illustration. All the *Polioptilæ* of North America and the

FIG. 12.—Goldfinch (*Spinus tristis*).

FIG. 13.—Black-tailed gnatcatcher (*Polioptila californica*).

West Indies are superior felt-makers. Their nests are large for the birds, remarkably deep, and have thick soft walls made of downy materials, but abundantly strong for the oc-

cupants, which are among the smallest American species. The nests are models of architectural beauty and ingenuity of design. They are deep and purse-like in shape, not pensile, but interwoven with small upright twigs, and usually are placed near the tree-top, swaying with every breeze, the depth of the cavity and the small diameter at the opening preventing the eggs from rolling out. The black-capped species of St. Lucas (*Polioptila californica*) uses the living tendrils of a wild vine as the framework of its nest, which is interwoven with the vine so intricately as to be rendered inseparable.

Prof. Rennie recognizes as a distinct group what he calls "dome-builders," but nearly all might easily be ranged in one of the other groups. They consist of a great number of species and belong to a variety of families, and either occasionally or uniformly construct covered nests entered by holes in their sides. With many species the domed cover of their nest is not a uniform feature. The Carolina wren at times builds a domed nest, and quite as frequently constructs one open at the top. The golden-crowned thrush and the black and white creeper have almost always a covered nest, yet both occasionally build without any cover. The house-sparrow usually has an open nest, but also occasionally builds one with an arched covering. In the West Indies, and in tropical countries generally, domed nests are a predominating feature, and are undoubtedly an instinctive provision against the violence of tropical rains. Travelers in South America describe the nest of a common species known locally as the baker-bird, or oven-bird (*Furnarius*), so called because it constructs a nest in the form of a baker's oven. This is placed in the most exposed situations, but at a considerable height. The nest is described as made of tempered clay, and as having a lateral opening twice as high as wide, and in the interior divided into two chambers by a partition beginning at the entrance.

The North American water-ouzel, or dipper (*Cinclus mexicanus*) builds a domed nest of a very peculiar character. It is hemispherical in shape, of uniform contour, and usually built on a rock on the edge of a mountain-stream. Externally, it is composed of green moss in a living state, having within a strong, compactly built apartment arched over and supported by twigs, with a cup-like depression at the bottom composed of fine roots and twigs firmly bound together. These structures are a little less than a foot in diameter and from 6 to 8 inches in height. Both species of cactus-wrens of California and Cape St. Lucas build curious domed nests of great size and purse-like in shape. These are composed of long flexible grasses, and are lined with feathers. Both species of *Cistothorus* build circular domed nests, that of *C. stellaris* ingeniously interwoven, externally of long wiry grasses and finer sedges, lined with soft vegetable down. That of *C. palustris* is a stronger structure, built in higher situations, of coarse sedges firmly interwoven and cemented with mud.

FIG. 14.—Marsh-wren (*Cistothorus palustris*).

Another singular peculiarity, found only in species belonging to a few genera, is the employment of cement-like secretions in the construction of their nests, and these are grouped together as "cementers" in certain systems. In some cases it is difficult to determine whether the birds generate their own cement or make use of adhesive substances that exist in nature. We find the nests of humming-birds and of several other kinds of birds covered over with a coating of lichens and mosses, and thus made to resemble the moss-covered bark of the trees on which they are built, and apparently this covering is made to adhere by means of some adhesive cement; but that this is secreted by the bird itself we do not know. We infer, rather than know, that certain swallows temper the earth of which they construct their nests with their own adhesive secretions. In regard to other cases our knowledge is more positive. The chimney-swallow fastens its simple cradle of twigs against the inner walls of a hollow tree or the inside of the chimney, and glues together, twig by twig, the nest itself, by means of a powerful cement which it secretes from its own throat. The famous edible nests of the little Bornean swift (*Collocalia fuciphaga*), formerly supposed to be made of partly digested seaweed, are now known to be constructed entirely of mucus. These nests, which are placed against the rocky sides of caves, are shaped something like a section of a shallow, thin cup, and when new are white and translucent. They darken and deteriorate with age, nests which have been used bringing a much smaller price than those which are perfectly fresh. For other nests, see BUNTING, DICÆUM, CAPE TITMOUSE, etc.; and for further information, see Rennie, *The Architecture of Birds* (London, 1831); Wood, *Homes without Hands* (London, 1865); Davie, *Nests and Eggs of North American Birds* (Columbus, 1889); Bendire, *Life Histories of North American Birds* (Washington, 1892); Newton, *A Dictionary of Birds* (London, 1893–94).

Revised by F. A. LUCAS.

Netherlands, The (Dutch, *De Nederlanden*. Fr. *Les Pays-Bas*): a kingdom of Western Europe; situated between lats. 50° 45′ and 53° 35′ N. and lons. 3° 24′ and 7° 12′ E.; bounded E. by Germany, S. by Belgium, and W. and N. by the North Sea, which indents the coast with two large inlets, the Zuyder Zee and the Dollart; area, 12,656 sq. miles. The country is also known as *Holland*, but *The Netherlands* is its official designation. It has a number of colonies, which are divided into two groups, the Dutch East Indies and the Dutch West Indies. The former includes Java, Madura, Bali, Lombok, Banca, Billiton, the Moluccas, Timor, Sumatra, Celebes, and parts of Borneo and New Guinea; area, 719,674 sq. miles; pop. 31,614,000. The Dutch West Indies include Dutch Guiana, or Surinam (see GUIANA), and Curaçao; area, 46,463 sq. miles; pop. 120,000. All these colonies are treated separately; see JAVA, MADURA, etc.

Physical Features.—As the name indicates, the Netherlands are low and flat, and form the delta of the rivers Rhine, Maas, and Scheldt; there are no mountains, but the naturally formed sandbanks or dunes on some parts of the seacoast attain a considerable height. The country is intersected by the rivers mentioned and their branches, the Waal, Yssel, Leek, and Vecht. Where these are bordered by cities they are called *gracht*, or *haven*, and serve for internal navigation. Along some parts of the seacoast and along all the rivers there have been constructed for protection against inundation huge dikes, 30 feet high, 70 feet broad at the base, some of Norwegian granite, but the majority of clay or peat, strengthened by timber structures. Among the canals, of which there are 1,907,170 miles, serving partly for drainage, partly for communication, the most important are the NORTH HOLLAND CANAL, the NORTH SEA CANAL (*qq. v.*), and the New Waterway, built 1870–85, connecting Rotterdam with the North Sea. A few lakes are found in the province of North Holland, but HAARLEM LAKE (*q. v.*), formerly the largest of them, was drained in 1839–52.

Geology.—The greater part of the country is of alluvial origin; minerals are nowhere found, except a kind of clay well adapted for tiles, brick, and pottery, and a little coal in the province of Limburg, where the mines belong to the state.

Fauna.—All the animals found in Western Europe are indigenous in the Netherlands; wolves appear sometimes, but only during winter and in the sparsely inhabited districts; foxes are plentiful; rabbits abound in the sandy regions, and often do great damage by burrowing through the dunes. Among domestic animals the cattle rank very high, both as milk producers and for their excellent meat. The horses are big and strong; the Frisian horse, of the Percheron type, is much sought for by breeders, as are also the trotters of the northern provinces.

Climate.—The climate is temperate but variable, and generally far from pleasant. Fevers of a malarial character, colds, and bronchial and pulmonary affections are apt to follow on the sudden changes in winds and temperature. The country is fairly healthful, however, except in districts where the soil is marshy, as in much of the province of Zealand.

Soil.—A careful estimate shows that 34 per cent. of the surface consists of good and 2 per cent. of inferior clay land; 45 per cent. is poor and partially reclaimed sand, and fully 18·5 per cent. is covered with heath or other growths without value. Considering the uses to which the soil has been put,

we find that 27·1 per cent. is arable land, 35·4 pastures, 1·7 gardens and orchards, 6 per cent. occupied by water and roads, 7 per cent. woodland, and 0·7 per cent. covered with buildings, the remainder being unimproved. The uncultivated tracts are becoming less in area through irrigation and the introduction of better fertilizers; but much remains to be done in this direction, especially in the provinces Gelderland and Drenthe.

Divisions.—The country is divided into eleven provinces, as follows, with area in square miles and population, Dec. 31, 1899:

PROVINCES.	Area.	Population.	Capitals.	* Ref.
North Brabant	1,980	553,845	Bois-le-duc	7-F
Gelderland	1,972	566,549	Arnhem	6-G
North Holland	1,070	968,105	Haarlem	5-E
South Holland	1,166	1,114,401	The Hague	6-E
Zealand	690	216,293	Middelburg	8-C
Utrecht	534	251,034	Utrecht	6-F
Friesland	1,280	340,263	Leeuwarden	2-G
Overyssel	1,291	333,337	Zwolle	4-H
Groningen	790	299,604	Groningen	2-I
Drenthe	1,032	148,542	Assen	3-I
Limburg	851	281,951	Maestricht	10-G
Totals	12,656	5,103,924		

* Reference for location, see map of Holland and Belgium, vol. iv.

Principal Towns, with Population in 1899.—Amsterdam (523,557) is the capital; The Hague (205,328) is the seat of the government and the residence of the royal family. The other towns of greatest population and importance are Rotterdam, 319,866; Utrecht, 102,040; Groningen, 66,739; Haarlem, 64,836; Arnhem, 57,248; and Leyden, 53,640 (see the separate articles on these and other Dutch towns).

Population.—The people form in blood and language a branch of the Teutonic race. They are characterized especially by industry, perseverance, cautiousness, frugality, scrupulous cleanliness, and a certain sedateness of manners; they are prosperous and contented, and their wealth is quite equally distributed. On Dec. 31, 1899, the population was 5,103,924 (2,520,380 males and 2,583,544 females). The average density per square mile was 403; it was greatest in the province of South Holland (956) and least in Drenthe (144). In 1889 the population was divided as to religious denomination as follows: 2,728,870 Protestants, 1,604,179 Roman Catholics, 97,274 Hebrews, and 81,092 of other denominations. In the same year the number of foreigners in the Netherlands was 48,884, of whom 28,767 were Germans, 13,697 Belgians, 1,398 French, 1,339 British, and 788 Swiss.

Industries and Productions.—Agriculture flourishes most in Friesland (where the finest cattle are reared), North Holland, and parts of Gelderland and Limburg. Rye, barley, and wheat are the chief cereals produced, but fruit and vegetables form a large item of export, especially to England. Potatoes, tobacco, hemp, flax, and beetroot are also staple products. The raising of flower-bulbs has been carried on for centuries, and is still the leading branch of floriculture in the Netherlands. Haarlem is the center of this industry, and in its vicinity may be seen miles of flower-beds containing all varieties of the tulip, crocus, hyacinth, etc. In 1634 and 1636 the "tulipomania," an insane speculation in rare varieties of the tulip, made its appearance in the Netherlands: in all the large cities regular tulip exchanges were established, where bulbs were dealt in at fabulous prices, and where thousands of persons ruined themselves in their efforts to secure some special specimens. Gardening has reached a high degree of perfection, and even in the cities fine garden plots are often found attached to the residences of the well-to-do.

Of manufactures, the most important are cheese (Edam, Hoorn, and North Holland generally), gin (Schiedam, Rotterdam), chocolate and cocoa (Weesp, Utrecht, Rotterdam), potteries (Delft, Maestricht), linens (Bois-le-duc, Helmond), carpets (Deventer), refined sugar (Amsterdam, Rotterdam), long-stemmed clay pipes (Gouda), beet-sugar, potato-starch (Groningen), and cotton goods (Hengelo, Twenthe).

The fisheries have somewhat declined, but contribute still a large amount to the national wealth; herring, cod, salmon, turbot, and anchovies are taken on the coast, and oysters are found in the waters surrounding and intersecting the province of Zealand. Over 25,000,000 herrings are annually taken in the Zuyder Zee alone, and the total number of oysters produced in 1897 was 40,000.

Commerce.—In the principal seaports (Amsterdam, Rotterdam, Harlingen, and the Helder), a large part of the population follows the sea for a livelihood. The commerce of the country, at one time the most important in the world, has declined considerably, but is still extensive and active. It is principally carried on with the Dutch colonies, Great Britain, the countries on the Baltic, and the U. S. In 1899 the value of imports amounted to 1,916,000,000 florins or guilders and the exports to 1,583,000,000, the imports from the U. S. being worth 297,100,000 florins and the exports to the U. S. 60,700,000 (1 florin = $0.40). In that year 11,803 vessels of 9,467,730 tons, of which 3,267 of 2,354,100 tons were Dutch, entered the Dutch ports, while 11,672 vessels of 9,392,682 tons (Dutch, 3,293 of 2,351,622 tons) cleared. The merchant marine at the end of 1899 included 432 sailing vessels, with 84,606 tonnage, and 192 steamers, of 236,118 tons.

Education.—Four universities, those of Leyden (founded in 1575), Groningen (1614), Utrecht (1636), and Amsterdam (1632), all conferring degrees in law, medicine, philosophy, and letters, are attended by about 3,000 students, and are favorably known abroad. The medium and lower grade of instruction is provided on a very liberal scale, and all the schools are unsectarian. In 1891–92 there were, besides professional and technical institutions, 38 secondary schools, with 4,835 pupils, 4,292 elementary schools (2,976 public, with 458,739 pupils, and 1,316 private, with 200,363 pupils), and 993 infant schools, of which 130 were public, with 23,421 pupils, and 86 private, with 79,187 pupils.

Government.—The government is a constitutional and hereditary monarchy. The reigning dynasty is the House of Orange-Nassau, now extinct in the direct male line. The national legislature consists of two branches, the First and Second Chamber of the States-General. The First Chamber, of fifty deputies, is chosen by the provincial states; the term of office is nine years, about one-third retiring every third year. The Second Chamber, of 100 deputies, is chosen directly by males over thirty years of age, who pay a certain amount in taxes; the term is four years, all retiring together. The executive power vests solely in the sovereign; the legislative, jointly on the sovereign and the legislature; but the First Chamber lacks the right of introducing or amending bills. The presidents of both chambers are appointed by the sovereign from among the members. The cabinet consists of the following departments: (1) Foreign Affairs, (2) Interior, (3) Justice, (4) Marine, (5) Finances, (6) War, (7) Waterways, Commerce, and Industry, (8) Colonies; the ministers are appointed by the sovereign; they may, but usually do not, belong to either of the chambers. The provinces are governed by royal commissaries, appointed by the sovereign; and each province has its provincial legislature (*provinciale staten*), elected by the same electors who have the right to elect the members of the Second Chamber. The government of the cities is vested in a mayor (*Burgemeester*), a board of assessors (*Wethouders*), and a common council (*Gemeenteraad*), the members of the last-named body being elected by a class of electors paying less taxes than the electors for the Second Chamber.

There is a standing army of 75,000 men; the navy consisted in 1900 of 13 modern ships (and 5 under construction), and several older vessels, manned by 8,550 officers and men. In 1900 the public debt amounted to 1,158,735,450 florins; in 1899 the receipts 148,021,758 florins, and expenditures, 150,193,989.

History.—The Netherlands or Low Countries denoted, when first spoken of in history, the whole plain extending from the foot of the Vosges and the Ardennes to the North Sea, and comprised not only the present kingdom of the Netherlands, but also Belgium and the northernmost parts of France. It was inhabited by three distinct though kindred tribes—the FRISIANS (*q. v.*) to the N., the Batavians, of German stock, in the center, and the Belgæ, of Gallic stock, to the S. The Belgæ were subjugated by Cæsar; the Batavians were at first allies of Rome, but after the unsuccessful attempt of Claudius Civilis in 67 A. D. to unite the Batavian communities into an organized empire, they too were conquered by the Romans; the Frisians submitted after repeated defeats and rebellions. In 357 the Batavians are spoken of as forming part of the Roman army in the battle of Strassburg against the Germans, and as displaying great valor; but after this time their name disappears from history. The Belgæ gave way to the Franks; the Saxons pushed onward from the E., and in alliance with the Frisians opposed the encroachments of the Franks. On the establishment of the great Frankish empire under the Carlovingians the whole plain was incorporated and the popula-

tion Christianized; but by the division of the empire of Charlemagne the country was divided, the southern part falling to France, the central to Lothringia, and the northern to Germany, and for centuries the different parts followed the different destinies of the main bodies to which they belonged. Meanwhile, the feudal system got a foothold in the country. Dukedoms, Brabant, Limburg, Luxemburg; countships, Artois, Flanders, Holland; bishoprics, Mechlin, Utrecht, etc., were formed, and the remote position of the country made the feudal lords more independent of the royal or imperial power here than anywhere else. On the other hand, the situation on the ocean and the mouths of three great rivers invited to commerce, and flourishing cities grew up and surrounded themselves with strong fortifications. By a marriage the countship of Flanders became united to Burgundy in 1384, and subsequently the Burgundian dukes succeeded, partly by force, partly by craft, in gaining possession of the whole country, which they governed well. By another marriage the Netherlands, with the other Burgundian dominions, came into the possession of the house of Hapsburg in 1477. By the division of Charles V.'s empire between Austria and Spain the Netherlands fell to Spain, and it was a good consequence of this combination, so fatal in other respects, that the Dutch retained their full share in the new commerce which was opened up by the discovery of America and the establishment of the Spaniards in the East Indies. On the whole, it was not so much the interests of the two countries which clashed as the different character of the people and its ruler. The REFORMATION (*q. v.*) had made a deep impression and spread widely in the Netherlands, and Philip II. determined to root it out. In 1566 war broke out. The salient points of the struggle were the formation at Utrecht (Jan. 23, 1579) of a union between the seven northern provinces, Holland, Zealand, Utrecht, Friesland, Groningen, Overyssel, and Gelderland, and the recognition by Spain of this union by the armistice of twelve years concluded in 1609. (For further details, see the articles on MARGARET OF PARMA, ALVA (DUKE OF), JOHN (DON) OF AUSTRIA, FARNESE, the Spanish governors, and WILLIAM OF NASSAU and MAURICE, COUNT OF NASSAU, the Dutch leaders.) By the Peace of Westphalia (1648) the independence of the republic of the United Provinces was formally acknowledged, while the southern provinces, nearly corresponding to the present kingdom of Belgium, remained with Spain and within the Roman Catholic Church. The prosperity of the young state was prodigious, and in maritime affairs it shared with England the supremacy of the world. It crushed the Spaniards and acquired possessions in America and the East Indies. It checked the Portuguese and several times defeated the English. After the battle of Goodwin Sands (Nov. 29, 1652) its admiral, Van Tromp, paraded a broom at his masthead along the English coast as a token that he had swept the Channel, and in June, 1667, De Ruyter sailed up the Thames and blockaded the port of London. In the Baltic also the Netherlands became perfect masters by the Peace of Copenhagen (1660), which kept the Baltic waters open for Dutch trade; and at the same time that they actually held in their hands the commerce of the world, their achievements in philology, theology, natural philosophy, and art gained the admiration of all Europe. Their resistance to the arrogance of Louis XIV. was their greatest glory. (Details of this contest will be found in the articles on LOUIS XIV., WILLIAM OF NASSAU, TURENNE, etc.) After that period the importance of the republic gradually decreased, not because its activity and prosperity really declined, but simply because it was superseded by England; and when in 1782, led by jealousy and considering the opportunity good on account of the American Revolution, it declared war against England, its maritime power received a blow from which it never recovered. Meanwhile, two parties had developed in the interior politics of the state—one aiming to raise the office of the stadtholder into royalty and make it hereditary in the family of Orange-Nassau, while the other, the so-called "patriots," strove to abolish it altogether and establish a pure republic. When in the winter of 1794–95 the French army, after conquering the Spanish Netherlands, entered the territory of the United Provinces, it was hailed by the patriots; the stadtholder, William V., fled to England, and the Batavian republic was proclaimed May 16, 1795. The country paid dear, however, for its new constitution, which, moreover, was changed several times according to the whims of Napoleon. In 1806 the Netherlands was made a kingdom under Louis Bonaparte (the kingdom of Holland); in 1810 it was incorporated with France. Meanwhile the state of its finances had become nearly desperate. The Congress of Vienna established the kingdom of Holland once more, gave the crown to the house of Orange-Nassau, and joined the former Spanish Netherlands with it. This last measure proved a new source of trouble. The southern provinces were agricultural, Roman Catholic, and French or Flemish speaking. The discrepancy between the two parts of the new state, both in political interests and in national character, was so palpable that when in 1830 the southern provinces rose into rebellion the great powers of Europe immediately consented to the separation, and the kingdom of BELGIUM (*q. v.*) was erected, though not until much blood and more money were squandered by the attempts of the King of Holland at maintaining his government. The revolutionary movement of 1848 finally occasioned some change in a liberal direction in the constitution, under the leadership of J. R. Thorbecke (1798–1872), and since that time further progress has been made in all directions toward a more enlightened policy. The franchise has been considerably extended, existing laws have been amended in a more liberal spirit, and many material improvements (railways, canals, etc.) have been made. In 1872 a conflict arose with the Sultan of Atjih, on the island of Sumatra, who grew uneasy under the Dutch supremacy. This revolt developed into a tedious war, which cost the mother country vast sums of money and many lives. See NETHERLANDS, THE, in the Appendix.

For the language and literature of the Netherlands, see DUTCH LANGUAGE and DUTCH LITERATURE.

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Nets and **Netting**: textures made by threads or cords crossing one another and knotted at the points of intersection so as to keep the shape and size of their open meshes. Fishing-nets are the most common instance of the stouter kinds of net, although these are made of many degrees of fineness, and of many different materials. In the decorative arts and in costume net has been used, in Europe and in the East, for fabrics of colored thread and of elaborate design, and as a ground upon which can be sewn sprigs and flowers cut from lace. It is, however, more commonly used for the making of fringes, edgings, bags, coverings for the hair, and "tidies" or "antimacassars." For these purposes a strong and fine cord is commonly used, often of silk. The net is often of very elaborate pattern, and darning or simple forms of embroidery are used to make it still more decorative.

The term is much used also for open-mesh fabrics, which are not true net, because not knotted where the threads cross. Thus mosquito-net is merely a very coarse and open gauze. In ornamental art, too, the work done by pulling out threads and stitching back others in cambric or lawn, so as to produce *drawn work* or *cut work*, is sometimes called net. RUSSELL STURGIS.

Netsuke: the name given in Japan to the elaborately carved buttons or knobs of metal, wood, or ivory used in attaching the tobacco-pouch or other light article to the belt. Artists formerly vied with each other in the minute pains they took to make these *netsukes* marvels of intricate workmanship. Europeans apply the name to all miniature carvings in ivory of Japanese or Eastern workmanship.

Nettement, ALFRED FRANÇOIS: journalist and historian; b. in Paris, France, July 22, 1805. After completing his education at the Collège Rollin, he began in 1829 to publish *critiques* in the journal *L'Universel*, and for many years he wrote for that and other periodicals. He was an ardent Catholic and legitimist, and throughout the troubled years from 1830 to 1850 he resolutely maintained this position. After the Revolution of 1848 he founded *L'Opinion Publique*, a journal intended to help the restoration of the grandson of Charles X. After the *coup d'état* of Dec. 2, 1851, this was suppressed, and Nettement was thrown into prison. After his release he wrote for a time for the *Revue*

Contemporaine, and after 1858 edited *La Semaine des familles*. During all these years he had been producing also a series of historical works, which, even if they can not be called partisan in tone, reflect very clearly their author's opinions. Among these were *Histoire de la révolution de Juillet 1830* (2 vols., 1833); *Suger et son temps* (1842); *Vie de Marie-Thérèse de France* (1843; 3d ed. 1872); *Henri de France, etc.* (2 vols., 1845); *Études critiques sur les girondins* (1848); *La révolution française* (1848); *Histoire de la littérature française sous la Restauration* (2 vols., 1852); *Histoire de la littérature française sous la royauté de Juillet* (2 vols., 1854; 2d enlarged ed. 1858); *Souvenirs de la Restauration* (1858); *La conquête d'Alger* (1856); *Histoire de la Restauration* (8 vols., 1860–72). Besides these larger works, he wrote numerous pamphlets and several works on the history of the Parisian press, of which the most interesting is *Études critiques sur le feuilleton roman* (2 series, 2d ed. 1845–46). Worthy of mention also is his *Vie de Madame la marquise de la Rochejacquelin* (1858; 2d ed. 1865). D. in Paris, Nov. 15, 1869. A. R. Marsh.

Nettle [O. Eng. *netele* : O. H. Germ. *nezzila* > Mod. Germ. *nessel*]: any one of many plants, mostly covered more or less densely with poisonous stinging hairs. They belong to the family *Urticaceæ*, and mostly to the genus *Urtica*. There are over thirty species, many of which are tropical, some of the latter having severe and even dangerous stinging powers. The stalks of some kinds abound in a strong fiber, which, especially in Asia, has a considerable use in the arts. The common nettle-fiber is employed like hemp in Italy. This species (*Urtica dioica*) is naturalized in the U. S. from Europe. Its young shoots make an excellent potherb, and when older are sometimes put into beer. The most common stinging nettles of the Eastern U. S. are, besides the above, the *U. urens*, also European, *U. chamædryoïdes* and *gracilis*, and *Laportea canadensis*. The false nettle of the U. S. is *Bœhmeria cylindrica*, a stingless herb. The so-called Dead-nettle (*q. v.*) is not a nettle at all. In the East Indies the Neilgherry nettle, *Girardinia palmata*, one of the most actively stinging of the true nettles, yields an excellent fiber, which brings a high price in England.

Revised by Charles E. Bessey.

Nettle-rash, or **Hives** (in Lat. *urticaria*): an inflammatory affection of the skin with effusion, causing elevations of the size of a pea, or larger. These wheals are pale, or pale with a red margin, or red, or pale with a small vesicle in the center. The disease is generally of an acute character; the elevations develop quite suddenly and disappear after hours or days. Frequently they return, and some people do not lose the predisposition for many years. They may return at regular or irregular intervals, every day or two, without necessarily having anything in common with intermittent fever. The cause of this condition is either local or systemic. Among the local causes are contact with nettles, from which it has its name; the influence of insects; a hot bath; the sun; and mechanical and chemical influences of different kinds. In predisposed persons, pressure with the finger, friction, or irritation as by a subcutaneous injection of an indifferent fluid, are sufficient to produce it. Among the systemic causes are substances which irritate the nerves of the blood-vessels or of the digestive or genito-urinary organs; certain articles of food, such as champagne, beer, sausage, strawberries, raspberries, currants, oysters; medicines, such as quinine or cod-liver oil. The recurrence of menstruation, the application of leeches to the womb, etc., are causes which have been observed. At times the condition can be traced to no cause, and then a general irritability of the nervous system must be assumed to produce it. Frequently, therefore, it sets in with a chill or with fever, and it is always accompanied by itching and burning. Treatment, although simple, is not always efficient. Locally the use of glycerin, cold-cream, weak solutions of carbolic acid (1–2 per cent.), salt-water bathing, etc., will relieve the itching. The diet must be regulated; no coffee, spice, beer, and but little meat must be taken. The stomach must be improved by the use of bismuth or hydrochloric acid, according to the indications. Mild purgatives will be beneficial—in very bad cases now and then an emetic. Insects must be looked for, menstruation regulated, etc. A. Jacobi and F. E. Sondern.

Nettleship, Edward: ophthalmologist; b. at Kettering, Northamptonshire, England, Mar. 3, 1845; studied medicine in King's College Hospital, London Hospital, and London Veterinary College; in 1873 was appointed curator of Moorfields Ophthalmic Hospital; in 1877 appointed ophthalmic surgeon to St. Thomas's Hospital. His *Student's Guide to Diseases of the Eye*, published in 1880, has passed through several editions both in England and the U. S. S. T. A.

Nettleship, Henry: classical scholar; b. at Kettering, Northamptonshire, England, May 5, 1839; educated at Cathedral School, Durham, at Charterhouse, and at Corpus Christi College, Oxford, where he graduated in 1861. He was assistant master at Harrow from 1868 to 1873, when he became fellow and tutor of Corpus Christi and classical lecturer at Christ Church. In 1878 he was appointed Corpus Professor of Latin Literature in the University of Oxford. He published and edited a large number of works on classical subjects, among which are a portion of the commentary on the *Æneid* in Conington's *Vergil*; a revised edition of Conington's *Vergil*; *Lectures and Essays on Subjects connected with Latin Literature and Scholarship* (1885); *Contributions to Latin Lexicography* (1889). D. July 10, 1893.

Nettle-tree: a handsome tree (the *Celtis australis*), a native of Europe, belonging to the family *Urticaceæ*, and valued for its wood, much used in turnery. It has several congeners in various parts of the Old and New Worlds, the common species of the U. S. being called Hackberry (*q. v.*). In Australia, etc., there are nettle-trees more properly so called, with very sharply stinging leaves and shoots.

Nettleworts (*Urticaceæ*): a group of dicotyledonous plants commonly regarded as a family composed of several sub-families, although probably more correctly a group of families. The flowers are apetalous, and mostly unisexual, with a single, superior, one-celled, one-ovuled ovary. The species (1,560) are mostly tropical, with a considerable number extending into the temperate zones.

The Elms and their allies constitute the sub-family (or family) *Ulmaceæ*, including a dozen or more genera of trees and shrubs and about 120 species.

The Mulberries and their allies (sub-family or family *Moraceæ*) include nearly 1,000 trees and shrubs and a few herbs. The figs (*Ficus*), mulberries (*Morus*), breadfruit (*Artocarpus*), milk-tree (*Brosimum*), and upas-tree (*Antiaris*) are representative plants of this sub-family. Here are also placed the hemp (*Cannabis*) and the hop (*Humulus*).

The Nettles (sub-family or family *Urticaceæ*) are mostly herbs with stinging hairs. They are represented by *Urtica* (the nettles proper), *Bœhmeria* (ramie), *Laportea* (wood nettles, etc.). Charles E. Bessey.

Neuchâtel, or **Neufchâtel**, nö'shaă'tel' (Germ. **Neuenburg**, noi'*e*n-boorch): canton of Switzerland, bounded by France and the Lake of Neuchâtel. Area, 312 sq. miles. It is traversed by several ranges of the Jura Mountains, separated by longitudinal valleys stretching from the S. W. toward the N. E. The lower parts of these mountains are generally well adapted to the production of wheat, wine, and fruits; the higher afford good pasturage, where many cattle are reared and much cheese is produced; some are covered with forests yielding good timber; but the chief occupation of the inhabitants is nevertheless manufacturing, especially watchmaking, which employs nearly 20,000 persons. The first watch was made here in 1681. Up to 1848 the country formed the principality of Neuchâtel, and belonged to the King of Prussia; in that year it adopted a republican constitution, and in 1857 definitely became a member of the Swiss confederation. Three-fourths of the population, 111,928 in number (in June, 1894), speak French, and four-fifths are Protestants.

Neuchâtel: capital of the canton of Neuchâtel, Switzerland; beautifully situated on the shore of the Lake of Neuchâtel (see map of Switzerland, ref. 4–C). It is well built, and has important manufactures of watches and laces, and a large trade in wine and absinthe. Pop. (1893) 16,772.

Neuchâtel, Lake of: a body of water in Switzerland, 25 miles long and from 3 to 5 miles broad. It sends its waters through the Aar to the Rhine.

Neuendorff, noi'*e*n-dōrf, Adolph: composer and conductor; b. in Hamburg, Germany, June 13, 1843; began the study of music at the age of six years. In 1855 his parents removed to New York, where he continued his musical studies. He became chorus-master of the new German theater in 1857, and soon after violinist in the orchestra of the Stadt theater. In 1859 he made an appearance as a pianist, and then traveled with his father for two years in South America. In 1863 he became conductor of the German theater in Milwau-

kee, but was soon back again in New York. Since then he occupied many positions as conductor, including one year with the Philharmonie Society. He introduced Waehtel and Madame Pappenheim to New York, and conducted a series of Wagner's operas in 1877. He composed several successful operas. D. in New York, Dec. 4, 1897. D. E. H.

Neufchâtel: See NEUCHÂTEL.

Neuilly, nö'yee': town; in the department of Seine, France; 1½ miles from the western extremity of Paris, on the right bank of the river Seine, which is here crossed, on the prolongation of the avenue through the Champs Elysées, by the noble stone bridge built by Perronet. (See BRIDGES.) It was the famous summer residence of Louis Philippe, who occupied the royal château erected in the reign of Louis XV., which was destroyed by the mob Feb. 25, 1848, the right wing alone being saved, which yet forms an object of interest to visitors. The beautiful grounds about Neuilly, once the favorite resort of Parisians, are now laid out in walks skirted by charming villas. Neuilly has a varied manufacturing industry, comprising starch, chemicals, straw goods, porcelain, etc. Pop. (1896) 32,730.

Neumann, noi'măn, KARL FRIEDRICH: Orientalist; b. at Reichmannsdorf, Bavaria, Dec. 22, 1798, of Jewish parents; studied at Heidelberg, Munich, and Göttingen, and was converted to Lutheranism; went in 1827 to Venice to study Armenian in the convent of San Lazaro, thence to Paris and London; made a journey to India and China in 1829–30; brought back a large collection of Chinese and Hindu books, which are now partly in Berlin and partly in Munich; was appointed Professor of Oriental Languages at Munich in 1831, but dismissed in 1852 on account of his liberal views in politics; removed in 1863 to Berlin, and died there Mar. 17, 1870. He was a very prolific writer on various topics. His principal works are *Mémoires sur la Vie et les Ouvrages de David, Philosophe Arménien* (1829); *Lehrsaal des Mittelreichs* (1836); *Geschichte der armenischen Litteratur* (1836); *Asiatische Studien* (1837); *Die Völker des südlichen Russland* (1847); *Ostasiatische Geschichte* (1840–60); *History of Vartan by Elisæus*, and *Chronicle of the Armenian Kingdom in Cilicia, by Vahram* (1830), translated from the Armenian. He also wrote *Geschichte der Vereinigten Staaten von Nordamerika* (3 vols., 1863–66), and *Hoein Schein, or the Discovery of America by Buddhist Monks* (1874). Revised by F. M. COLBY.

Neumayer, noi'mī-er, GEORG B., Ph. D.: magnetician and meteorologist; b. at Kirchheim-Bolander, Pfalz-am-Rhein, Germany, June 21, 1826; was educated in the Polytechnic School, University, and Observatory, at Munich. He was in Australia for many years, where he served as director of the Flagstaff Observatory at Melbourne, and director of the Magnetic Survey of Queensland. On his return he became successively hydrographer of the Admiralty at Berlin and director of the Deutsche Seewarte at Hamburg. He has received the honorable title of *Geheimer Admiralitätsrath*. Among his numerous works, both in German and English, are *Results* at Flagstaff Observatory (1860) and in Victoria (1866–69); his *Discussions* of these observations (1862); *Anleitung zu wissensch. Beobachtungen auf Reisen* (1874; 2d ed. 1888); *Die internationale Polarforschung, Die deutschen Expeditionen und ihre Ergebnisse* (2 vols., 1890–91); *Atlas des Erdmagnetismus* (in Berghaus's *Physikalischer Atlas*, 1891); and (with Prof. Dr. C. Börgen) *Die Beobachtungsergebnisse der deutschen Stationen im Systeme der intern. Polarforschung* (2 vols., 1874–88). MARK W. HARRINGTON.

Neumünster, noi'mün-ster: town; in the duchy of Holstein, Prussia; on the Schwale river; 20 miles by rail S. W. of Kiel (see map of German Empire, ref. 2-E); has large breweries, dye-works, tanneries, and manufactories of woolen and linen fabrics. Pop. (1890) 17,539.

Neu-Pommern, noi'pō'mern: See NEW POMERANIA.

Neuquen, nā-oo-kān': a territory of the Argentine Republic: on the eastern slope of the Andes, S. of the province of Mendoza, between the rivers Limay (a branch of the Negro) and the Colorado. Area officially stated at 42,116 sq. miles, but the limits are not well determined; population about 30,000. In the mountainous western portion there are many fertile valleys; much of the eastern part, except in the river valleys, is arid; and there is an immense bed of shingle, said to be the largest in the world, extending for 600 miles through this territory and Rio Negro: its average thickness is 50 feet. The principal industry, confined to the fertile lands along the rivers, is cattle and sheep raising; the cattle are driven over the mountains to the Chilian markets. Gold, silver, coal, etc., are reported. Until 1879 this region was held by the Ranqueles Indians. Capital, the village of General Achá, with about 2,000 inhabitants. HERBERT H. SMITH.

Neuralgia [Mod. Lat.; Gr. *νεῦρον*, nerve + *ἄλγος*, pain]: pain in a nerve due to functional disturbance either in its central or peripheral extremity. If inflammation be present in the nerve-trunk, NEURITIS (*q. v.*) is a more proper designation. It is, however, often difficult to distinguish between the two conditions, and many authors use the term neuralgia even if inflammation be present, provided pain be the predominant symptom. The disease is rarely met with in children, and is more frequent in women than in men. The causes are debility, exposure to cold, anæmia, reflex irritation, as in facial neuralgia from a decayed tooth, rheumatism, gout, diabetes, malaria, and lead-poisoning. The pain is localized in the distribution of a certain nerve or nerves, and rarely occurs on both sides at once. It is paroxysmal, lasting from a few minutes to many hours, and is deep-seated, sharp, burning or boring, and darting. In the intervals there may be a dull ache. It may recur at regular intervals even when not due to malaria. The skin, especially at certain points on the affected nerve, is extremely sensitive to pressure. Local œdema, sweating, or redness may occur. The hair may become gray in spots, or even fall out. Neuralgias are classified according to the part affected. The following are the principal varieties: Facial (see FACIAL NEURALGIA); intercostal; brachial (involving the arm); crural (involving the front of the thigh); sciatica; coccygodynia (causing intense pain at the end of the spine, made much worse by sitting); erythromelalgia (in which there is great pain in the heel or sole, with hyperæmia or cyanosis). There are also neuralgias of the internal organs, of which gastralgia (neuralgia of the stomach) and nephralgia (neuralgia of the kidney) are examples. In *epileptiform neuralgia* the attack comes on suddenly with extreme severity, lasts only a few seconds, and recurs many times daily. The pain is felt only in the fifth nerve, and may be accompanied by spasm. In the *neuralgia of stumps* the patient, at a greater or less time, usually several months, after amputation of an arm or leg, begins to feel pain, not in the scar, but in the amputated extremity. The apparent position of the removed member is plainly felt, and he often feels the fingers violently flexed or extended. Later the pain appears in the retained part of the member. Sometimes there is violent twitching of the stump. The affection is caused by pressure of the contracting scar upon the ends of the nerves. WILLIAM PEPPER and C. W. BURR.

Neurasthenia: See NERVOUS DISEASES.

Neurilemma: See HISTOLOGY (*Nerves*).

Neurine [from Gr. *νεῦρον*, nerve], or **Cho'line** [from Gr. *χόλος*, gall, bile]: the tri-methyl-oxethyl-ammonium-hydrate, $(CH_3)_3(C_2H_4OH)NOH$. It is obtained from the bile, from the brain, from LECITHIN (*q. v.*), from PROTAGON (*q. v.*), and is prepared synthetically. Lecithin, which occurs in the brain, nerves, yolk of eggs, blood-corpuscles, etc., is now known to be the di-stearyl-glycerin-phosphate of neurine.

Neuri'tis [Gr. *νεῦρον*, nerve + Mod. Lat. suffix *-itis*, denoting a disease of the part to the name of which it is added]: inflammation of a nerve. The nerve is red and swollen. The inflammation may be confined to the fibrous sheath (perineuritis), or invade the deeper connective tissue (interstitial neuritis), or the nerve-fibers may be primarily affected (parenchymatous neuritis). The changes in the last are similar to those in Wallerian degeneration following cutting of a nerve. The medullary substance becomes segmented and divides into globules and granules. The axis cylinders break up, become granular, and finally disappear. The nuclei of the sheath of Schwann increase in number. In the former the internodal nuclei are swollen, those of the sheath of Schwann proliferate, and the nerve-fibers may be completely replaced by fibrous tissue. The following are the chief varieties of neuritis: *Localized neuritis*, due to cold, wounds, and extension of disease from neighboring parts. "Crutch palsy," in which the head of the crutch pressing against the musculo-spiral nerve bruises it and causes palsy in the muscles supplied, is quite common. The hand hangs from the wrist and can not be extended, the forearm is supinated with difficulty, and there is numbness and tingling. In the idiopathic form and in that from wounds there is

great pain, numbness, diminution of the tactile sense, impairment or absolute loss of motion in the muscles, and ultimately wasting. There may be muscular contraction, redness and glossiness of the skin, œdema, and herpes. *Multiple neuritis* may be idiopathic or caused by the poisons of acute infectious diseases, as, for example, diphtheria, typhoid and scarlet fevers, and smallpox; certain poisons, among which are alcohol, lead, and mercury; and, finally, some chronic constitutional diseases, such as cancer, tuberculosis, and diabetes. In the acute form the onset is rapid. Fever, backache, headache, and limb-ache appear first, and are followed by a more or less complete palsy of the legs and arms, and sometimes of the intercostal muscles, so that respiration becomes purely diaphragmatic. There is a characteristic drop of the hands and feet. Sensory disturbances may be slight or severe. There is muscular wasting. The course of the disease varies greatly. The patient may die in a few days or may recover after a prolonged convalescence. In the alcoholic form the onset is apt to be gradual, and there may be neuralgic pains in the arms and legs for months before palsy develops. Fever is rare. The type of the palsy is similar to that already described. There is often delirium, with convulsions and hallucinations of grandeur. Occasionally the mental symptoms are the same as those met with in delirium tremens. The disease is most frequent in women. Steady, quiet drinking is more apt to cause it than occasional drunkenness. *Endemic neuritis* (beriberi) is common in Japan, New Zealand, India, Brazil, and the West Indies. It was formerly prevalent in China. Its cause has not been positively determined, but it is probably infectious. The onset may be sudden or gradual. The symptoms are fever, anæmia, ascending palsy, including sometimes the diaphragm and larynx, muscular wasting, œdema beginning in the legs and becoming general, and anæsthesia to touch but not to pain. Death results from cardiac failure. The mortality-rate varies from 3 to 50 per cent. in different epidemics. In all forms of neuritis there is reaction of degeneration in the muscles.

WILLIAM PEPPER and C. W. BURR.

Neurop'tera [Mod. Lat.; Gr. *νεῦρον*, nerve + *πτερόν*, wing]: a name applied with different limitations by different authors to a group of insects. By some it is used to include the day-flies (Ephemerida), dragon-flies (Odonata), stone-flies (Plecoptera), white ants (Isoptera), book-lice (Corrodentia), scorpion-flies (Panorpata, or Mecoptera), caddis-flies (Trichoptera), and the hellgrammites and ant-lions. By others its use is limited to the last-named forms. With its wider signification it is difficult of definition, but it may be said to include those forms of insects in which the

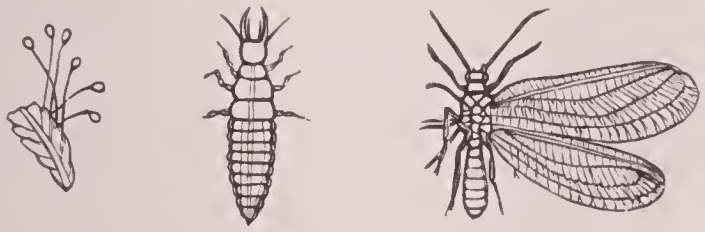


FIG. 1.—Eggs, larva, and adult of *Chrysopaperla*.

mouth-parts, like those of grasshoppers, are fitted for biting and in which the gauzy wings are provided with numerous cross-veins. Such a definition, however, brings together a heterogeneous assemblage of forms, some having a complete, others an imperfect metamorphosis, as well as some in which the mouth-parts are as well adapted for sucking as for biting. (See ENTOMOLOGY.) The Neuroptera proper have a complete metamorphosis, passing through larval and pupal stages before becoming adult; the mouth-parts are fitted for biting, and the wings, four in number, are membranous, and are furnished with numerous veins. The group or order contains but two American families. The first, the *Sialidæ*, contains the hellgrammite flies, *Corydalus*, the aquatic larvæ of which, under the name of "dobsons," are familiar to fishermen. When ready to pupate the larvæ leave the water and make a cavity in the earth, in which the pupa remains inactive for four or five weeks. The other family, *Hemerobidæ*, contains the ant-lions, aphis-lions, and a few other forms. Of these the ant-lions are best known. They dig funnel-shaped pitfalls, at the bottom of which the strong-jawed larva lies buried. Any ant or other insect venturing within the mouth of the funnel tumbles down, and is seized by the larva at the bottom of the pit. The ant-lions spin silken cocoons in which to pass the pupal stage. The aphis-lions (*Chrysopa*) lay their eggs on stalks so as to place them above danger. The larvæ hunt for their prey, which consists of other insects; there is a silken cocoon for the pupal stage. The adults are frequently called golden-eyed flies on account of the color of the eyes in the living insects. Some species emit a most nauseous odor on being disturbed. See ENTOMOLOGY.

FIG. 2.—*Corydalis cornuta*.

J. S. KINGSLEY.

Neuro'sis [from Gr. *νεῦρον*, nerve]: the generic name applied to disorders of the nervous system in which no structural change is discoverable. The number of such affections has materially decreased with improved methods of research. Doubtless some of them are of toxic nature, the disturbed action of the nervous system being due to the altered physiology under the influence of poisons, as we know to be the case in instances of alcoholic or opium poisoning. The long continuance of intoxication or chronic disturbance of the nervous system of a purely functional nature may doubtless lead to organic changes, so that in the end a functional disease may become organic. Among the neuroses are generally considered neuralgia, chorea, epilepsy, paralysis agitans, neurasthenia, and others. The causes which are operative to induce these conditions are considered under the heading NERVOUS DISEASES.

An interesting group are the so-called *occupation neuroses*, such as writer's or scrivener's cramp or palsy, telegrapher's cramp, sempstress's cramp, and the like. In these affections the habitual overuse of certain groups of muscles in finely co-ordinated movements occasionally leads to a condition in which every attempt to perform the accustomed work leads to painful spasm or cramp of the muscles involved. Sometimes there is simply palsy, at other times only pain or cramp: but, as a rule, cramp and pain are associated. In the treatment of neuroses the first indication, as a general thing, is to secure rest of the entire nervous system or of the parts involved. In addition, general tonic treatment is required for the underlying loss of tone, which is the predisposing factor. WILLIAM PEPPER.

In *psychology*, the word neurosis is used to indicate any condition of the central nervous system which is correlative to a particular condition or function in consciousness. Every *neurosis* has its *psychosis*. For example, emotion is a psychosis, which is supposed to involve a certain kind of nervous process or neurosis. The distinction in terms was suggested by Huxley, and has been generally adopted.

J. M. BALDWIN.

Neurot'ics [from Gr. *νεῦρον*, nerve]: in medicine, such drugs as are capable of primarily affecting the functions of intellection, sensibility, or motility. Alcohol, the ethers, chloral, potassium bromide, amyl nitrite, the drugs of the opium type, quinine, strychnine, hemlock, Calabar bean, aconite, digitalis, etc., are neurotics.

Neusiedl, noi'seed'l, **Lake of** (Germ. *Neusiedler See*): a body of water in Hungary; near the northwestern frontier; 23 miles long and 7 miles broad. Its water contains various salts in solution, and has a brackish taste. The lake sometimes dries up entirely, as was the case in 1693, 1738, and 1865; but in 1870 the basin again became filled with water through the Hanság marsh, and the farms and plantations which Archduke Albrecht had laid out under the name of New Mexico were all submerged. Under sudden risings of the water a canal conducts it to the river Rabnitz.

Neustadt, noi'stăt, or **Wie'ner-Neustadt**, *vee'ner-*: town of Lower Austria; at the beginning of the canal of same

name, and on the Vienna and Gratz Railway; 26 miles S. of Vienna (see map of Austria-Hungary, ref. 5–E). It is surrounded by a wall and a deep ditch. In 1834 the town was nearly destroyed by fire. It has since been handsomely rebuilt, and is the seat of a Cistercian abbey and of a military academy founded by Maria Theresa. Its manufactures are important, and include locomotives, machinery, tacks, clocks, leather, etc.; and it has a good trade in horses and agricultural products. Pop. (1890) 24,780.

Neu-Strelitz, noi'strā'lits: capital of the grand duchy of Mecklenburg-Strelitz, Germany; situated between two lakes, 62 miles N. N. W. of Berlin (see map of German Empire, ref. 2–G). It was founded in 1733, is built in the form of an eight-pointed star, and contains a fine palace with a library, a theater, educational and benevolent institutions, and a fine park. Pop. (1890) 9,481.

Neuter Nation: See IROQUOIAN INDIANS.

Neutral Axis: the line in a cross-section of a beam which is neither extended nor compressed when the beam is deflected by a load. This line passes through the center of gravity of the cross-section, provided the elastic limit of the material be not exceeded. See ELASTIC CURVE and FLEXURE. M. M.

Neutrality: the state of peace which a nation observes while some of its friends are at war. Anciently, such a condition can hardly be said to have existed, for wars were general and every state was either the ally or the enemy of every other. In nothing can the progress of society be so clearly seen as in the increasing growth and importance of the neutral status.

Neutrality is not only a privilege to be free, so far as is possible, from the losses and evils of war; it is also a duty to avoid aiding either belligerent, remembering that the other is a friend. The position which a state intends to take in view of a war between its neighbors should be clearly defined. It is accordingly customary to issue a proclamation of neutrality, laying down the rules which are to govern its intercourse with both belligerents alike; the privileges, if any, which they may expect; the obligations which it will itself recognize, and the duties thereby devolving upon its subjects.

Besides such proclamations in view of a particular war, it is also customary for a state to put on its statute-books general laws regulating the actions of its citizens with reference to foreign wars. These are neutrality acts. They are only municipal laws, it is true, yet their violation by the subjects of a state may be ground for damages against it in favor of an injured belligerent, as was proved in the Alabama case. The non-existence or insufficiency of such laws is no excuse for a failure to observe a strict neutrality, but may rather be a cause of complaint. For a full discussion of this subject, the rights and duties of neutral states, and the effects upon neutral trade, the reader is referred to the general article INTERNATIONAL LAW.

The following proclamation of neutrality, issued by the King of Spain at the outbreak of the civil war in the U. S., June 17, 1861, affords an illustration:

"Taking into consideration the relations which exist between Spain and the United States of America, and the desirability that the reciprocal sentiments of good understanding should not be changed by reason of the grave events which have taken place in that republic, I have resolved to maintain the most strict neutrality in the contest begun between the Federal States of the Union and the States confederated at the South; and in order to avoid the damage which might accrue to my subjects and to navigation and commerce from the want of clear provisions to which to adjust their conduct, I do decree the following:

"ART. 1. It is forbidden in all the ports of the monarchy to arm, provide, or equip any privateer vessel, whatever may be the flag she displays.

"ART. 2. It is forbidden in like manner to the owners, masters, or captains of merchant vessels to accept letters of marque, or contribute in any way whatsoever to the armament or equipment of vessels of war or privateers.

"ART. 3. It is forbidden to vessels of war or privateers with their prizes to enter or to remain for more than twenty-four hours in the ports of the monarchy, except in case of stress of weather. Whenever this last shall occur, the authorities will keep watch over the vessel, and oblige her to go out to sea as soon as possible without permitting her to take in any stores except those strictly necessary for the moment, but in no cases arms or supplies for war.

"ART. 4. Articles proceeding from prizes shall not be sold in the ports of the monarchy.

"ART. 5. The transportation under the Spanish flag of all articles of commerce is guaranteed, except when they are directed to blockaded ports. The transportation of effects of war is forbidden, as well as the carrying of papers or communications for belligerents. Transgressors shall be responsible for their acts, and shall have no right to the protection of my Government.

"ART. 6. It is forbidden to all Spaniards to enlist in the belligerent armies or take service on board of vessels of war or privateers.

"ART. 7. My subjects will abstain from every act which, in violation of the laws of the kingdom, can be considered as contrary to neutrality.

"ART. 8. Those who violate the foregoing provisions shall have no right to the protection of my Government, shall suffer the consequences of the measures which the belligerents may dictate, and shall be punished according to the laws of Spain."

This is a fair sample of proclamations of neutrality, yet it is liable to misconstruction. For in point of fact the conveyance of contraband, blockade-running, enlistment in a foreign army, or service on a foreign ship would probably not be punished by the laws of Spain or any other country while neutral. It is simply intended to give warning that such acts are illegal, and that if penalties are incurred at the hands of either belligerent for committing them—e. g. confiscation of contraband goods—no remedy can be furnished by their own Government. On the other hand, certain other acts forbidden by the proclamation, such as arming a privateer or ship of war, would probably be prevented under penalty by the Government. This somewhat curious and illogical distinction between acts apparently of equal criminality rests upon usage, a usage acquiesced in by belligerent as well as neutral, and founded upon the principles that (1) neutral trade shall be as little disturbed as possible in time of war; that (2) anything resembling the fitting out of an armed expedition on neutral ground to operate against a friendly state is not a mere act of trade, but a direct act of war and unneutral, and likely to involve the neutral state in difficulties and make it responsible for damage thereby inflicted. See CONTRABAND and INTERNATIONAL LAW.

T. S. WOOLSEY.

Neuville, nö'veel', ALPHONSE MARIE, de: military painter; b. at St.-Omer, Pas-de-Calais, France, May 31, 1836. He was a pupil of Picot; was awarded medals at the Salons of 1859 and 1861; was made an officer of the Legion of Honor 1881. He began life as a lawyer, but abandoning the law to take up the study of art, he soon achieved a reputation, and with his pictures of episodes of the Franco-German war of 1870 reached the highest rank among modern battle-painters. His compositions are notable for action and vigorous draughtsmanship. One of the best and most important is *The Defense of Le Bourget*, painted in 1879, in the collection of Mrs. W. H. Vanderbilt, New York. D. in Paris, May 20, 1885. WILLIAM A. COFFIN.

Neva: a river of the government of St. Petersburg, Russia. It connects Lake Ladoga with the Gulf of Finland; is 35 miles long; has a curved and sinuous course, with many bars and other obstructions to navigation at its head and mouth, and a series of rapids about midway of its length. It is broad and deep, and the obstructions to navigation have been measurably overcome by engineering works. St. Petersburg occupies the islands of its delta. M. W. H.

Nevada, nĕe-vaa'da: one of the U. S. of North America (Western group); twenty-third in order of admission into the Union; ranked in 1899 eighth in production of gold, sixth in silver, and seventh in aggregate value of both.

Location and Area.—It lies between 35° and 42° N. lat., and 114° and 120° W. lon.; bounded N. by Oregon and Idaho, E. by Utah and Arizona, S. W. and W. by California; extreme length from N. to S., 483 miles; greatest breadth from E. to W., 423 miles; area, 110,700 sq. miles.

Physical Features.—The greater part of Nevada is included in the Great American Basin, which has for its walls the Sierra Nevada on the W. and the Wahsatch Mountains on the E. It is bounded N. and S. by cross-ranges, and has no outlet for its waters. This vast basin is a table-land about 4,000 feet above the sea, and mountains rise from 1,000 to 8,000 feet above its level. About 12,000 sq. miles in the S. E. of the State are outside of this basin, and belong to the Colorado river basin. The Sierra Neva-


NEVADA
Scale of Miles
0 10 30 50 70
121 E 120 F 119 118 Longitude 117 West from 116 Greenwich 115 J 114
43 E 42 F 41 G Longitude 40 H West from 39 Washington 38 J 37
OREGON
IDAHO
UTAH
ARIZONA
CALIFORNIA
HUMBOLDT
ELKO
LANDER
EUREKA
CHURCHILL
WHITE PINE
ESMERALDA
NYE
LINCOLN
WASHOE
STOREY
DOUGLAS
ORMSBY
LYON
Goose Lake
Ft. Bidwell
Lake City
Alturas
Pitt R.
Eagle L.
Susanville
Honey L.
Smoke Creek Desert
Pyramid L.
Winnemucca Lake
Black Rock Desert
Winnemucca
Golconda
Paradise Valley
Little Humboldt R.
Quinn R.
Mountain City
White Rock
Cornucopia
Tuscarora
Tecoma
Pequop
Toano
Montello
Wells
Elko
Halleck
Fort Halleck
Snow Water L.
Ruby Valley
Franklin L.
Gosiute L.
Humboldt R.
Battle Mt.
Mill City
Unionville
Rye Patch
Oreana
Lovelock
Humboldt
White Plains
Hot Sps.
Wadsworth
Reno
Truckee
Virginia City
Gold Hill
Carson City
Carson L.
Carson Sink
Salt Flat
Stillwater
Humboldt Salt Deposit
Silver Cr.
Austin
Walters
Reese R.
Bridges
Mineral
Alpha
Palisade
Carlin
Evans
Garden Pass
Diamond
Eureka
Ruby Hill
Prospect Mt.
Pinto
Sherman T.
Treasure City
Hamilton
Eberhardt
Mineral City
Ely
Osceola
Cherry Creek
Schellbourne
San Juan
Ione
Ellsworth
Genoa
Yerington
Walker Lake
Walker R.
Downeyville
Cloverdale
Hawthorne
Aurora
Bodie
Bridgeport
Belleville
Columbus
Candelaria
Soda Springs
Indian Sp.
San Antonio
Belmont
Danville
Duckwater
Tybo
Hot Cr.
Reveille
Kawich Range
Blue Eagle
White R.
Geyser
Pioche
Bullionville
Panaca
Hiko
Pahranagat L.
Tem Piute
Silver Peak
Lida
Benton
Mono L.
Yosemite Valley
Bishop Cr.
Big Pine
Independence
Owens R.
Lone Pine
Cerro Gordo
Keeler
Owens Lake
Death Valley
Dry Salt Lake
Dry Salt L.
Las Vegas
Las Vegas Pass
Muddy Sps.
Muddy R.
St. Joseph
St. Thomas
Overton
West Pt.
Virgin R.
Callville
Grand Canyon
Newberry Mts.
Hardyville
Mohave City
Marvel
Blake
Quincy
Pilot Peak
Downieville
Dutch Flat
Placerville
Markleeville
Silver Mt.
Jackson
San Andreas
Copperopolis
Sonora
Merced R.
Merced Falls
Mariposa
Merced
Raymond
Madera
Pollasky
Fresno
San Joaquin R.
Kings R.
New Idria
Goshen
Visalia
Hanford
Tulare
Tipton
Huron
Alcalde
Tulare Lake
Tulare R.
Southern Pacific R.R.
Kernville
Kern R.
Bakersfield
Asphalto
San Luis Obispo
Port Harford
Mojave
Dry L.
Sierra Nevada
Inyo Mts.

da Mountains constitute the west boundary of the State. They throw out one spur, however, the Washoe Mountains, which have a N. E. direction. Most of the mountain chains are parallel to each other, and have a general course from N. to S. The principal chains, beginning at the W., are the Virginia Mountains, W. of Pyramid Lake; the Lake range, between Pyramid and Winnemucca Lakes; the Truckee Mountains, E. of Winnemucca Lake; the Trinity and Antelope Mountains, which form the west boundary of the Lower Humboldt river and Lake valley; the West Humboldt Mountains; and, separated from these by a broad valley, the East Humboldt Mountains; S. of the Humboldts are the Toyabe Mountains, and a parallel range, the Santa Rosa. The Pah-Ute and Coyote Mountains, also outliers of the Toyabe range on the W., extend northward toward the Humboldt river and lake. E. and S. E. of the East Humboldt range are the Edwards Creek Mountains, the New Pass range, the Shoshone and Reese River ranges, the Hot Creek, Reveille, and Smoky ranges, the Diamond, Egan, Ungoweah, and Goshoot Mountains, parallel ranges, with valleys between. In the S. W. is an isolated range, the White Mountains. The Colorado valley has numerous abrupt ranges rising from its plateaus, and three peaks of considerable height—viz., Tem Piute, Pahranegat, and Picohe. The most important ranges of the Colorado region are the Muddy, Vegas, Spring Mountain, and Kingston Mountains. Some of the peaks of the West Humboldt and South Toyabe ranges rise to the height of 10,000 to 12,000 feet. The eastern slope of the Sierra Nevada and the Humboldt, East Humboldt, and Toyabe ranges have a considerable number of streams, which, however, disappear very suddenly from the surface, and reappear as lakes or pools farther on. The principal rivers are the Truckee, which rises in Tahoe Lake and flows N. E. and N. W. into Pyramid Lake; the Humboldt, which is formed by the confluence of several small streams in the N. E. of the State, and after a general southwest course falls into Humboldt Lake; Walker river, in the S. W., which, after a circuitous course, falls into Walker Lake; Carson river, discharging into Carson Lake; Quinn's river, in the N. W.; Reese river, in the central portion of the State; the Rio Virgin, in the S. E.; and the Colorado, which forms for a considerable distance a part of the southeast boundary. The principal lakes are Pyramid, 33 miles long and 14 wide; Walker, nearly as large; Carson, 12 miles in diameter; Humboldt, somewhat smaller; Winnemucca, 18 miles long, 8 wide; and Lake Tahoe, one-third of which is in Nevada, 1,500 feet deep, 6,000 feet above the sea. There are also numerous shallow lakes of large extent in the rainy season, but dry or nearly so in the dry season.

Seal of Nevada.

Mineral Resources.—Gold is not an abundant metal in Nevada, but some of the argentiferous ores contain a large amount of gold in combination. The percentage of gold in these ores varies from 21 to 52 per cent. of the entire metallic product. Silver is, however, the staple mineral product of Nevada. The silver lodes are found in almost every part of the State, some yielding from $65 to $100 to the ton, others ranging from $450 to $2,500 or more to the ton. Of these the mines on the Comstock vein or lode have proved the most valuable. The product of the mines for the year ending Sept. 30, 1891, was 375,708 tons; the gross value, $5,948,563. The yield of the Comstock lode for 1890 was over $4,000,000. The number of men employed on that lode was 1,500. The director of the U. S. mint reported the product of Nevada gold mines in 1899 as valued at $2,219,000, and the Nevada silver mines as producing fine silver with a coining value of $1,090,457. There has been a slight falling off in the output of precious metals in Nevada since 1897, when the gold output was valued at $2,976,400, and the silver at $1,588,881. The other minerals of Nevada are lead, copper in various forms, the production of which decreased from 288,077 lb. in 1883 to 20,000 lb. in 1893, but was revived again in 1898, and in 1899 yielded 556,775 lb.; iron in numerous forms, as magnetic, spathic, specular, common iron pyrites, arsenical and magnetic pyrites, etc.; it is not as yet mined to any extent; antimony, arsenic, possibly quicksilver, manganese, sulphuret of zinc, graphite or plumbago, sulphur (pure), gypsum, rock-salt, nitrate of potassa, carbonate of soda in immense quantities, borax, lignite or brown coal, kaolin, sulphate of magnesia, agates, amethyst, epidote, tourmaline, chalcedony, jasper, carnelian, fluorspar, selenite, granite, and mica, of which 1,500 lb. from a single mine were shipped to Syracuse, N. Y., and Hamburg, Germany, in 1894 to be cut. There are numerous mineral springs and some geysers.

Soil and Productions.—While the State will never be largely agricultural, it possesses a sufficiency of arable lands to supply with the aid of irrigation, and possibly without, the needs of such a population as it is destined to have, and its mountain-slopes and some of its valleys will prove to be among the best grazing-lands of the Pacific region. In 1889 there were 1,167 irrigated farms in the State, covering an area of 224,403 acres. The average value of products per acre from these irrigated lands was $12.92. Only 7 per cent. of the land under irrigation was devoted to the cultivation of cereals, the remainder being given up to forage. Its timber-lands proper, those on which grow the lofty pines of the sierras, are of very moderate extent. A part of the lower portions of the mountain regions and some of the valleys along which the rivers flow are covered with a smaller growth of piñon or nut-pine, cottonwood, birch, willow, dwarf cedar, etc. Of the sixty-five natural families of plants catalogued, many are represented by a large number of genera and species. Lupines, clovers, vetches, and nutritious grasses are the most characteristic plants.

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	1,404	1,277	* 9·0
Total acreage of farms	530,862	1,661,416	† 213·0
Value of farms, including buildings and fences	$5,408,325	$12,339,410	† 128·2

* Decrease. † Increase.

The following table shows the acreage, yield, and value of the principal crops (exclusive of a small quantity of barley) in the calendar year 1900:

CROPS.	Acreage.	Yield.	Value.
Wheat	40,457	991,196 bush.	$693,837
Potatoes	1,753	273,468 "	153,142
Hay	154,330	375,022 tons	2,887,669
Totals	196,540	.....	$3,734,648

On Jan. 1, 1900, the farm animals comprised 42,090 horses, value $690,594; 1,338 mules, value $46,654; 18,250 milch-cows, value $622,325; 219,831 oxen and other cattle, value $5,068,415; 657,773 sheep, value $1,914,120; and about 12,000 swine, value $100,000; total head, 951,282; total value, $8,642,108.

Climate.—This is characterized by great extremes. In winter snow falls upon the summits of the mountains, though there is not much in the valleys. The air is dry, the winds are strong, and, though the sunshine is bright and pleasant at midday, the nights are often intensely cold. In January the mercury falls to from 10° to 16° below zero in the valleys, and much lower in the mountains. Spring comes in about the end of February, though there may be piercing winds and sharp frosts, chilling rain and snow in March, or even in April. Thunder-storms of great severity occur in April and May and into June. When these have passed away, the dry season prevails until October. The temperature rises occasionally to 100° or 105°. It falls every night to between 70° and 80°, and does not average in July and August more than 90° at midday. In the eastern part there are frequent thunder-storms in summer and till Sept. 15, and the heat is longer continued and more oppressive. There is less intense cold, very little snow or frost in winter in Southeastern Nevada, and the culture of cotton and sugar-cane has been attempted there. The climate is remarkably healthful and invigorating.

Divisions.—For administrative purposes the State is divided into fourteen counties, as follows:

COUNTIES.	* Ref.	Pop. 1890.	Pop. 1900.	COUNTY-TOWNS.	Pop. 1900.
Churchill	5-F	703	830	Stillwater	129
Douglas	6-E	1,551	1,534	Genoa	323
Elko	3-I	4,794	5,688	Elko	849
Esmeralda	6-F	2,148	1,972	Hawthorne	436
Enreka	4-H	3,275	1,954	Eureka	785
Humboldt	3-G	3,434	4,463	Winnemucca	1,110
Lander	4-H	2,266	1,534	Austin	702
Lincoln	8-J	2,466	3,284	Pioche	242
Lyon	5-E	1,987	2,268	Dayton	458
Nye	6-H	1,290	1,140	Belmont	242
Ormsby	5-E	4,883	2,893	Carson City	2,100
Storey	5-F	8,806	3,673	Virginia City	2,695
Washoe	4-E	6,437	9,141	Reno	4,500
White Pine	5-J	1,721	1,961	Hamilton	221
Totals		45,761	42,335		

* Reference for location of counties, see map of Nevada.

Principal Cities and Towns, with Population for 1900.—Reno, 4,500; Virginia City, 2,695; Carson City, 2,100; Winnemucca, 1,110.

Population and Races.—1860, 6,857; 1870, 42,491; 1880, 62,266; 1890, 45,761 (native, 31,055; foreign, 14,706; males, 29,214; females, 16,547; white, 39,084; colored, 6,677, of whom 242 were of African descent, 2,833 Chinese, 3 Japanese, and 3,599 civilized Indians); 1900, 42,335.

Industries and Business Interests.—Exclusive of the mining and milling industries, there were reported in 1890 95 manufacturing establishments, which had a combined capital of $1,211,269, employed 620 persons, paid $445,503 for wages and $439,058 for materials, and had products valued at $1,105,063. There were 118 quartz-crushing mills, 13 smelting-furnaces, 10 borax-works, 11 grist-mills, and 11 sawmills.

Finance.—The total debt, exclusive of an irredeemable bond of $380,000, on Jan. 1, 1894, was $201,946; cash in treasury, $190,306; net debt, $11,460. The assessed valuation in 1900 was placed at about $25,000,000, and the State Board advised raising it to $75,000,000. The tax levy averages 3·8 per cent.

Banking.—On Sept. 5, 1900, there were 1 national bank with a capital of $82,000, surplus and profits $8,289.50, and deposits $432,791.48; 4 State banks, capital $370,000, surplus and profits $185,088, deposits $1,474,337; and 1 private bank, capital $25,000, surplus $113, and deposits $24,364.

Post-offices and Periodicals.—On Jan. 1, 1901, there were 189 post-offices, of which 9 were presidential (1 second-class and 8 third-class) and 180 fourth-class, and 53 money-order offices. There were 7 daily, 2 semi-weekly, 20 weekly, and 1 semi-monthly periodicals; total, 30.

Libraries.—In 1892 there were reported 8 public libraries of 1,000 volumes and over, which together contained 40,215 bound volumes and 1,970 pamphlets. They were classified as general, college, public institution, State, social, scientific, Masonic, and not reporting, one each.

Means of Communication.—Nevada had in operation, Jan. 1, 1892, 923 miles of railway, costing $16,570,715, with net earnings of $833,918; in 1899 the mileage in operation was 910·35. The Central Pacific is the principal trunk line, running for 450 miles of its course through the State.

Churches.—The Methodist Episcopal denomination has (1893) 28 churches, 13 ministers, and 895 full members; Protestant Episcopal, 11 churches, 535 members; Roman Catholic, 17 churches, 8 priests, and about 5,000 adherents; Presbyterians, 8 churches, 190 members; Baptists, 3 churches, 52 members; Congregationalists, 1 church, 52 members; Jews, 1 synagogue.

Schools.—In 1900 the number of children of school age (six to eighteen years) was 9,026. In 1898 there were 7,348 enrolled in the public schools, with an average attendance of 4,982; there were 224 schools, and 314 teachers—40 men and 274 women; average monthly salaries: men, $56.11; women, $44.83. The revenue for school purposes was $206,821, the expenditure $203,642, the value of school property $265,011. Nevada has a State university, which had 300 students in 1900.

History.—Nevada is a part of the territory ceded to the U. S. by Mexico by the Treaty of Guadalupe Hidalgo, Feb. 2, 1848. It was at first a part of California Territory, and was subsequently attached to Utah; it was constituted a Territory Mar. 2, 1861, with somewhat smaller boundaries than at present. The constitution was ratified, and Nevada admitted into the Union as a State, Oct. 31, 1864. Additions were made to its territory by congressional enactment in 1866.

GOVERNORS OF NEVADA.

Territorial.		Jewett D. Adams	1883–87
James W. Nye	1861–64	C. C. Stevenson	1887–91
State.		R. K. Colcord	1891–95
Henry G. Blaisdell	1864–71	John E. Jones *	1895–96
Louis R. Bradley	1871–79	Reinhold Sadler	1896–
John H. Kinkead	1879–83		

* D. Apr. 10, 1896.

Revised by C. K. Adams.

Nevada: town (located in 1853); capital of Story co., Ia. (for location of county, see map of Iowa, ref. 4-G); on the Chi. and N. W. Railway; 35 miles N. N. E. of Des Moines. It is in an agricultural and stock-raising region; contains 6 churches, graded schools, a national bank with capital of $50,000, a private bank, and a quarterly and 2 weekly periodicals; and has flour and grist mills, 2 grain elevators, foundry, and machine-shop, planing-mill, 2 tile-works, creamery, and wagon-factory. The State Agricultural College is 9 miles W. of the town. Pop. (1880) 1,541; (1890) 1,662; (1900) 2,472.

Editor of "Story County Watchman."

Nevada: city; capital of Vernon co., Mo. (for location of county, see map of Missouri, ref. 6-E); on the Mo., Kan. and Tex. and the Mo. Pac. railways; 90 miles S. W. of Sedalia. It is the seat of Christian University (Christian), of Cottery College (non-sectarian), and of State Insane Asylum No. 3; has a beautiful lake and park, gas and electric lights, street-railway, artesian well, 2 State banks, with combined capital of $150,000, a national bank with capital of $100,000, a private bank, public-school library, and a monthly, 2 daily, and 4 weekly periodicals; and contains a large zinc-smelter, foundry, ice plant, mills, and other manufactories. Pop. (1880) 1,913; (1890) 7,262; (1900) 7,461.

Editor of "Southwest Mail."

Nevada, Emma Wixom: opera-singer; b. in Nevada City, Cal., in 1861. She was educated in Austin, Tex., and in San Francisco; studied singing in Vienna under Madame Marchesi. She made her *début* at her Majesty's theater, London, in 1880, adopting the name of Nevada. She sang afterward with much success in the chief capitals of Europe. Returning to the U. S., she made her first appearance in New York in 1884 in *La Sonnambula*. Her favorite *rôles* are Lucia, Amina, and Mignon.

Nevada City: city; capital of Nevada co., Cal. (for location, see map of California, ref. 5-D); on Deer creek, and the Nevada County N. G. Railroad; 65 miles N. E. of Sacramento. It is in a mining and a fruit and vine growing region, and has several quartz-mills, a weekly and two daily newspapers, and a State bank with capital of $50,000. Pop. (1880) 4,022; (1890) 2,524; (1900) 3,250.

Névé: See Glaciers.

Nevers, *ne-vār'* (anc. *Noviodunum*, or *Nevirnum*): capital of the department of Nièvre, France; on the Loire, at the influx of the Nièvre, 159 miles by rail S. S. E. of Paris (see map of France, ref. 5-F). The town is old and ill-built, with narrow, crooked streets, but it has beautiful promenades, extensive manufactures of iron and copper ware, chemicals, porcelain, cloth, and linens, and large tanneries, breweries, and cannon-foundries. It has been the see of a bishop since 506; its cathedral, restored in 1879, dates from the thirteenth and fourteenth centuries; and there is a stone bridge of fifteen arches over the Loire. Pop. (1896) 27,108.

Nevin, Alfred, Edwin Henry, Ethelbert, and William Channing: See the Appendix.

Nevin, John Williamson, D. D., LL. D.: theologian; b. in Shippensburg, Franklin co., Pa., Feb. 20, 1803; graduated at Union College, 1821, and at Princeton Theological Seminary, 1826, where he remained as tutor, and wrote his *Biblical Antiquities* (2 vols., Philadelphia, 1828). He was Professor of Hebrew and Biblical Literature in the Presbyterian Theological Seminary at Allegheny City (1829–39), where he edited a weekly literary journal entitled *The Friend* (1833–34); became president of the Mercersburg Theological Seminary 1840, and was president also of Marshall College 1841–53. He published in 1843, at Chambersburg, *The Anxious Bench*, which occasioned much controversy on the subject of revivals; and in 1844 a translation (with an introduction) of Dr. Schaff's inaugural address, *The Principle of Protestantism*, which gave rise to the "Mercersburg theology," of which

Dr. Nevin continued till his death to be the chief exponent. Also *The Mystical Presence* (Philadelphia, 1846), which increased, in its doctrinal aspect, the controversy alluded to; *The History and Genius of the Heidelberg Catechism* (1847), and *Antichrist, or the Spirit of Sect and Schism* (1848). Dr. Nevin edited *The Mercersburg Review* (quarterly, 1849–53); resigned the direction of the Theological Seminary 1851, and the presidency of Marshall College on its removal to Lancaster and consolidation with Franklin College in 1853. He was president of Franklin and Marshall College 1866–76. D. at Caernarvon Place, near Lancaster, Pa., June 7, 1886. See his biography by Theodore Appel (Philadelphia, 1889).

Revised by S. M. Jackson.

Nevis: an island of the British West Indies, in the federated Leeward group. It is 3 miles wide and 4 miles long, and rises by gradual slopes to a height of 3,200 feet. The scenery is beautiful, and the lower slopes of the island, which comprise some 6,000 acres, are fertile and well cultivated. It was discovered by Columbus in 1498, and was settled in 1628 by English emigrants from St. Christopher, with which it forms a presidency, with one legislative council, meeting at St. Kitts. The island was taken by the French in 1706; was restored by the Peace of Utrecht; was taken again by the French in 1782, and restored in the following year. Pop. 11,864. Charlestown (*q. v.*), the capital, is the chief town and has a safe roadstead. Sugar, rum, and molasses are exported.

Nevius, John Livingston, D. D.: missionary and author; b. at Ovid, N. Y., Mar. 4, 1829; educated at Union College and Princeton Theological Seminary; was a missionary of the Presbyterian Board at Ningpo, China, 1853–61, and after 1861 in Shantung. D. at Chefoo, in Shantung, Oct. 19, 1893. He published in English *China and the Chinese* (New York, 1868); *San-Poh; or, North of the Hills* (Philadelphia); *Methods of Mission Work* (1886); and *Demon Possession* (1892); in Chinese, *Guide to Heaven* (1857: in classic Chinese, and in Ningpo dialect); *The Two Lights*; *Errors of Ancestral Worship*; *Guide to Evangelists*; *Systematic Theology* (3 vols., completed); *Explanation of the "True Doctrine"*; *Commentary on the Acts*; *Mark's Gospel with Notes*; *Manual for Inquirers, Evangelists, and Outstations*; *Questions on Matthew's Gospel*, on the *Acts with Commentary*, and on *Romans with Analysis for Bible and Theological Classes*; *Defense of Protestantism against Romanism* (1890); with other writers, *The Westminster Standards*; and *A Mandarin Hymn-book*.—His wife, Helen S. Coan Nevius, b. at Lodi, N. Y., Jan. 8, 1832, wrote a number of books in the Chinese language, including *A Catechism of Christian Doctrine*; and in English, *Our Life in China* (New York, 1857).

Nevome Indians: See Piman Indians.

New Albany: city; capital of Floyd co., Ind. (for location of county, see map of Indiana, ref. 11–F); on the Ohio river, and the Balt. and Ohio S. W., the Louis., N. Alb. and Chi., the Louis., Evans. and St. L., and the Pitts., Cin., Chi. and St. L. railways; 3 miles W. of Louisville, Ky. It derives excellent power for manufacturing from the falls of the Ohio, 2 miles distant, and has a large commerce by rail and water. The census returns of 1890 showed that 299 manufacturing establishments (representing 65 industries) reported. These had a combined capital of $5,352,521; employed 4,508 persons; paid $2,099,091 for wages and $3,471,487 for materials; and had products valued at $6,633,259. The principal industries are the manufacture of iron and steel, cotton, woolen, and hosiery goods, plate glass, and tanned leather. The city has a new belt line of railway, electric street-railways extending through the suburbs, gas and electric light plants, new Masonic temple, Odd Fellows' hall, De Pauw College for young women, public high school for white pupils, Scribner high school for colored youth, 3 libraries (De Pauw College, founded 1846; Township, founded 1851; and Public, founded 1885) containing over 10,000 volumes, 4 national banks with combined capital of $700,000, a State bank with capital of $100,000, and a monthly, 2 daily, and 4 weekly periodicals. The assessed valuation in 1893 was $11,113,060, and the net debt Jan. 1, 1894, $367,989. Pop. (1880) 16,423; (1890) 21,059; (1900) 20,628. Editor of "Ledger."

New Amsterdam: the old name of New York city, adopted on the arrival of Gov. Stuyvesant, in 1647. Previous to that date the village was called Manhattan. On its capitulation, in Sept., 1664, to the English, its name was changed to New York.

Newark: town (founded in 1758); New Castle co., Del. (for location of county, see map of Delaware, ref. 2–H); on the Phil., Wil. and Balt. and the Balt. and Ohio railways; 12 miles S. W. of Wilmington, 37 S. W. of Philadelphia, 58 N. E. of Baltimore. It is in an agricultural region; has several paper-mills and vulcanite-fiber works; and contains the Delaware State College (endowed by the national land grant, and chartered in the year 1870), Academy of Newark (non-sectarian, chartered in the year 1769), Delaware Normal School, 2 libraries (Delaware College and the Delta Phi Society, both founded in 1835) containing over 6,000 volumes, one weekly and a monthly periodical, and a national bank with capital of $50,000. Pop. (1880) 1,148; (1890) 1,191; (1900) 1,213. Editor of "Delaware Ledger."

Newark: city (settled by families from Milford, Branford, and Guilford, Conn., in 1666; chartered as a city in 1836); port of entry; capital of Essex co., N. J. (for location, see map of New Jersey, ref. 2–D); on the Passaic river, the Penn., the Del., Lack. and W., the Erie, the Lehigh Valley, and the Central of N. J. railways, and several lines leased by them; 9 miles west of New York city. It has a river and bay frontage of 10·5 miles, and an area of 18 sq. miles, of which three-fourths are improved and built up. There are 114·44 miles of paved streets, 28·38 miles of steam-railway track, and 90 miles of trolley tracks. The water-supply is obtained from the Pequannock watershed, 21 miles distant, the new system swelling the water debt to $7,777,000. There are brick and pipe sewers, aggregating 179·18 miles in length. The city is laid out regularly; has three public parks—Washington Park, containing a statue of Seth Boyden, the inventor; Military Park, the old training common, containing bronze statues of Gen. Philip Kearny and of Frederick T. Frelinghuysen, formerly U. S. Secretary of State; and Lincoln Park. Since 1895 Essex County has had commissioners laying out a system of parks at a cost of $4,000,000. Three of these are located in Newark—Branch Brook Park, containing 277 acres; East Side Park, 12½ acres; West Side Park, 23 acres. Broad avenues lead in various directions to the county lines, and extend to Elizabeth, the Oranges, Montclair, Caldwell, Rutherford Park, and other points. The city ranks next after New Haven in the number and age of its elm-trees. The river, navigable for some distance above the city, has been greatly improved by the U. S. Government, and, because of its sheltered position, has been a favorite racing-course for the National Association of Amateur Oarsmen and other rowing associations, but of late years the polluted condition of the stream has almost driven oarsmen from its surface. The city is best known for the extent and variety of its manufactures. The census returns of 1890 showed that 2,413 manufacturing establishments (representing 185 industries) reported. These had a combined capital of $53,847,452; employed 43,302 persons; paid $24,568,966 for wages and $38,074,115 for materials; and had products valued at $81,399,137. The following table shows the principal industries:

CLASSIFICATION.	Establishments.	Capital.	Persons employed.
Malt liquors	17	$5,490,473	927
Leather	50	5,052,687	2,303
Jewelry	68	3,853,115	1,905
Foundry and machine-shop products	73	3,601,983	2,225
Hardware	53	2,055,450	1,579
Celluloid and celluloid goods	4	2,028,268	693
Hats and caps	49	1,499,409	2,721
Trunks and valises	14	1,339,050	1,263
Men's clothing, wholesale	93	1,251,287	2,286
Boots and shoes	71	1,190,083	1,765

Next in importance to its manufactories are its financial institutions. In 1900 there were 9 national banks with combined capital of $2,950,000, a State bank with capital of $100,000, 5 savings-banks, a private bank, a trust company with a capital of $1,000,000, 5 insurance companies with combined capital of $1,915,312 and cash assets of $6,535,349, and 2 widely known life companies—the Mutual Benefit and the Prudential of America. Official reports for 1891 showed 272 building and loan associations with 78,700 shareholders and $25,600,000 in assets. The assessed valuations in 1900 were: Real estate, $118,389,585; personal $31,716,875; total, $150,106,460; and the net debt in 1900 was $12,091,640.76. The foreign trade was represented in the fiscal year ending June 30, 1900 by imports of merchandise valued at $295,887 and by exports valued at $1,221,983. In 1900 there were 132

churches, the Roman Catholic, Methodist Episcopal, Presbyterian, Baptist, and Protestant Episcopal predominating in the order given. There were 57,714 children of school age, of whom 38,124 were attending the public schools and 9,138 attending private and parochial schools. The city owned 48 school buildings and hired 4. There were 998 public-school teachers, of whom all but 110 were women. The evening schools had 4,236 pupils. There were also the Newark Academy, an old-established classical institution, St. Benedict's College, St. Mary's and St. Vincent's Academies, and a technical school. Of libraries there were the Free Public (founded 1888), Board of Trade, two business colleges, Essex County Law, St. Benedict's College, Young Men's Catholic Association, New Jersey Historical Society, and the public-school libraries. The charitable and benevolent institutions included the Orphan Asylum, Foster Home, Home for the Friendless, Krueger Home for Aged Men and Women, Faith Home, Home for Incurables, Home for Crippled Children, Day Nursery and Baby Shelter, St. Barnabas, St. Michael's, and the German hospitals, Hospital for Women and Children, Babies' Hospital, Newark City Hospital, and the Charitable Eye and Ear Infirmary. There were 29 social clubs and associations and 8 singing societies. Pop. (1880) 136,508; (1890) 181,830; (1900) 246,070. JOHN L. O'TOOLE.

Newark: village; Wayne co., N. Y. (for location of county, see map of New York, ref. 4–E); on the N. Y. Cent. and H. R., the N. Cent., and the W. Shore railways, and the Erie Canal; 30 miles E. of Rochester. It is in an agricultural region; contains 10 churches, an academy, union school, 2 lower grade schools, water-works, electric lights, the State Custodial Asylum for Feeble-minded Women, union school library (founded 1857), a national bank with capital of $50,000, 2 private banks, and 3 weekly newspapers; and is principally engaged in peppermint-distilling, fruit evaporating and canning, and the manufacture of tinware, vinegar, and flour. Pop. (1880), 2,450; (1890) 3,698; (1900) 4,578. EDITOR OF "GAZETTE."

Newark: city; capital of Licking co., O. (for location of county, see map of Ohio, ref. 5–F); on the Balt. and O. and the Pitts., Cin., Chi. and St. L. railways, and the Ohio and Erie Canal; 33 miles N. E. of Columbus. It is in an agricultural, coal-mining, and natural-gas region; has a large trade in coal, grain, and live stock; and contains 7 public-school buildings, circulating library (founded 1877), 2 national banks with combined capital of $250,000, a savings-bank with capital of $75,000, a private bank, and 3 daily and 4 weekly newspapers. The car-shops of the Balt. and Ohio Railroad are located here, and there are also manufactories of glass, portable engines, stoves, iron-bridge work, paper, wire-cloth, carriages, flour, lumber, and soap. The assessed valuation in 1893 was $5,950,870, and the total debt $335,731. Pop. (1880) 9,600; (1890) 14,270; (1900) 18,157. EDITOR OF "ADVOCATE."

Newark System: in geology, a group of rocks of Mezozoic age, occurring in isolated tracts near the Atlantic coast from Nova Scotia to the Carolinas. Except in Nova Scotia they are sharply separated by unconformity from Archæan and Paleozoic rocks beneath and from Cretaceous and Cenozoic strata above. They are further contrasted by their prevailing red color, and they are distinguished from later formations by high dips. The system has received much attention from geologists, and, being of doubtful age, has been called by many names; its synonomy is larger than that of any other formation or group of the U. S. The largest tract follows the southeastern margin of the Appalachian Mountains from Southern New York across New Jersey, Pennsylvania, and Maryland into Virginia, and smaller areas carry the same trend to North Carolina. A more easterly belt is represented near Richmond, Va., and in Central and Southern North Carolina. A large tract occupies the Connecticut valley in Massachusetts and Connecticut, and other tracts border the Bay of Fundy in Nova Scotia.

The principal rock is shale, chiefly red, but also of dark-slate color. Red sandstones associated with these, though thinner, are of such economic and topographic importance that the system is frequently spoken of as a sandstone. Limestones and conglomerates are of rarer occurrence. The maximum thickness, measured in Pennsylvania, is 27,000 feet. Interbedded with the sedimentary rocks, and also to some extent intruded among them, are traps, and these hard rocks have been left prominent by erosion, constituting the conspicuous hills of the Connecticut valley, the Palisade ridge along the Hudson, and the Watchung Mountains of New Jersey. Remains of plants and fishes have been found in the shales, and many sandstone layers show the tracks of large vertebrates.

The sandstones are quarried for building material and have a wide use under the name of brownstone. The traps constitute one of the best road materials in the country, and are extensively quarried for this purpose, as also for the manufacture of paving-blocks. Coal-seams occur at various places, and were for many years mined near Richmond, Va. See JURA-TRIAS PERIOD, and consult I. C. Russell, *Bulletin No. 85, United States Geological Survey.*

G. K. GILBERT.

Newark-upon-Trent: town; in the county of Nottingham, England: on a navigable branch of the Trent; 120 miles N. by W. of London (see map of England, ref. 8–I). It has an ancient parish church, a grammar school founded in 1529, a free library, a hospital, a town-hall, a corn exchange, and a handsome coffee-palace. It has breweries, iron and brass foundries and other factories, and carries on a large trade in malt, flour, corn, wool, and cattle. Pop. (1891) 14,457.

Newaygo: village; capital of Newaygo co., Mich. (for location of county, see map of Michigan, ref. 6–H): on the Muskegon river, and the Chi. and N. W. Railway; 36 miles N. by W. of Grand Rapids. It has good water-power, and contains two flour-mills, large furniture-factory, saw and shingle mills, and sash-factory, a private bank, and a monthly and two weekly periodicals. Pop. (1880) 1,097; (1890) 1,330; (1900) 1,172. EDITOR OF "REPUBLICAN."

New Bedford: city (set off from Dartmouth 1787, incorporated 1847); one of the capitals of Bristol co., Mass. (for location of county, see map of Massachusetts, ref. 5–I); on the Acushnet river, near its mouth, and the N. Y., N. H. and Hart. Railroad; 56 miles S. of Boston. For more than 100 years it has been the chief seat of the U. S. whale-fishery. From 1755 till about 1854 this industry was at its height and employed 400 whaling-ships, but it has since declined steadily, and in 1900 employed only 22 vessels of all kinds in this pursuit. As this industry declined local capitalists turned their attention to manufacturing, and by 1900 had made New Bedford the second cotton-manufacturing city in the country. In this industry there are 13 establishments and $19,589,000 capital. The cotton-mills had 1,369,380 spindles and 23,351 looms, and a woolen-mill had 4,500 spindles and 63 looms. The census of 1890 showed in all 351 manufacturing establishments (representing 57 industries) with a combined capital of 19,602,583; employing 10,730 persons; paying in wages $4,626,135; and manufacturing products valued at $15,886,288. There are about 50 churches, an excellent system of public schools, a free public library (founded 1852) containing over 70,000 volumes and having an endowment of $64,100, 5 other libraries containing nearly 20,000 volumes, a Friends Academy, St. Luke's and St. Joseph's Hospitals, an orphan asylum, a water-service with over 60 miles of mains, gas and electric light plants, electric street-railway, 3 national banks with combined capital of $2,600,000, 2 savings-banks with deposits of $20,929,041, 2 co-operative banks with deposits of about $500,000, a safe-deposit and trust company with capital of $200,000, and 2 daily and 3 weekly newspapers. The city has regular steamboat communication with Martha's Vineyard, Nantucket, and New York, and has become an important coal-shipping point. The beautiful harbor in Buzzard's Bay is protected by a granite fortification on the extremity of Clark's Point, which is connected with the heart of the city by an avenue 4 miles long. The assessed valuations in 1900 were: Real, $35,762,290; personal, $20,492,665; bank, $1,629,497.50; total, $57,884,452.50; and the net bonded debt on Jan. 1, 1901, was $2,972,159,640. Pop. (1880) 26,845; (1890) 40,733; (1900) 62,442. WILLIAM J. SAYRE.

Newbern: city (settled by the Swiss in 1710); capital of Craven co., N. C. (for location of county, see map of North Carolina, ref. 4–J); at the junction of the Neuse and Trent rivers, and on the Atlantic and N. C. and the Wil., Newb. and Norfolk railways; 90 miles N. E. of Wilmington, 108 miles E. S. E. of Raleigh. It has direct communication with the sea by Ocracoke inlet, and regular connection with Norfolk, Baltimore, and New York by steamship. It is the port of entry for the Pamlico customs district, has a valuable trade in cotton, lumber, naval stores, and fish, and ships early vegetables to Northern markets. The principal local industries are the manufacture of tobacco and lumber

and the distillation of turpentine. There are 15 churches, public library (founded 1886), high school, collegiate institute, a national bank with capital of $100,000, a State bank with capital of $75,000, a citizens' bank with capital of $50,000, a private bank, and a daily and a weekly newspaper. The city was the capital of the province of North Carolina from the organization of the Government till 1793, and was captured by a Union force under Gen. Burnside on Mar. 14, 1862. Pop. (1880) 6,443; (1890) 7,843; (1900) 9,090.

EDITOR OF "JOURNAL."

Newberry: town; capital of Newberry co., S. C. (for location of county, see map of South Carolina, ref. 5–D); on the Columbia and Greenville and the Col., Newb. and Laurens railways; 47 miles N. W. of Columbia. It is the seat of Newberry College (Lutheran, chartered 1856), has graded schools for white and colored pupils, and contains a cotton-factory, cottonseed-oil mill and ginnery, fertilizer-works, door, sash, and blind factory, a national bank with capital of $150,000, a savings-bank with capital of $15,000, and three weekly newspapers. It is a growing cotton-market. Pop. (1880) 2,342; (1890) 3,020; (1900) 4,607.

EDITOR OF "HERALD AND NEWS."

Newberry, JOHN STRONG, M. D., LL. D.: geologist and naturalist; b. at Windsor, Conn., Dec. 22, 1822; graduated at Western Reserve College in 1846, and at Cleveland Medical College in 1848. In 1851 he established himself as a physician in Cleveland, but, finding no time for scientific studies, in 1855 he accepted an appointment as surgeon and geologist of the expedition under Lieut. R. S. Williamson, U. S. army, for the exploration of the territory lying between San Francisco and the Columbia river. In 1857–58 he was attached, in the same capacity, to the expedition under Lieut. J. C. Ives, U. S. army, which made the first exploration of the Colorado river. In 1859 he accompanied Capt. J. N. Macomb, U. S. engineers, in the exploration of the country bordering the upper Colorado and San Juan rivers. During the civil war he was a member of the U. S. Sanitary Commission, and to him was delegated the organization and direction of all its operations in the valley of the Mississippi. In 1866 he was appointed Professor of Geology in the School of Mines, Columbia College, New York, a position he retained until his death, which occurred at New Haven, Conn., Dec. 7, 1892. In 1869 the Geological Survey of Ohio was organized, and he was placed at its head. Under his direction the work was vigorously prosecuted, and an important series of reports were published. Dr. Newberry was honored with membership in most of the learned societies of the U. S. and in many of Europe; was one of the original corporators of the National Academy of Sciences; was president of the American Association for the Advancement of Science (1867), of the New York Academy of Sciences (1867–91), of the Torrey Botanical Club (1880–90), and of the International Congress of Geologists (1891), and received the Murchison medal of the Geological Society of London (1888). His publications have been chiefly in the department of geology and palæontology, but also include papers on botany and zoölogy. The most important are a report *On the Geology, Botany, and Zoölogy of Northern California and Oregon*; *The Geology of the Colorado Expedition* (1860); *Geology of the San Juan Expedition* (1875); *Reports of the Geological Survey of Ohio*; *Our Later Extinct Floras* (1869); *Catalogue of the Plants of Ohio* (1860); *Fossil Plants collected on the Northwestern Boundary Commission* (1863); *The Rock Oils of Ohio* (1859); *Circles of Depositions in American Sedimentary Rocks* (1873); *Iron Resources of the United States* (1874); *The Structure and Relations of Dinichthys* (1875); *Fossil Fishes and Fossil Plants of the Triassic Rocks of New Jersey and the Connecticut Valley* (1888); *Palæozoic Fishes of North America* (1889). Revised by G. K. GILBERT.

Newboldt, JOHN HENRY: See the Appendix.

New Braunfels: city (founded by Prince Braunfels in 1845); capital of Comal co., Tex. (for location of county, see map of Texas, ref. 5–H); at the intersection of the Comal and Guadalupe rivers, and on the International and Gt. N. Railroad; 30 miles N. E. of San Antonio, 50 miles S. by W. of Austin. It is in an agricultural and stock-raising region, has excellent water-power, and contains 3 churches, public school, 2 denominational schools, hospital, waterworks, electric lights, 2 cotton-gins, 2 roller-mills, several carriage and machine shops, cottonseed-oil mill, a national bank with capital of $50,000, and 2 weekly newspapers. Pop. (1880) 1,938; (1890) 1,608; (1900) 2,097.

New Brighton: village (now part of the borough of Richmond, New York city); Richmond co., N. Y. (for location of county, see map of New York, ref. 8–A); on the north shore of Staten Island, and on the Staten Island Rapid Transit Railroad; 6 miles S. W. of Manhattan, with which it is connected by ferry. It comprises several villages, which command a view of the upper bay of New York and the Narrows, and the Sailors' Snug Harbor, for aged mariners, a richly endowed estate with extensive buildings, and an institution for destitute children of seamen. The village contains 10 churches, 3 libraries (Brighton Heights Seminary, Sailors' Snug Harbor, and Trinity English and Classical School) containing nearly 10,000 volumes, 2 large hotels, a national bank with capital of $100,000, the S. R. Smith Infirmary (a small but thoroughly equipped hospital), 2 weekly newspapers, and many costly residences of New York business men. There are two dyeing and printing works, several large plaster-mills, the largest cotton-storage warehouses on New York harbor, wall-paper and silk printing-factories, and public water-works and an electric-lighting system supplying New Brighton, West New Brighton, and Tompkinsville. Pop. (1880) 12,679; (1890) 16,423.

EDITOR OF "STATEN ISLANDER."

New Brighton: borough; Beaver co., Pa. (for location of county, see map of Pennsylvania, ref. 4–A); on the Beaver river, and the Pitts., Ft. W. and Chi., the Erie and Pitts., and the Pitts. and Lake Erie railways; 29 miles N. N. W. of Pittsburg. It is in a coal and clay region, contains 8 churches, 4 public-school buildings, library (Y. M. C. A., founded 1852), 2 national banks with combined capital of $150,000, a private bank, and a daily and a weekly newspaper, and has 4 potteries, 2 flour-mills, 2 planing-mills, novelty iron-works, bath-tub works, flint-glass factory, sewer-pipe works, horse-nail works, gas-engine works, and soap-factory. Pop. (1880) 3,653; (1890) 5,616; (1900) 6,820.

EDITOR OF "NEWS."

New Britain: a name given by Dampier to the group of islands now called BISMARCK ARCHIPELAGO (*q. v.*), and especially to the largest island of this group, now under German protection and called NEU-POMMERN or NEW POMERANIA (*q. v.*).

New Britain: city (first settlement made about 1650; became a town in 1850; chartered as a city in 1870); Hartford co., Conn. (for location of county, see map of Connecticut, ref. 9–G); on the N. Y. and N. E. and the N. Y., N. H. and Hart. railways; 9 miles S. W. of Hartford. It contains 12 churches, a Roman Catholic cathedral, State armory, State Normal School, high school, public-school property valued at over $260,000, 2 libraries (Normal School, founded 1851, and Institute, founded 1853) containing over 16,000 volumes, public park of 74 acres, gas, water, and electric-light plants, 2 national banks with combined capital of $410,000, a savings-bank with deposits of over $2,530,000, and 2 daily and 3 weekly newspapers. The industries include the manufacture of iron and brass goods, artistic bronze house-trimmings, builders' hardware, cutlery, hosiery, joiners' tools, and brick. The assessed valuation of the city in 1892 was $8,154,059, and the net debt on Jan. 1, 1894, was $459,816. Pop. (1880) township, 13,979; city, 11,800; (1890) township and city coextensive, 19,007; (1900) 28,202.

EDITOR OF "HERALD."

New Brunswick: a province of the Dominion of Canada, formerly a part of Nova Scotia; bounded N. by the Province of Quebec and the Bay of Chaleurs, E. by the Gulf of St. Lawrence, Northumberland Strait, and the Bay of Fundy, and W. by the State of Maine. It lies between 44° 30′ and 48° 5′ N. lat., and 63° 47′ and 69° 5′ W. lon. Area, 28,100 sq. miles (for location, see map of provinces of Quebec and New Brunswick).

Physical Features.—The physical features of New Brunswick are a reflection of its geological history. All the geological deposits of greater age than the Carboniferous form a *massif* or "complex," diversified in places by ridges of intrusive granite. Of the granites, there are two principal bands which form the axes of two ranges of hills, the one in the northern portion of the province, the other near its southern coast. In most places the rocks of the *massif* are altered by heat and pressure, and contain in places ores of various metals. Between the two ranges of granite hills a large triangular area of the *massif* is covered by sandstones and shales of Carboniferous age, which are unaltered, and therefore comparatively soft and friable, and contain beds of coal and other mineral deposits of economical importance.

The Carboniferous deposits form an undulating plain whose eastern margin borders the Gulf of St. Lawrence, and on the other two sides is limited by the slopes of the two hill ranges mentioned above.

North of the northern granite range the *massif* forms a plateau of calcareous slates which is crossed by the upper branches of the St. John river, and extends down the valley of the Restigouche to Chaleurs Bay. The plateau and the plain nearly meet on the middle courses of the St. John river, where the Palfrey Mountains on the one side and the Nepisiguit Hills on the other sink down to the level of the plain. Similarly in its lower courses the St. John river breaks through the southern range of hills, its valley dividing the Nerepis Hills from the Quaco Hills. In the Quaco Hills the rocks consist largely of ancient, consolidated volcanic deposits, and the granitic core appears at the surface in only a few places.

The highest hills are in the main granitic belts. Bald Mountain, in the Nerepis Hills, is 1,400 feet high, and the Sagamore Mountain, in the Nepisiguit Hills, is 2,240 feet high. The largest lake in the province is Grand Lake, in the hollow of the carboniferous plain, and is 30 miles long; but the lower reaches of the St. John river, among the Southern Hills, present several lake-like expansions of considerable size, as Washademoak Lake and Belleisle and Kennebecasis Bays.

The chief rivers are the St. John, over 440 miles long, the Miramichi, the Restigouche, and the Nepisiguit, the first discharging its waters into the Bay of Fundy, the other three emptying into the Gulf of St. Lawrence. The St. Croix and the Petitcodiac are also rivers of some importance entering the Bay of Fundy. The St. John river is unique, for one of so considerable size, in being contracted at its mouth to 400 feet, and having there a tidal rapid with alternate flow out and in twice a day.

The principal indentations of the eastern coast of New Brunswick are Chaleur, Miramichi, and Verte Bays. The province is divided from Prince Edward Island on this coast by the Strait of Northumberland, and from Nova Scotia by the Bay of Fundy. This bay has two indentations of its northern shore, Passamaquoddy at one end, and Chignecto Bay at the other. The bays of both shores of the province afford excellent fishing-grounds.

Mineral Products.—Coal has been found at many points in New Brunswick, but occurs only in thin seams; the most important is that at Grand Lake, which has been worked for many years. A valuable deposit of albertite (melanasphalt) was formerly worked at Hillsboro, in Albert County, but the vein is exhausted. It occurs in an extensive deposit of pyroschist, of which at present no use is made. Quarries of excellent freestone are worked in Albert, Westmoreland, Northumberland, and Gloucester Counties, and the product sent to the upper provinces of Canada, and more largely to the U. S. Good roofing-slates are found in the northern part of Charlotte County and elsewhere. Lime is calcined at St. John, where there are large deposits of limestone; the product is used for domestic purposes and for exportation to the U. S. Manganese mines have been opened, and are still operated in Albert and King's Counties. Extensive deposits of nickeliferous pyrites have been found in Charlotte County, but are not yet worked with profit. Plumbago, copper, antimony, bismuth, and lead occur; gold has been found in small quantities, and iron ore of several kinds is known to occur in considerable quantities, but is not mined.

Climate.—The climate of New Brunswick has some unusual contrasts. The western part of the central plain has a high summer temperature, and the mercury sometimes rises to 95° and 100° in the shade; here the native flora or wild plants include many species found in Eastern Ontario and Western Massachusetts; the genial temperature is due to the southern range of hills, which exclude the moist, chilly winds of the Gulf of Maine. On the other hand, many of the plants of Labrador are found growing on the islands and points of the southern shore that jut out into the Bay of Fundy, which are thus bathed in the cool air and fogs of the Atlantic Ocean. As a result the vegetation of this shore has a more arctic (or alpine) aspect than that of the highest hills of the interior. Statistics show that the hottest months of the year are those in which fogs are most prevalent along the coast. In 1889 the maximum temperature at St. John in February was 42°, minimum −11°; maximum in June 86·7°, minimum 45°; mean temperature for year, 43°; average annual rainfall, 26·4 inches. At Fredericton, 80 miles inland, the maximum temperature in February was 42·9°, minimum −33°; maximum in May 91·7°, minimum 32°; mean temperature for year, 43·9°; average annual rainfall, 25·8 inches.

Soil.—Considerable tracts in New Brunswick are of a hilly and broken character, and so not suitable for agricultural purposes; but the moisture of the climate encourages the growth of trees, and such tracts afford excellent timberland. Other parts consist of good farming land. The best soils are found in connection with calcareous slates of Silurian age, as in Carleton, Victoria, Restigouche, and Queen's counties; or with the red sandstones of Carboniferous age, as in the valleys of King's, Albert, and Westmoreland; or on the flood plains of the great rivers, as the St. John, Miramichi, and Restigouche. Very fertile diked lands occur around the shores near the head of the Bay of Fundy. The total acres occupied in 1891 were 4,471,250; under crop, 1,018,704; in pasture, 479,607; gardens and orchards, 11,479; woodland and forest, 2,961,460. A great impetus has been given to dairying and cheese-making, both federal and provincial governments aiding the farmers in these directions. The chief agricultural products are wheat, buckwheat, oats, rye, hay, potatoes, and other root-crops.

Geographical Divisions and Population.—The province is divided into sixteen counties, as follows:

COUNTIES.	* Ref.	Pop. 1881.	Pop. 1891.	COUNTY-TOWNS.
Albert	5-I	12,329	10,971	Hopewell Cape.
Carleton	5-G	23,365	22,529	Woodstock.
Charlotte	6-G	26,087	23,752	St. Andrews.
Gloucester	3-H	21,614	24,897	Bathurst.
Kent	4-I	22,618	23,845	Richibucto.
King's	5-H	25,617	23,087	Hampton.
Madawaska	3-F	.....	.....	Edmundston.
Northumberland	4-H	25,109	25,713	Newcastle.
Queen's	5-H	14,017	12,152	Gagetown.
Restigouche	3-G	7,058	8,308	Dalhousie.
St. John (city)	6-H	26,127	24,184	
St. John (county)	6-H	26,839	25,390	St. John.
Sunbury	5-H	6,651	5,762	Oromocto.
Victoria	4-G	15,686	18,217	Grand Falls.
Westmoreland	5-I	37,719	41,477	Dorchester.
York	5-G	30,397	30,979	Fredericton.
Totals	.....	321,233	321,263	

* Reference for location of counties, see map of provinces of Quebec and New Brunswick.

Madawaska and Victoria are separate counties for provincial and municipal purposes, but constitute one county under the name of Victoria for Dominion purposes, and hence the census returns appear only under the latter. The population in 1824 was 74,176; in 1840, 156,662; in 1861, 252,047. In 1881 the origins of the people were: English, 93,387; French, 56,635; Irish, 101,284; Scotch, 49,829; German, 6,310; Dutch, 4,373. Of the Irish, fully one-half were north of Ireland Protestants. In 1891 more than three-fourths of the population were of native parentage. The chief centers of population are the city of St. John, pop. 39,179, including Portland, annexed in 1889 (in census return in above table Portland is included in St. John county); Fredericton, pop. 6,500; Moncton, 8,762; Chatham, 5,644; Newcastle, 4,000; Sussex, 3,200; Woodstock, 3,288; St. Stephen, 2,680; Bathurst, 4,800; Richibucto, 3,986; St. Andrews, 1,778; Marysville, 1,400.

Means of Communication.—There are in operation fully 1,350 miles of railway, intersecting the province in all directions, and bringing all parts into easy communication, connecting it with Nova Scotia and Quebec on the E. and N. and with the U. S. on the W. Chief among the lines of railway are the Intercolonial Railway, running from St. John to Moncton and connecting the latter city with Halifax on the E. and Quebec on the N., having within the province a length of 345 miles; the Canadian Pacific Railway, extending from St. John to Vanceboro, Fredericton, Woodstock, and Edmundston, and connecting with the railway systems of Canada and the U. S., with over 400 miles of rails in the province; the Canada Eastern Railway, running from Fredericton to Chatham through the interior of the province, 127 miles; the Shore Line Railway, 82 miles long, extending from St. John to St. Stephen; the Central Railway, 75 miles long; the Kent Northern, 34 miles; the Salisbury and Harvey and Albert Southern, 69 miles; the Caraquet Railway, 68 miles; the Elgin and Havelock, and other shorter lines.

During the summer steamers ply on the river St. John, where is to be seen some of the finest natural scenery in the world. A line of steamers also runs between St. John and

Boston, from St. John to Digby and Annapolis in Nova Scotia, and from Shediac to Prince Edward Island. Regular passenger and freight steamships also run from St. John to Great Britain and to the West Indies. A very large amount of money has already been expended in the construction of a ship-railway across the Isthmus of Chignecto between New Brunswick and Nova Scotia, a distance of 17 miles. It will connect the waters of the Gulf of St. Lawrence and the Bay of Fundy, and when completed will be able to transport the largest ship.

Industries and Business Interests.—Ship-building and lumbering, outside of agriculture, were the staple industries for years. Lumbering still occupies a prominent position, but ship-building, owing to the use of iron and steel in the construction of ships, has very considerably declined. The number of vessels on the registry for 1893 was 1,010; the total tonnage, 156,086. The industrial establishments in 1881 were 3,117, with 19,922 persons employed; in 1891 there were 5,419; capital invested, $16,608,755; number of employees, 26,609; wages paid, $5,936,021; cost of raw material, $12,443,043; value of products, $23,685,636. The value of machinery and tools employed in 1891 was $5,478,924; number of steam-engines in use, not including those used in mines, agriculture, and shipping, 507, with 23,626 horse-power. There are five cotton-mills, a sugar-refinery, two rolling-mills, nail-mills, a pulp-mill, several foundries, together with many factories and other industrial establishments. The total value of exports for the year 1893 (exclusive of trade with the other provinces of Canada) was $7,253,611, of which $3,069,027 went to Great Britain and $3,735,074 to the U. S. For the same year the total value of imports was $5,763,884, of which $1,976,225 came from Great Britain and $2,933,763 from the U. S. The chief articles of export were minerals, value $80,417; fish, $756,437; forest products, $5,539,676; animals and their products, $210,539; agricultural products, $174,968; manufactures, $464,940; miscellaneous, $26,634.

In 1893 there were engaged in the fisheries 226 vessels; tonnage, 3,382; value, $83,795; men employed on vessels, 827. Also 5,978 boats; value, $202,282; men employed on boats, 10,478; fathoms of gill-nets and seines in use, 528,817; value of nets, seines, lobster plant, etc., $1,489,035. The total value of the fisheries for 1893 was $3,746,121.

Political Organization.—The Government consists of a Lieutenant-Governor, appointed by the Governor-General of Canada, whose term of office is five years, or until his successor thereafter is appointed; an executive council, consisting of an attorney-general, solicitor-general, provincial secretary, chief commissioner of board of works, surveyor-general, and two or three others. All members of the executive council must be members of the legislative assembly. The legislative assembly is composed of forty-one members and elected for four years, unless sooner dissolved by the Lieutenant-Governor. The legislative council, or upper house, was abolished in 1892. The franchise is so broad that it nearly approaches manhood suffrage. Any male person twenty-one years of age, being a British subject, under no disability, owning real estate of the value of $100, or real and personal together of the value of $400, or having an annual income of $400, or being a priest or other Christian minister in charge of a congregation, or a licensed teacher or professor in any school or college, or a resident for twelve months prior to the election in any electoral district, may have his name put on the voters' list.

The judiciary of the province is composed of a chief justice and five associate justices of the Supreme Court; six county court judges, having jurisdiction in actions of contract to the extent of $400 and of torts to $200, with criminal jurisdiction the same as the Supreme Court, except in capital offenses. Parish court commissioners and justices of the peace have limited jurisdiction in their localities for the collection of debts and in preliminary examinations.

The total annual revenue is about $650,000, of which $483,569 is received as a subsidy from the Dominion. The balance is derived from crown lands, fishing rights, fees of offices, and certain sources of direct taxation. This revenue is expended by the executive Government in paying interest on the public debt, toward the support of public schools, roads, bridges, agriculture, charitable institutions, and other public services. The net debt, incurred chiefly in aid of railway construction within the province, on Dec. 31, 1893, was $2,183,563.

Churches and Schools.—In 1891 there were 974 church edifices, as follows: Roman Catholic, 153; Church of England, 156; Baptist, 322; Methodist, 208; Presbyterian, 108; others, 19. The Roman Catholics numbered 115,961; Baptists, 79,649; members of the Church of England, 43,095; Presbyterians, 40,639; Methodists, 35,504; all others, 6,415.

The public-schools system is free and non-sectarian, under the control of the provincial Government, and liberally supported from the public funds. The property of the different localities is also assessed to support the schools. During the first term of 1893 there were 1,614 schools, taught by 1,693 teachers; attendance of pupils, 60,154, or 1 in 5·34 of the population. There may be a grammar school in each county and a superior school in every parish. In 1893 there were 14 grammar and 50 superior schools. The attendance given above includes these schools. The payment of provincial funds for the year ended June 30, 1893, was $148,832.27. The total expenditure during the year for grammar, superior, and common schools (not including district assessments for school buildings, apparatus, fuel, etc.) was $421,383.60, or an average cost per pupil of $6.06.

The province also maintains at Fredericton a normal school for training teachers; attendance, 1892–93, 264. Three institutions possess university powers and confer degrees in the different arts and faculties—the University of New Brunswick (coeducational) at Fredericton, supported by the province; attendance in 1893, 81; the University of Mt. Allison (coeducational), Sackville, controlled by the Methodists; attendance, 1892–93, 152; Mt. Allison was the first university in Canada to confer full university privileges and degrees upon women; St. Joseph's College, Memramcook, under the control of the Roman Catholics, and especially patronized by the French Acadians. The Methodists also maintain a Ladies' College and Boys' Academy at Sackville; the Baptists, a seminary for both sexes at St. Martins; and the Roman Catholics, convent schools at St. John and other parts of the province.

Charitable Institutions, etc.—Several of these are at St. John, including the provincial asylum for lunatics, hitherto maintained by the province, but now in part by the counties, and under control of the Government; the General Public Hospital, open to all and supported by the province, by the municipality of St. John, by fees from paying patients, and from income from invested funds; the Protestant and Roman Catholic orphan asylums; the Wiggins Male Orphan Asylum for the benefit of sons of deceased mariners; the Reformatory for Boys, where the inmates are educated and taught a trade; and the Home for Aged Women. The Victoria Hospital at Fredericton is supported in the same manner as the General Public Hospital. The Lazaretto, at Tracadie, Gloucester County, for the care of those smitten with leprosy, is supported by the Dominion Government, and the Roman Catholic Sisters of the Hôtel Dieu take charge of the patients. There were about twenty-five patients in 1893. The penitentiary for the maritime provinces, at Dorchester, is supported by the Dominion for the incarceration of convicts.

History, etc.—The province was formerly a part of Nova Scotia, and known as Sunbury County. A colony of about 800 persons in 1761 from New England settled at Maugerville on the St. John river. The largest immigration took place when the United Empire Loyalists, mostly from Massachusetts, arrived in the province May 18 and Oct. 4, 1783. They founded the city of St. John. Their descendants are scattered throughout the province, and are found in all walks of life. By royal letters patent, dated Aug. 16, 1784, King George the Third made it a separate province, and appointed Thomas Carleton, a brother of Sir Guy Carleton, captain-general and governor-in-chief. Fredericton is the capital, where are fine legislative buildings. The first legislature met at St. John Jan. 3, 1786. The province became a part of the Dominion of Canada July 1, 1867, and is represented in the Senate of Canada by ten members, appointed for life, and in the House of Commons by sixteen members, elected for five years.

AUTHORITIES.—For detailed information as to the history and growth of the province, consult Munro's *History of New Brunswick*; Johnson's *Agricultural Report*; Cooney's *History of New Brunswick*; Hannay's *History of Acadia*; Gray's *History of Confederation*; Fenety's *Political Notes*; Lawrence's *Foot-Prints*; the annual parliamentary reports; and the decennial census returns. ALFRED A. STOCKTON.

New Brunswick: city (settled under the name of Prigmore's Swamp in 1681, received its present name in 1714, granted a royal charter in 1730, incorporated as a town in

1736, and as a city on Sept. 1, 1784); capital of Middlesex co., N. J. (for location of county, see map of New Jersey, ref. 4–D); at the head of navigation on the Raritan river, at the eastern terminus of the Delaware and Raritan Canal, and on the Penn. Railroad; 26 miles N. E. of Trenton, 33 miles S. W. of New York city. It is the seat of Rutgers College (Reformed, chartered 1766), of a theological seminary of the Reformed Church (chartered 1784), and of the State Mechanical and Agricultural College (endowed with the national land grant and now a part of Rutgers College). There are 2 private classical schools for boys, a grammar school connected with the college, a young ladies' seminary, a model farm and observatory belonging to the college, 2 national banks with combined capital of $350,000, a savings-bank with assets of $1,654,472, a public library, and 3 daily and 6 weekly newspapers. The industries include the manufacture of wall-paper, rubber goods, printing-presses, boots and shoes, lamps and bronze-work, porous plasters, machinery, hosiery, and buttons. The assessed valuation in 1893 was $10,200,000, and the net debt on Apr. 1, 1894, was $1,256,276. Pop. (1880) 17,166; (1890) 18,603; (1900) 20,006.
EDITOR OF "HOME NEWS."

Newburg: city (settled by the whites in 1709; known as the Palatine Parish of Quassaic till 1752, when it received its present name; chartered as a city in 1865); one of the capitals of Orange co., N. Y. (for location of county, see map of New York, ref. 7–I); on the Hudson river, and the Erie and the West Shore railways (the N. Y. C. and H. R., the N. Y. and N. E., and the Newburg, Dutchess and Conn. railways on the opposite side of the river); 60 miles N. of New York city. It is in an agricultural region, has an elevated site, and possesses much historical interest. The old Hasbrouck House was occupied by George Washington during a part of the Revolutionary war, and his proclamation disbanding the American army was promulgated there. The building contains many relics of Revolutionary days, and with the grounds is carefully preserved. Near the building is a stone monument, erected by the Federal and State governments to commemorate the successful close of the war. The city has regular steamboat connection with New York and the principal cities on the Hudson, and contains 25 churches, graded public and parochial schools, Free Library (founded 1852), Y. M. C. A. Library (founded 1881), Second Judicial District Law Library (founded 1880), Home for the Friendless, St. Luke's Home, Home for Children, an academy, hospital, electric street-railways, 3 national banks with combined capital of $1,000,000, a savings-bank with surplus of nearly $1,100,000, and 4 daily, a monthly, 2 semi-weekly, and 2 weekly newspapers. There is a large trade in coal and dairy products. The principal industries are ship-building and the manufacture of agricultural implements, oilcloth, cotton and woolen goods, carpets, paper, shoes, and carriages. Pop. (1880) 18,049; (1890) 23,087; (1900) 24,943.
EDITOR OF "JOURNAL."

Newburyport: city (settled about 1635, was separated from the town of Newbury in 1764, chartered as a city in 1851): seaport; one of the capitals of Essex co., Mass. (for location, see map of Massachusetts, ref. 1–I); on the Merrimack river, and the Boston and Maine Railroad; 3 miles W. of the Atlantic Ocean, 36 miles N. E. of Boston. It contains the Putnam Free School, Anna Jaques Hospital, Y. M. C. A. Memorial Building, Old Ladies' Home, high, training, and graded public schools, Marine Museum, public library (founded 1854) containing nearly 30,000 volumes, electric street-railways, 4 national banks with combined capital of 670,000, 2 savings-banks with aggregate deposits of about $6,500,000, and 2 daily and 2 weekly newspapers. The industries include ship-building and the manufacture of cotton goods, boots and shoes, fiberloid, carriages, silverware, hats, pumps, steam-engines, and combs. The assessed valuation in 1893 was $9,705,528, and the net debt on Jan. 1, 1894, was $388,790. Pop. (1880) 13,538; (1890) 13,947; (1900) 14,478.
EDITOR OF "HERALD."

New Caledonia: an island in the South Pacific, about 800 miles E. of Queensland, and half way between New Guinea and New Zealand. It was discovered by Cook in 1774 and annexed by France in 1853. It is 250 miles long, with a greatest breadth of 30 miles, and extends N. W. and S. E. Along its axis run a series of mountain masses, of which the culminating points reach 5,600 feet. At some distance from the west coast is a coral reef which protects the shores from the force of the waves, and gives a sort of interior navigation with smooth water. The soil is fertile, the climate excellent, and the plants of the tropics and temperate zone can be raised. There are many nickel mines, some of which yield ore containing 7 to 10 per cent. of pure nickel. Gold was formerly worked, iron ore is abundant, and valuable deposits of copper, mercury, tin, and platinum are known to exist. The chief port and capital is Noumea, an excellent port on the west coast near the south end; pop. 4,600. With its dependencies, including the Loyalty islands, 60 miles E., New Caledonia forms a convict colony with an area of 7,654 sq. miles, and a population (1890) of 62,752. The native population numbered 70,000 at the time of annexation, but they are rapidly decreasing, and now number less than 25,000. They are called Kanakas. The remaining population is chiefly white and half of its number consists of convicts, either under punishment or liberated. The Isle of Pines, at the southern extremity, was assigned to Communists deported after the overthrow of the Paris Commune.
MARK W. HARRINGTON.

New Canaan: town (incorporated in 1801); Fairfield co., Conn. (for location of county, see map of Connecticut, ref. 12–D); on the N. Y., N. H. and Hart. Railroad; 5 miles N. W. of Norwalk, 8 miles N. by E. of Stamford. It is delightfully situated among hills ranging from 300 to 500 feet above tide-water, has fine drives into the country and to the beaches on Long Island Sound, and contains many summer homes of New York physicians and business men, boot, shoe, and clothing factories, a national bank with capital of $100,000, a savings-bank, a library and reading-room, and a weekly newspaper. Pop. (1880) 2,673; (1890) 2,701; (1900) 2,968; borough (1900) 1,304.
EDITOR OF "MESSENGER."

New Castile: See CASTILE, NEW.

Newcas'tle: a port of entry; capital of Northumberland County, New Brunswick; on the left bank of the Miramichi, 30 miles from its mouth (see map of Quebec, ref. 4–H). The river is to this point navigable for large ships. Its ship-building, lumber-trade, and fisheries are important. Salmon, herring, bass, mackerel, oysters, and lobsters are largely exported. Pop. 4,000.

Newcastle: a town of New South Wales; 80 miles N. N. E. of Sydney; at the mouth of the Hunter river, terminus of a railway running to the counties N. W. and N. (see map of Australia, ref. 6–J). This is the center of the principal coal industry of Australia. The coal is sent largely to China. There is also a large commerce in cereals. The town is unattractive, and is given a sable color by the large amount of coal handled. The tonnage of the port is very large. Pop. (1891) 12,913.
M. W. H.

New Castle: city (formerly the county-seat); New Castle co., Del. (for location of county, see map of Delaware, ref. 2–H); on the Delaware river at the head of Delaware Bay, and on the Phil., Wil. and Balto. Railroad; 5 miles S. of Wilmington, the county-seat, 36 miles S. W. of Philadelphia. It has an excellent harbor with navigation open almost the entire year, is in an agricultural region, and has manufactories of cotton and woolen goods, carpets, rolling-mill products, piping, and agricultural implements. There are a library (founded 1812), a branch of the Farmers' Bank of Delaware (State), and a daily newspaper. Pop. (1880) 3,700; (1890) 4,010; (1900) 3,380.

Newcastle: town; capital of Henry co., Ind. (for location, see map of Indiana, ref. 6–F); on the Blue river, and the Ft. Wayne, Cin. and Louisv., the Cleve., Cin., Chi. and St. L., and the Pitts., Cin., Chi. and St. L. railways; 15 miles S. of Muncie, 42 miles E. by N. of Indianapolis. It is in an agricultural region, has important manufactures, and contains a national bank with capital of $100,000, a State bank with capital of $130,000, and three weekly newspapers. Pop. (1880) 2,299; (1890) 2,697; (1900) 3,406.

New Castle: city; capital of Lawrence co., Pa. (for location of county, see map of Pennsylvania, ref. 4–A); at the confluence of the Shenango and the Neshannock rivers, which here form the Beaver river, and on the Erie, the Penn., the Pitts. and Lake Erie, the Pitts. and W., and the W. N. Y. and Penn. railways; 52 miles N. by W. of Pittsburg. It is in a bituminous coal, limestone, fire-clay, iron-ore, and sandstone region, and has numerous blast furnaces and mills, 3 machine-shops, wire-rod mill, steel-billet mill, large wire-nail mill, tin-plate mill, asphalt-block works, stove-works, 2 glass-factories, grist and planing mills, several foundries, and a paper-mill. There are three national banks with combined capital of $500,000, 20 churches, 16 schools, 2 colleges, a library (Y. M. C. A., founded 1886),

and a monthly, 2 daily, and 4 weekly periodicals. Pop. (1880) 8,418; (1890) 11,600; (1900) 28,339.

EDITOR OF "COURANT."

Newcastle, DUKE OF : See CAVENDISH, WILLIAM.

Newcastle, THOMAS PELHAM HOLLES, Duke of: Prime Minister of Great Britain; b. in 1693, the son of the first Lord Pelham, to whose peerage and estates he succeeded in 1712. He had previously inherited the large estates of his uncle, and was one of the wealthiest land-owners in England. All the weight of his influence was thrown on the Whig side, and his services to the house of Hanover won him the gratitude of the king. He was made Earl of Clare in 1714, Duke of Newcastle in 1715, and in 1724 became Secretary of State in Walpole's ministry. His abilities are represented as of a mean order, but he held this office for thirty years, and when he laid it down he became Prime Minister, succeeding his brother, Henry Pelham, in that office in 1754. He resigned in 1756, but was recalled in the following year to form the ministry rendered brilliant by the genius of Pitt. Newcastle, who was merely the nominal head, resigned in 1762, and after this, with the exception of a few months in 1765, when he was Lord Privy Seal, he held no official position. D. in Aug., 1768. F. M. COLBY.

Newcastle-upon-Tyne: city (with the constitution of a county); in the county of Northumberland, England; on the left bank of the Tyne, 8 miles from its mouth; 275 miles from London and 117 from Edinburgh (see map of England, ref. 3–H). The city is built for the most part on steep hills and gently rising ground. It presents a striking appearance, owing to the contrasts of antiquated and modern buildings. Among the former are several towers belonging to the old walls, the keep and chapel of the old castle, and the Black Gate. The Church of St. Nicholas (1359–1435), now the cathedral, was built upon the site of an earlier structure, destroyed by fire in 1216, of which a few remains still exist. St. John's church, built in the reign of Henry I., contains much original Norman work, with other later additions. St. Andrew's church, dating from the twelfth century, is built in the Transition style. The central part of Newcastle owes its stately buildings chiefly to Richard Grainger (1798–1861). Grey Street (named from Earl Grey) and Grainger Street are the finest thoroughfares in the city. The town-hall, built in 1863, stands near the cathedral, and close by are the corn-market and the corporation offices. Other notable buildings are the Guild-hall, the Exchange, the Moot Hall for the meetings of assizes, and the Central News room and art-gallery. The Museum of the Natural History Society (1884) contains a collection of British birds and a unique series of Bewick's wood-cuts. The Public Library contains nearly 70,000 volumes, and the library of the Literary and Philosophical Society has 40,000 volumes. Two important colleges—the College of Science (1871) and the College of Medicine (1851)—are affiliated to the University of Durham. There is also the Rutherford College (1878). There are several public parks, including the Town Moor, an extensive common 987 acres in extent, the Leazes ornamental park, Brandling Park, besides Armstrong Park and Jesmond Dene, for which Newcastle is indebted to Lord Armstrong. The Tyne is crossed by three bridges which connect Newcastle with GATESHEAD (*q. v.*), which is virtually a part of Newcastle. The High Level Bridge, built by Robert Stephenson (1846–49), is a quarter of a mile long. It contains a carriage-way 90 feet above high water, by which the precipitous streets on both sides of the river are avoided, and a railway at a height of 118 feet above high water. The Swing Bridge, finished in 1876, which is 281 feet in length, is worked by hydraulic machinery. It was erected on the site of a Roman and two later bridges.

The port of Newcastle is the fourth in importance in the United Kingdom; London, Liverpool, and Cardiff coming first. The total tonnage (excluding that coastwise) entered and cleared in 1892 was 4,205,580. The Tyne is navigable for large vessels as far as Elswick, a township on the western outskirts of Newcastle, where the engineering and ordnance works of Sir W. G. Armstrong, Mitchell & Co. are situated. These occupy an area of 125 acres and present a frontage of about a mile to the river. The principal article of trade is coal. The output of the coal-fields of Durham and Northumberland, of which Newcastle is the center, was in 1892 33,362,861 tons; and in the same year 4,117,450 tons of coal and coke, exclusive of that used by steamers engaged in the foreign trade, were exported, mainly to Hamburg, the Baltic, and the Mediterranean. In 1891 the total number of persons employed in the coal business, including those washing and coking coal, was 123,404, of whom three-fourths were working underground. In ship-building the Tyne comes next to the Clyde. In 1892 92 steamships (not including war vessels), with a gross tonnage of 176,743, were launched at the Tyne ports, which include North and South Shields. The principal manufactures are locomotive and marine engines, heavy ordnance, lead and its compounds, chemical manures, earthenware, fire-brick, alkali, cement, and glass of various kinds. One of the alkali-works turns out the largest quantity of caustic soda of any works in the world. In 1891 over 40,000 tons of various goods and 180,000 tons of coal and coke were exported to the U. S.

In the times of the Romans there was a stationary camp at the bridge called *Pons Ælii*. Later, on account of its fortified position giving protection to the monks of the neighboring monasteries, the town was called Monkchester. Robert of Courthose, son of William the Conqueror, built a castle here which was called Newcastle and became the nucleus of the modern town. In the reign of Edward I. it was surrounded by walls, and afterward on four different occasions defeated the attempts of the Scots to effect its capture. In 1640, having declared in favor of the king, it was taken by the Scotch Covenanters under Leslie, who held it for a year. In 1644 it was taken again after a siege of ten months.

Newcastle is the seat of a bishopric founded in 1882. Since 1835 the city has been governed by a corporation composed of a mayor, 16 aldermen, and 48 town councilors. It returns 2 members to Parliament. Pop. (1891) 186,300; (1901) 214,881. R. A. ROBERTS.

Newchwang: See NIUCHWANG.

Newcomb, SIMON: astronomer and mathematician; b. at Wallace, Nova Scotia, Mar. 12, 1835; removed to the U. S. in boyhood; taught school in Maryland for several years; in 1857 was employed as a computer on *The Nautical Almanac*. In the following year he first gave special attention to theoretical astronomy; was appointed in 1861 Professor of Mathematics in the navy, and stationed at the Naval Observatory, for which he supervised the construction and erection of the great telescope; was secretary of the commission created by Congress in 1871 for the observation of the transit of Venus, Dec. 9, 1874, and took part in organizing the expeditions sent to remote quarters of the earth upon that occasion. He was superintendent of *The Nautical Almanac*, published by the Navy Department, 1877–99. The Royal Astronomical Society of England in 1874 awarded to him its gold medal for his tables of Uranus and Neptune. From 1884 until 1893 he acted as Professor of Mathematics and Astronomy in Johns Hopkins University. In 1878 he received the Huyghens medal of the Dutch Society of Sciences, and in 1890 the Copley medal of the Royal Society of London. Besides numerous astronomical investigations, he has written a number of mathematical textbooks and several works on economic subjects, and was one of the associate editors of the revised edition of *The Universal Cyclopædia*.

Newcomen, THOMAS; the inventor of the modern form of the steam-engine; b. in Devonshire, England, about the middle of the seventeenth century; practiced the trade of a blacksmith; became interested in the applications of steam, and in 1705 patented a fire-engine.

The engines of the Marquis of Worcester and of Savery and of all their predecessors in this field were more or less reproductions of the old steam-fountain of Hero (B. C. 120); but Newcomen made an entirely new departure and constructed in 1705 the first real steam-engine, consisting of a train of mechanism in which the steam-motor was at the one end, and the pump to which its work was applied was at the other, the intermediate parts being the simplest possible and giving direct connection between the driving and the driven parts. In the earlier engines the same vessel had usually served as boiler, engine, and pump, and performed each of its several offices with inefficiency. Newcomen, following Savery, built a steam-boiler of which the only function was to make and supply the steam required; he made a working cylinder of which the sole purpose was the transformation of the heat of the steam into useful work by a thermodynamic operation. He then transferred the power thus generated to a pump, by means of which it was applied to the useful work of raising water from the depths of a mine. The net result was the accomplishment

of this work with an economy greatly exceeding that attained by the best machines of his predecessors. The new engine also demanded but an insignificant steam-pressure, and thus was much safer where working at considerable depths than was the Savery engine, which, under similar conditions, employed a comparatively high pressure. Its greater safety and immense economy soon drove the latter entirely out of the market.

The principal defect of the Newcomen engine was the combining of the functions of working cylinder and condenser in the same vessel, and it was the invention of an improvement upon the Newcomen engine, the separate condenser, that gave James Watt his opportunity and his fame. The modern condensing pumping engine, however, is a Newcomen engine rather than a Watt engine, and Newcomen, rather than Watt, is "the inventor of the steam-engine." R. H. THURSTON.

New Cumberland: town; capital of Hancock co., W. Va. (for location, see map of West Virginia, ref. 2-H); on the Ohio river, and the Pitts., Cin., Chi. and St. Louis Railway; 9 miles N. of Steubenville, O., 30 miles W. of Pittsburg, Pa. It has manufactories of fire-brick, terra-cotta work, sewer-pipe, and foundry and machine shop products, a private bank, and two weekly newspapers. Pop. (1880) 1,218; (1890) 2,305; (1900) 2,198.

New Decatur: town; Morgan co., Ala. (for location, see map of Alabama, ref. 1-C); on the Tennessee river, and the Louisville and Nashville Railroad; 87 miles N. of Birmingham. It is in an agricultural, lumbering, and wool-growing region, and has a weekly newspaper. Pop. (1880) not in census; (1890) 3,565; (1900) 4,437.

Newell, SAMUEL: missionary; b. at Durham, Me., July 24, 1784; graduated at Harvard in 1807; studied theology at Andover Seminary; was one of the signers of the memorandum (dated June 27, 1810) from students of that institution which led to the formation of the American Board of Commissioners for Foreign missions; was ordained as a foreign missionary at Salem with four associates Feb. 5, 1812; sailed for Calcutta with Judson; in the same month was ordered to retire by the British authorities of Bengal; went to the Isle of France, thence to Ceylon, and settled at Bombay in 1817, where he wrote, with his companion missionary, Gordon Hall, a work entitled *The Conversion of the World, or the Claims of Six Hundred Millions* (Andover, 1818), which had an extensive circulation. He also prepared a memoir of his first wife, Harriet (Atwood) Newell, who died at the Isle of France, Nov. 30, 1812, at the age of nineteen years—a work which had a wide popularity, and was translated into several languages. D. at Bombay, Mar. 30, 1821.

New England: collectively, the States of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. The territory comprised in these States was originally called North Virginia, when granted in 1606 by James I., to the Plymouth Company for colonization, but received its present name from Capt. John Smith, who explored it in 1614, and made a map of the coast. The first white settlers were chiefly natives of England. In 1900 the population of New England was 5,591,952. See the articles on the individual States.

Newfoundland: an island and British colony in North America, lying across the entrance of the Gulf of St. Lawrence. It is situated between the parallels of 46° 36′ 50″ and 51° 39′ N. lat., and between the meridians of 52° 37′ and 59° 24′ 50″ W. lon. Its greatest length from Cape Ray (the southwestern extremity of the island) to Cape Norman (the farthest northern land) is 317 miles, and the greatest breadth from Cape Spear (the most easterly point) to Cape Anguille (the most westerly) is 316 miles. The total area is 42,200 sq. miles. Its coast is 1,000 miles round, measuring from headland to headland; but so deeply indented are its shores with bays that if these were circumnavigated the operation would more than double that extent of coast-line. It is that part of the continent of North America which lies nearest to Europe, the distance between the most eastern part of Newfoundland and Valentia, in Ireland, being 1,640 miles. By the two great bays of Trinity and Placentia it is almost severed into two portions, the southern being the peninsula of Avalon, on which ST. JOHN'S (*q. v.*), the capital, is situated, and which is united to the northern by a narrow isthmus, in one place only 3 miles in width. The Avalon peninsula is further divided by the bays of St. Mary and Conception; and, having thus an extensive frontage on the Atlantic and numerous harbors, and being in proximity to the best fishing-grounds, it is the most thickly populated portion of the island. On all sides the great arms of the Atlantic penetrate far into the land, some of the bays being 90 miles in length. Within a degree of the eastern coast is the Great Bank of Newfoundland—the greatest submarine island of the globe, 600 miles in length and 200 in breadth—the chief breeding-ground of the cod. The whole Atlantic coast of Labrador, 1,100 miles in extent, with its valuable fisheries, is also attached to Newfoundland and under the jurisdiction of the colony.

Climate.—The fogs generated on the Banks by the confluence of the Arctic current and the Gulf Stream are felt only on the southern and southeastern shores of the island when southerly winds prevail. The climate is variable, but taken as a whole is more temperate and more favorable to health than that of the neighboring continent. In winter the thermometer seldom sinks more than a few degrees below zero, and that for but a few hours. The summer range of the thermometer is from 70° to 80°, and it is seldom that 84° is reached. The average mean temperature is 41°–42°; the average rainfall is 58·30 inches. Tornadoes are unknown, and thunder-storms very rare.

Geology.—All the great ancient rock systems between the Lower Laurentian and the coal measures are more or less represented at one part or another of the island. The Laurentian system has an immense spread, constituting the principal mountain ranges and coming to the surface through the more recent deposits or brought up by great dislocations. Three-fourths of the peninsula of Avalon are Huronian (equivalent to the Cambrian of English geologists). Lower Silurian rocks have a large development, and in these the metallic ores occur. The Carboniferous series occupy a large area in the neighborhood of St. George's Bay and Grand Lake.

Mountains.—The coasts present, for the most part, a forbidding aspect. Dark cliffs, miles on miles of rocky walls from 200 to 300 feet in height, bold promontories and headlands, greet the voyager at almost all parts of the island; but when the bays are entered scenes of rare beauty are frequently met with. On passing from the rugged coast-line to the interior a hilly country presents itself, with eminences of no great elevation. The center of the island, which is but imperfectly known, consists of an elevated, undulating plateau traversed here and there by ranges of low hills, the surface being diversified by valleys, woods, and lakes. Much of the interior is a savanna country, the soil being a fine black peat-mould. All the great hill ranges take a northeasterly and southwesterly direction. The principal of these is the Long Range, which extends along the western side of the island for nearly its entire length, having peaks more than 2,000 feet in height. Parallel to this is the Anguille Range. The Middle Range stretches across the country from Fortune Bay to Notre Dame Bay. Avalon district is traversed by several ranges of hills. In addition, there are isolated and sharply peaked summits having the local name of "tolts."

Bays, Rivers, and Lakes.—The largest bay is Placentia, 55 miles wide at the entrance and 90 miles in length, containing numerous islands. Fortune Bay is 25 miles wide and 70 in length. At its mouth are the islands of St. Pierre and Miquelon, ceded by treaty to France as a shelter for its fishermen. Bay St. George, on the western coast, is 40 miles wide, with a good harbor at its head. Notre Dame Bay, on the northeastern coast, is 50 miles wide at its mouth, and with its numerous arms penetrates more than 80 miles inland. Bonavista Bay presents some of the finest scenery in the island. Trinity Bay runs 70 miles inland. The harbor on which the town of Trinity stands is one of the finest in the world. On the south side of the bay is Heart's Content, where the Atlantic cables are landed. Conception Bay is the most populous and commercially important.

The three largest rivers are the Exploits, the Humber, and the Gander. The Exploits rises in the southwestern angle of the island, flows in a northeasterly direction, and falls into the Bay of Exploits after a course of more than 200 miles. It drains an area of nearly 4,000 sq. miles. The Humber drains an area of 2,000 sq. miles and falls into the Bay of Islands. The Gander falls into Gander Bay, and drains an area of 2,500 sq. miles.

Lakes and ponds cover nearly a third of the entire surface, and in many districts they form a very beautiful feature in the landscape. The largest is Grand Lake, 56 miles

in length, with an area of 192 sq. miles, inclosing an island 22 miles long and 5 miles in breadth. Red Indian Lake is 37 miles long, with an area of 64 sq. miles. Gander Lake is 33 miles in length.

Fauna and Flora.—The reindeer, black bear, wolf, beaver, and several species of fox are among the indigenous wild animals. The species of birds, most of which are migratory, number about 300. The forests are chiefly found in the valleys of the large rivers and along the banks of their tributaries. The principal varieties of the forest timbers are white pine, white and black spruce, tamarack, fir, yellow and white birch. In the Gander, Exploits, Humber, and Gambo valleys there are considerable areas of pine-forests. There are many kinds of berry-bearing plants.

Minerals.—The first copper mine—that of Tilt Cove—was opened in 1864, on the shore of Notre Dame Bay. Another still more productive mine was opened in 1875 at Betts Cove, in the same district, and in 1878 a third, at Little Bay, which has eclipsed both its predecessors. A rich deposit of lead ore has been discovered at Port-a-Port, and lead and silver deposits on the shores of Placentia Bay. Gold has been found in small quantities. Gypsum in immense quantities is found on the western coast, also marble of various shades of color. There is a coal-field in St. George's Bay 25 miles wide by 10 miles in length. It is still unworked. The total value of copper ores exported up to 1898 was $10,500,000, and of all ores (1888–98) $7,829,148.

Agriculture.—While there are districts irreclaimably barren, especially near the southern and southeastern shores, there are many fertile belts which if cultivated would sustain a very large population in comfort. In the region around St. George's Bay there are 730 sq. miles suitable for settlement. Bay of Islands, including the Deer Lake and Grand Lake country, contains 600 sq. miles, the valley of the Gander 1,700 sq. miles, and the Exploits valley 1,620 sq. miles available for settlement. In addition, there are less extensive tracts of fertile land in other localities fit for agricultural purposes, and also extensive areas admirably suited for cattle and sheep raising, forming an area of 2,000,000 acres. Thus there are known to be close on 5,000,000 acres fit for agricultural and grazing purposes. Of this, 64,494 acres are improved land, and 20,524 acres are in pasture.

Fisheries.—The fisheries constitute the great staple industry. The most important is the cod-fishery, which is prosecuted around the shores of the island, along the coast of Labrador, and to a limited extent on the Banks. The average annual value of this fishery is about $6,000,000. It is prosecuted from June 1 till the middle of October. The codfish when salted and dried are exported to Brazil, the West Indies, Spain, Portugal, Italy, and Britain. (See FISHERY RELATIONS OF THE UNITED STATES.) The seal-fishery is next in value. It is carried on in powerful steamers and stout sailing vessels from Mar. 1 till the middle of April. The young seals are taken on the ice-fields brought down by the Arctic current, where they are suckled by the mothers till three or four weeks old, when they are in the best condition. In 1900 the catch was 203,850; average value, $2.92 per seal. The chief seats of the herring-fishery are Labrador, Bonne Bay, Bay of Islands, St. George's Bay, and Fortune Bay. The salmon and lobster fisheries are also important.

Population.—The seats of population are all situated on the various bays and harbors, there being no settlement at any distance from the seacoast. The earliest record of the resident population is that of 1654, which gives the number as 1,750; in 1763 it was 7,000; in 1804, 20,380; in 1857, 124,288; in 1884, 197,589; and in 1891, 202,145. Of these, 53,502 were engaged in catching and curing fish, the number of able-bodied fishermen being about 30,000. The population is distributed about the shores of the island as follows: South coast, from Cape Ray to Cape Race, 34,752; east and northeast coast, from Cape Race to Cape St. John, 150,389; from Cape Ray to Cape St. John, 12,773; Labrador (Atlantic coast), 4,211. According to the census of 1891, there were 72,342 Roman Catholics, 68,075 members of the Church of England, 52,672 Methodists, 2,092 members of the Salvation Army, and 1,447 Presbyterians.

Education.—The system of education is the separate or denominational one. The legislature each year appropriates from the general revenue a certain amount for educational purposes; in 1892 the sum was $144,450. This is divided among the religious denominations in proportion to their respective numbers. There are three superintendents of schools—one representing the Church of England, one the Roman Catholic Church, and one the Methodist Church. The number of elementary schools is 543. There are three colleges—Church of England, Roman Catholic, and Methodist—one Presbyterian Academy, and two grammar schools. In the elementary schools there are 31,422 pupils: in the colleges, academy, and grammar schools, 969. The total number of pupils is 1 in 6·14 of the entire population.

Government.—This consists of a governor, who is appointed by the crown of England; a legislative council or upper chamber, composed of 15 members nominated by the governor in council and holding office for life; and a house of assembly of 36 members, elected every four years by the votes of the people, each male twenty-one years of age having a vote. The executive council consists of 7 members chosen by the party commanding a majority in the legislature. They are responsible to the house of assembly. The island is divided into 17 electoral districts.

Revenue and Commerce.—The revenue is mainly derived from duties on imports. The revenue for the year 1899 amounted to $1,702,453. The public debt at the close of the year 1899 was $17,571,754. The value of exports for the year 1900 was $8,627,576; the value of imports was $7,497,147. The great import trade is with Great Britain, the U.S., and Canada. The registered shipping of Newfoundland at the close of 1899 was: vessels, 2,478; tonnage, 107,168.

Railways.—The first railway was opened for traffic in 1884, from St. John's to Harbour Grace, 83½ miles, with a branch to Placentia, 27 miles in length, built in 1888. In 1893 the Legislature decided on an extension of this line, and entered into a contract for building a line to Port-au-Basque, on the southwestern extremity of the island, viâ the Exploits valley, Bay of Islands, and St. George's Bay, 500 miles in length, to be completed in 1896. In 1899 638 miles of road were in operation in the island.

History.—Newfoundland was discovered in 1497 by John Cabot, although five hundred years before, according to Icelandic sagas, it was visited by Lief, son of Eric the Red. The value of its fisheries was soon afterward made known, and fishermen from Normandy, Brittany, and the Basque Provinces were attracted to its encompassing seas. It was not till 1583 that formal possession of the island was taken by Sir Humphrey Gilbert, in the name of Queen Elizabeth. Various attempts at planting a colony were made, the most important being by Sir George Calvert, afterward Lord Baltimore, who in 1623 obtained a patent entitling him to the lordship of the whole southern peninsula. He built a house at Ferryland and introduced settlers, but was so harassed by the French that he abandoned the place and settled in Maryland, where he founded the city of Baltimore. Meantime English fishermen in increasing numbers carried on the valuable cod-fisheries on the Banks and along the shores. The fish taken were dried on shore, and when winter approached the fishermen embarked for England, taking with them the products of their labors. Laws were enacted prohibiting fishermen from remaining behind at the close of the fishing season, forbidding settlement, or even the erection of a house without a special license. For more than a century this policy was persevered in, greatly retarding the prosperity of the country and inflicting cruelties and hardships on the settlers who resisted the tyranny of the merchant adventurers; but the laws prohibiting settlement and land-grants were at length repealed, a governor was appointed in 1728, and a new order of things began, but it was not until the beginning of the nineteenth century that the last restrictions were removed.

The French long disputed with Great Britain for the possession of Newfoundland, but the contest was ended in 1713 by the Treaty of Utrecht, which ceded the island to England, but secured to the French the right of fishing and curing fish on the northern coast from Pointe Riche to Cape Bonavista; the limits were afterward (1783) changed to Cape Ray and Cape St. John. This concession to the French has led to continual disputes and bitter animosities, and, though they have no territorial rights, that portion of the coast on which they have fishing privileges is but scantily settled and is far behind the rest of the island.

In 1832 representative government was bestowed on Newfoundland by the British Parliament. Household suffrage was established and the people acquired the power of making their own laws, and expending their own revenue. In 1854 the present form of government was established. In 1846 the prosperity of the colony met a severe check by a terrible fire which destroyed three-fourths of St. John's, the

capital, leaving 12,000 people homeless. Another in 1892 destroyed more than half the city; the estimated loss was $20,000,000. In 1858 the first transatlantic submarine cable was laid, connecting Newfoundland with the Old World. Previously the island had been connected by cable with the American continent. In 1873 direct steam communication with Great Britain and the U. S. was established, which gave an important impulse to trade. In 1887 the ballot system was introduced in the election of members of the legislative assembly; and in 1889 manhood suffrage was adopted. See NEWFOUNDLAND in the Appendix. M. HARVEY.

Newfoundland Dog: See DOGS.

Newgate: a prison in London; at the west end of Newgate Street, opposite the Old Bailey. It is mentioned as a prison in 1207. It was at the new gate of the city. In the fifteenth century Sir Richard Whittington in his will left funds to rebuild it. In 1666 it was again rebuilt after the great fire. The present edifice was erected in 1780, but was greatly damaged by a fire in the No-popery riots of that year. In 1808 Mrs. Fry began her labors for the improvement of the horrible condition which had for centuries characterized the place. Debtors ceased to be sent there in 1815, and the institution gradually became, in many respects, a model one of its kind. Since 1877 Newgate has been practically disused, except during sessions or when the gallows are required.

New Glasgow: town; Pictou co., Nova Scotia; on the Nova Scotia Railway; 9 miles S. E. of Pictou; on East river (see map of Quebec, ref. 2–C). It has ship-yards, foundries, tanneries, and other manufactories, several important coal mines, and a weekly newspaper. Pop. (1891) 3,776.

New Granada: See COLOMBIA.

New Guinea: the largest known island except Greenland. It lies just N. of Australia, between the equator and 11° S. lat., and has an estimated area of 312,000 sq. miles. If the bottom of the shallow channel between New Guinea and Australia were elevated about 300 feet the island would form a part of the southern continent. On the other sides of New Guinea, however, the insular mass is clearly defined by the rapid slope of the sea-bottom to oceanic depths. Most of the north and southeast coasts are high and mountainous, long ranges paralleling the shores usually at some distance inland, the culminating point of the island, as far as is known, being Mt. Owen Stanley (about 13,200 feet) in the southeast prolongation of the island. The Charles Louis Mountains, which abut on the southwest coast, form the only important range whose main axis is directed from the sea toward the central regions. The island is surrounded by many large and small islands, naturally a part of the mainland and doubtless joined with it in an earlier geological age. There are also many verdant coral islands. The coasts are indented by deep bays, few of them, however, affording first-rate harbors. Unlike most of the adjacent portions of Australia, the island has an abundant rainfall and a luxurious flora. Its drainage system is fairly well developed, though much of the land in the non-mountainous regions adjacent to the coasts is of a swampy character. The largest rivers are the Fly and the Kaiserin Augusta, both of which take their rise in the central regions, the Fly following a tortuous course southward to the Gulf of Papua, and the Kaiserin Augusta taking a course almost due E. through the German possessions. Most of the rivers are densely wooded along their banks, but where the bush is penetrated for a few miles an open, undulating country is reached, covered with grass and scattered forest trees.

The flora of the western half of the island differs considerably from that of the remainder, being nearly akin to the flora of the myriad islands farther W., while the vegetation of the rest of the island unmistakably shows the influence of Australia. There are also many species peculiar to New Guinea. For instance, fifty palms are named as found only on this island. In its fauna, however, New Guinea far more strongly resembles Australia than the lands nearer Asia. Only two mammals and about fifty birds are known to be peculiar to New Guinea, but some of these are very remarkable, as, for instance, the several varieties of the birds of paradise. The inhabitants are chiefly Papuan, though among some of the tribes a Malayan admixture is apparent, and other natives, particularly in the S. E., resemble and are evidently related to the Polynesians. The island is sparsely settled, which may be due to the almost incessant warfare between the tribes that was common everywhere before the whites obtained a firm foothold on the coasts. The population probably does not exceed 700,000.

The entire island has been divided by treaty among three European powers. About one-half the total area, comprising all of the island W. of the 141st meridian, is Dutch territory, and for governmental purposes has been attached to the residency of Ternate, Molucca islands. The Dutch have done very little to develop this large domain, which is estimated to contain 200,000 inhabitants.

British New Guinea (founded 1888, area 90,000 sq. miles, estimated pop. 300,000) comprises the southern part of East New Guinea and the neighboring islands. British missionaries have labored there with encouraging results, and have laid the foundations of law and order. The cost of the administration is guaranteed by New South Wales, Victoria, and Queensland, and the administrator is appointed by the British Government. The chief settlement is Port Moresby on the Gulf of Papua; the white population is about 250, and there are eight stations along the coast to which mails are carried by an Australian line of steamers. The country has a fair amount of resources, including gold, and some of the land is suited for sugar and other tropical cultures.

Kaiser Wilhelm's Land (German protectorate since 1884, area 72,000 sq. miles, estimated pop. 110,000) includes all of the northern part of Southeast New Guinea. The German New Guinea Company, to whom the administration is intrusted, have planted a number of stations, opened plantations with success, and are exporting tobacco to Europe. Horses and cattle flourish in some districts and the protectorate has much fine timber and other natural riches. See NEW GUINEA in the Appendix. See d'Albertis, *New Guinea* (London, 1880); Chalmers and Gill, *Work and Adventure in New Guinea* (London, 1885); Romilly, *From my Verandah in New Guinea* (London, 1889). C. C. ADAMS.

Newhall, CHARLES STEDMAN: See the Appendix.

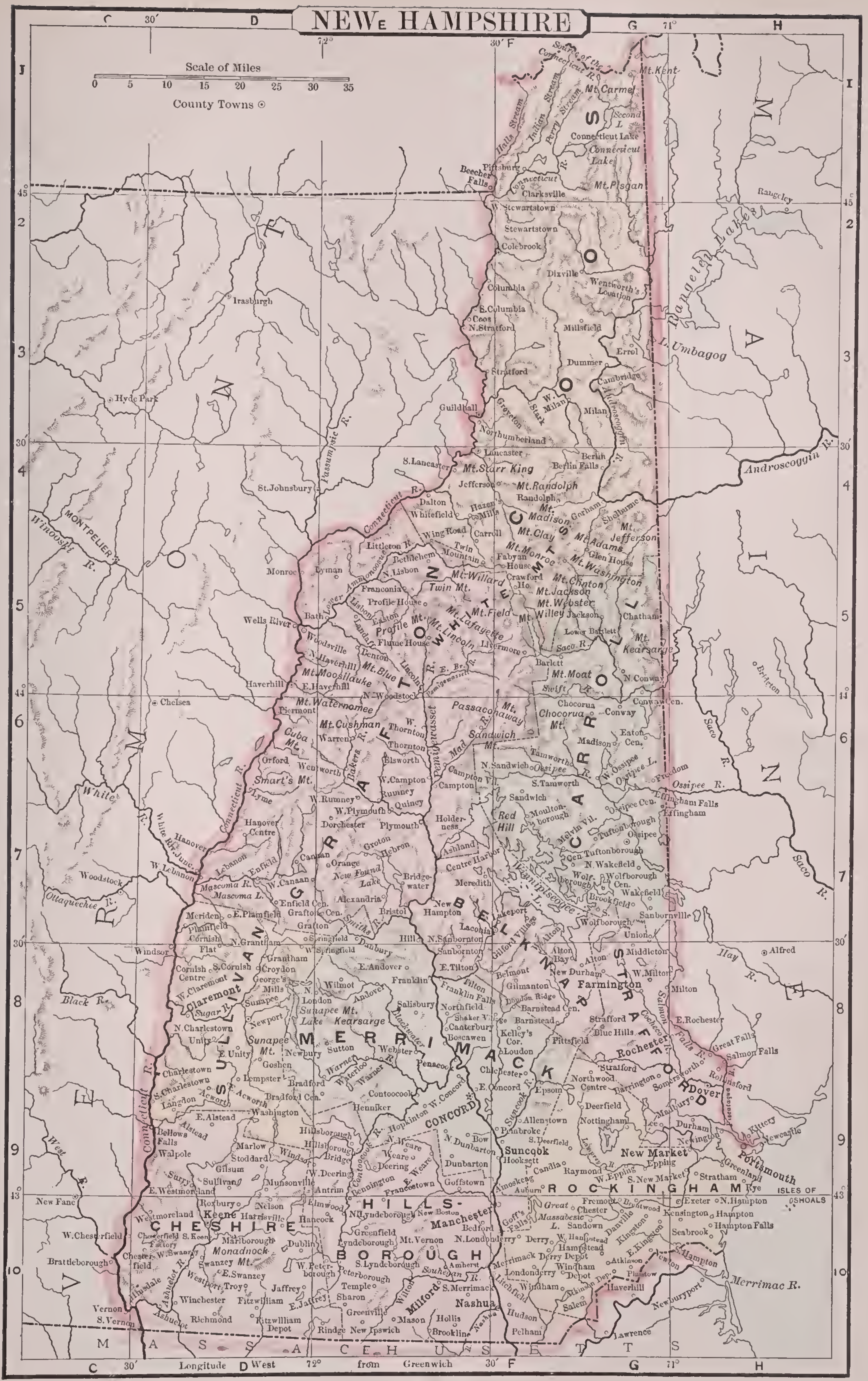
New Hampshire [named from *Hampshire* in England]: one of the U. S. of North America (North Atlantic group); the ninth of the thirteen original States that ratified the Federal Constitution.

Location and Area.—It lies between 42° 40′ and 45° 18′ 23″ N. lat., and 70° 37′ and 72° 37′ W. lon.; in general shape it is that of a right-angled triangle, with its apex toward the N. and the right angle at the S. E.; extreme length, 178 miles; extreme width, 100 miles; bounded on the N. by the Province of Quebec, on the E. by Maine and the Atlantic Ocean, on the S. S. E. and S. by Massachusetts, and on the W. by Vermont; area, 9,336 sq. miles (5,975,040 acres). The relative position of New Hampshire in the Union in 1890 was third in manufacture of cotton, sixth in manufacture of wool, twenty-fourth in assessed valuation, and thirty-third each in population and agricultural products.

Seal of New Hampshire.

Physical Features.—The Appalachian range of mountains enters the State from Maine and, crossing diagonally, forms first an elevated mountain tract, known as the White Mountain region, exceeding 2,000 feet in height, and then passes southwesterly in a range of lesser hills along the western side of the State. Coos County, N. of the White Mountains, has an average elevation of over 1,500 feet above the sea, while the S. E. part of the State, between the highlands and the coast, has an average elevation of less than 500 feet. The White Mountain district, comprising about 1,400 sq. miles, and divided by the valleys of the Saco and Lower Ammonoosuc rivers and the famous "Notch" into two ranges, known locally as the White and Franconia ranges, is one of great beauty, and is fitly called the Switzerland of America. Its highest peak is Mt. Washington (6,286 feet), the highest land near the coast N. of Mt. Mitchell in North Carolina; but there are twenty-eight other peaks

NEW HAMPSHIRE



above 4,000 feet. The picturesque scenery of the State, together with its healthful climate, has made it attractive as a summer resort. New Hampshire has only 18 miles of seacoast, and Portsmouth is the only good harbor. Of the Isles of Shoals, a group of eight rocky islands lying 8 or 9 miles off the coast, three belong to New Hampshire. There are five principal drainage basins. The entire western portion, about 3,060 sq. miles, is drained by the Connecticut river, which, rising in the extreme N. of New Hampshire, forms for the entire distance the natural boundary between it and Vermont. Its chief tributaries in New Hampshire are the Upper and Lower Ammonoosuc in the mountain region, the Mascoma and Sugar rivers (the latter the outlet of Sunapee Lake) in the central part, and the Ashuelot river in the S. The N. E. portion, 775 sq. miles, is drained by the Androscoggin river, which rises in Lake Umbagog. The eastern mountain district, 850 sq. miles, discharges its waters through the Saco river. The S. E. basin, 825 sq. miles, is that of the Piscataqua, which with its tributary, the Salmon Falls river, forms for a considerable distance the boundary with Maine. The Cocheco river also flows into the Piscataqua, which forms the harbor of Portsmouth, and is the only navigable river in the State. The central and southern parts, about 3,825 sq. miles, are drained by the Merrimack, which is formed by the junction of the Pemigewasset, that, rising in the mountains, receives the waters of Squam and New Found Lakes, and the Winnipiseogee, which is the outlet of the lake of the same name. Its principal tributaries are the Contoocook, Sowhegan, Suncook, and Nashua rivers. The Merrimack is thickly set with manufacturing cities, and is said to turn more spindles than any other stream in the world. The State is noted for the number and beauty of its lakes and ponds, the water area being about 300 sq. miles. The largest lake is Winnipiseogee (i. e. The smile of the Great Spirit), in Belknap and Carroll Counties. It is 19 miles long and 8·25 miles wide. Its outline is very irregular, and it contains 264 islands. The other principal sheets of water are Umbagog, 18 sq. miles (partly in Maine); Squam, 15·6; Sunapee, 11·2; New Found, 8; Ossipee, 7; and Great Bay, 6·8.

Geology and Mineralogy.—New Hampshire was one of the earlier portions of the American continent to appear above the primal ocean. Nearly all its formations belong to the Eozoic age, and few parts of the country exhibit in

FARMS, ETC.	1880.	1890.	Per cent.*
Total number of farms	32,181	29,151	9·4
Total acreage of farms	3,721,173	3,459,018	7·0
Total value of farms	$75,834,389	$66,162,600	12·8

* Decrease.

The following table shows the acreage, yield, and value of the principal crops in the calendar year 1900:

CROPS.	Acreage.	Yield.	Value.
Corn	25,264	934,768 bush.	$523,470
Wheat	496	8,085 "	7,438
Oats	30,526	995,148 "	378,156
Rye	887	15,168 "	12,438
Barley	4,528	102,786 "	68,867
Potatoes	17,916	1,809,516 "	959,043
Hay	596,076	518,586 tons	8,038,083
Totals	675,693	.....	$9,987,495

On Jan. 1, 1900, the farm animals comprised 55,578 horses, value, $3,217,455; 135,457 milch cows, value $4,429,444; 79,221 oxen and other cattle, value $2,025,477; and 79,072 sheep, value $252,239; total head, 349,326; total value, $9,924,615.

Climate.—The climate is cold but healthful, the winters being severe and the summers mild and agreeable. The mean annual temperature for the part N. of the White Mountains and on the W. as far S. as Hanover is 41°, that of the southern part is 45°; the mean winter and summer temperatures for the two parts respectively are 17° and 65°, and 23° and 66·5°. The monthly average temperatures at the following places show the local variations:

PLACE.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Average.	Period.
Concord	20·975°	24·35°	31·35°	44·47°	57·37°	65·47°	70·40°	68·22°	60·77°	50·1°	37·5°	26·05°	46·42°	20 years.
Hanover	16·5	18·6	26·4	41·0	55·8	65·2	69·1	66·2	57·7	45·6	33·2	21·0	43·0	20 "
Stratford	16·33	17·8	25·53	39·29	52·9	62·97	67·13	63·53	55·73	43·13	32·47	18·6	41·13	15 "
Mt. Washington	5·6	7·0	10·53	20·33	34·27	44·43	47·6	47·06	40·6	30·2	16·76	9·2	26·1	15 "

moraines and the scarification of the rocks better proofs of the ice age. The general movement of the glaciers during that period was to the S. E. The terraces of the next period are very marked along the Connecticut and Merrimack rivers. Ores of gold, silver, copper, zinc, lead, tin, arsenic, iron, bismuth, manganese, and molybdenum are found in the State, but in quantities so small or so difficult of extraction that at present none is mined. Other minerals are quartz and feldspar for glass, plumbago, precious stones, ochers, whetstones, and soapstone. Beryl is very abundant, and the largest known crystals have been found at Grafton and Acworth, one having weighed 2,900 lb. Mica occurs in fine sheets at Grafton and Alstead. Four-fifths of the entire product of the U. S. comes from New Hampshire. There are also found fine brick-clays, slate, limestone and colored porphyries, and granite.

Flora and Fauna.—About 50 per cent. of the State is covered with forests, but the large forest areas are restricted to the White Mountain district and to Coos County. The principal trees are the chestnut, hornbeam, locust, elm, butternut, white ash, hickory, white oak, poplar in the S., and the beech, sugar-maple, white and yellow birches, red oak, pine, spruce, larch, and fir in the N. The birds include those ordinarily found in New England and several Canadian species. In the northern forests are deer, fox, bear, raccoon, mink, marten, and smaller game. The streams, once full of trout, have been greatly depleted, and the State Fish Commission is attempting to restock the waters with trout and salmon.

Soil and Productions.—The soil is not fertile. It is light and sandy in the southern part, but portions of the Connecticut valley and of Coos County are well adapted to farming. The following summary from the census reports of 1880 and 1890 shows the extent of farm operations in the State:

The average precipitation in inches, including melted snow, is shown by the following table:

PLACE.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Average.	Period.
Lunenburgh, Vt.	3·01	2·88	3·34	2·79	3·69	3·53	3·91	3·65	3·39	3·59	3·26	2·97	40·09	37 years.
Concord	2·90	2·54	2·97	2·97	3·39	3·23	3·86	3·94	3·34	3·94	3·42	2·68	39·17	29 "
Dover	2·34	2·96	3·48	3·43	3·65	3·50	3·61	3·65	3·20	3·97	3·90	2·38	42·05	20 "
Hanover *	2·43	1·86	2·12	1·95	2·61	3·27	3·06	2·87	2·93	2·80	2·26	2·08	30·05	21 "
Weirs	3·43	3·38	3·83	3·07	3·31	3·30	4·16	3·55	3·70	4·02	3·92	3·47	43·12	28 "

* The mean for 38 years before at Hanover was 36·53.

Divisions.—For administrative purposes the State is divided into ten counties, as follows:

COUNTIES AND COUNTY-TOWNS, WITH POPULATION.

COUNTIES.	* Ref.	Pop. 1890.	Pop. 1900.	COUNTY-TOWNS.	Pop. 1900.
Belknap	8-F	20,321	19,526	Laconia	8,042
Carroll	6-G	18,124	16,895	Ossipee	1,479
Cheshire	10-D	29,579	31,321	Keene	9,165
Coos	3-F	23,211	29,468	Colebrook	1,876
				Lancaster	3,190
Grafton	6-E	37,217	40,814	Haverhill	3,414
				Plymouth	1,972
Hillsboro	10-E	93,247	112,640	Manchester	56,987
				Nashua	23,898
Merrimack	8-F	49,435	52,430	Concord	19,632
Rockingham	10-G	49,650	51,118	Exeter	4,922
				Portsmouth	10,637
Strafford	8-G	38,442	39,337	Dover	13,207
Sullivan	8-D	17,304	18,009	Newport	3,126
Totals	.....	376,530	411,588		

* Reference for location of counties, see map of New Hampshire.

Principal Cities and Towns, with Population for 1900.—Manchester, 56,987; Nashua, 23,898; Concord, 19,632; Dover, 13,207; Portsmouth, 10,637; Keene, 9,165; Berlin, 8,886; Rochester, 8,466; Laconia, 8,042; Somersworth, 7,023; Claremont, 6,498; Franklin, 5,846; Exeter, 4,922.

Population and Races.—The population in 1860 was 326,073; in 1870, 318,300; in 1880, 346,991; and in 1890, 376,530 (natives 304,190; foreign, 72,340; males, 186,566; females, 189,964; whites, 375,840; colored, 690); 1900, 411,588.

Industries and Business Interests.—The principal industry is manufacturing. It is estimated that there are 2,000 water-powers in the State, many of them of great value. There is considerable manufacture of paper and of boots and shoes, but that of cotton and woolen goods forms the chief industry. The lumber and sawmill industry is also large. The census returns of 1890 showed that 3,229 manufacturing establishments reported, having a combined capital of $79,375,160, employing 63,361 persons, paying $24,248,054 for wages and $47,754,152 for materials, and having products valued at $85,770,549. The cotton industry had 27 plants and $26,801,933 capital, employed 19,533 persons, paid $6,429,084 in wages, consumed 107,319,124 lb. of raw material, and had products valued at $21,958,002; the woolen industry had 89 plants and $14,721,786 capital, employed 9,400 persons, paid $3,341,695 for wages, consumed 22,152,190 lb. of raw material, and had products valued at $14,445,172; and the lumber and sawmill industry had 831 plants and $11,883,447 capital, employed 8,932 persons, paid $2,519,609 for wages and $4,883,591 for materials, and had products valued at $10,907,438. In 1899 New Hampshire held fifth rank in the production of granite, the output having a value of $802,636.

Finance.—Official reports for the year ending May 31, 1900, showed balance on hand, $341,586.88; receipts, $1,285,684.10; disbursements, $1,170,743.66; balance, $456,527.32. The assessed valuation of taxable property is about $300,000,000. On June 1, 1899, the net indebtedness was $1,335,068.05, and on June 1, 1900, it was $1,118,798.94. Reduction of the debt during the year $216,269.11.

Banking and Insurance.—The first bank in the State was established at Portsmouth in 1792, and the first savings-bank in 1823. On Sept. 5, 1900, there were 55 national banks with combined capital of $5,498,300, surplus and profits of $2,236,559.23, and deposits of $12,284,777.96. On June 30, 1900, 9 State banks with combined capital of $560,000, surplus and profits of $104,710 and deposits of $989,536; and 58 mutual savings-banks with surplus and profits of $4,220,592, and $53,896,711 in savings deposits from 136,544 depositors. The insurance business was represented in 1893 by 38 local and 45 foreign fire-insurance companies, which wrote risks amounting to $84,222,246, received premiums of $1,026,593, and paid losses of $595,665; 21 life and 11 fidelity and casualty companies, which wrote risks of $16,594,075, received premiums of $762,189, and paid losses of $432,524; and 21 fraternal beneficiary associations, which had 621,000 members, received $17,294,443 for assessments, and paid $7,474,901 for all liabilities.

Post-offices and Periodicals.—On Jan. 1, 1901, there were 566 post-offices, of which 48 were presidential (2 first-class, 11 second-class, and 35 third-class), and 518 fourth-class, 318 money-order offices and 12 money-order stations. There were 14 daily, 3 semi-weekly, 282 weekly, 1 bi-weekly, 3 semi-monthly, 35 monthly, 1 bi-monthly, and 1 quarterly publications; total, 98.

Libraries.—In 1892 there were reported 31 public libraries of 1,000 volumes and over, which contained 150,668 bound volumes and 13,197 pamphlets. They were classified as follows: General, 6; school, 8; college, 5; college society, 1; law, 1; public institution, 2; State, 1; Y. M. C. A., 1; social, 3; historical, 1; and not reported, 2.

Means of Communication.—The first railway in the State was chartered in 1835. The mileage has increased as follows: (1850) 467; (1860) 661; (1870) 736; (1880) 1,015; (1890) 1,142; (1899) 1,223·23, not including a narrow-gauge railway of 13 miles, and lumber roads used only in winter. The railway up Mt. Washington is noticeable as a triumph of engineering. It makes an ascent of 3,625 feet in 2¾ miles, with a maximum grade of 1,980 feet to the mile, and an extreme curve of 497 feet radius. With a few slight exceptions, all the railways of the State are embraced in five systems, the Boston and Maine, the Concord and Montreal, the Fitchburg, the Maine Central, and the Grand Trunk.

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	68	67	39,920	$205,600
Congregational	188	228	19,712	1,405,050
Methodist Episcopal	134	132	12,354	614,350
Baptist	85	100	8,768	585,050
Free-will Baptist	94	93	8,004	379,000
Unitarian	26	28	3,252	357,200
Protestant Episcopal	44	55	2,911	541,400
Advent Christian	43	43	1,978	36,500
Christian	23	24	1,522	62,950
Universalist	33	34	1,204	203,025

There are also communities of Shakers at Enfield and Canterbury, numbering 100 and 150 respectively.

Schools.—In 1892 there were 37 academies in the State, having 180 teachers, 2,630 pupils, and buildings valued at $955,000, and 51 high schools, with 125 teachers and 3,180 pupils. In 1885 the district system was abolished and the town system established. This has resulted in a considerable increase in the length of the school year, which in 1899 was 135·3 days. In the school year 1898–99 there were 1,902 public schools with 2,970 teachers—256 men and 2,714 women; average monthly salary of men, $69.75; of women, $40.59. According to the school census there were 69,783 children of school age, of whom 65,193 were enrolled and 47,773 in average daily attendance. The value of school property was $3,658,143; revenue for school purposes, $999,556; expenditure, $1,051,265. Expenditure per pupil, based on average daily attendance, $22.02. Each town is required by law to raise for school purposes $350 for every $1 of its apportionment of the State tax. The only normal school was established at Plymouth in 1870; in 1900 it had 13 teachers and 347 pupils. It is supported by the State. Its course of study covers two years. There are two colleges in the State—Dartmouth College (*q. v.*) and the New Hampshire College of Agriculture and the Mechanic Arts. The latter was established in connection with Dartmouth College in 1866, and was removed to Durham by act of Legislature in 1893, when it had a faculty of 21 members and 120 students.

Charitable, Reformatory, and Penal Institutions.—The New Hampshire Asylum for the Insane was established at Concord in 1838. It is supported by the income of considerable invested funds and by what is paid by individuals and towns for the support of patients. A training-school for nurses is established in connection with it. There is also an asylum for the insane in each county. The State board of health is also a commission of lunacy, and "all persons committed to custody as insane persons shall be wards of the State, and subject to State supervision." The New Hampshire Orphans' Home at Franklin, established in 1871, is supported by voluntary contributions. The Industrial School, established at Manchester in 1851, is a "house of reformation for juvenile offenders" of both sexes. Boys are instructed in farm and garden work, or are taught some trade; girls are instructed in housework, and are taught to make both men's and women's clothing. The State prison was established at Concord in 1812.

Government.—Manhood suffrage prevails, restricted only in the case of paupers, of persons voluntarily excused from taxation, and of unnaturalized aliens. The Governor, 5 councilors, and the Legislature, consisting (1901) of 24 Senators and 397 Representatives, are elected biennially in November and enter upon office on the first Wednesday of the next ensuing January. A majority is necessary for an election. From 1734 to 1792 the chief magistrate was called President; after that date the title was Governor. The first biennial election was in 1878. In 1889 the beginning of official terms was changed from June to January. The judiciary system of 1874 provided for a superior court, composed of a chief justice and two associate justices, and a circuit court similarly constituted; but in 1876 these were combined into a Supreme Court with a chief justice and six associate justices, having legal and equitable jurisdiction.

History.—The first European who visited New Hampshire was Martin Pring, who entered the Piscataqua in June, 1603; and the first map of the coast was made by Capt. John Smith in 1614. The territory was included in the grant made in 1620 to the Plymouth Company, and was further included in that made by the company in 1622 to Sir Ferdinando Gorges and Capt. John Mason of all the

land between the Merrimack and Kennebec rivers and a line 60 miles inland. The name given in the charter to the tract was "Maine," but it was also called "Laconia." The first settlement was made in 1623 at Little Harbor (Rye) and at Dover. Strawberry Bank (Portsmouth) was settled in 1631, Exeter in 1638, and Hampton in 1639. In Nov., 1629, Mason and Gorges divided their grant, Mason taking that part W. of the Piscataqua river, to which he gave the name of New Hampshire, from the county of Hampshire, where he lived. The efforts of Mason and his heirs to enforce their proprietary rights led to litigation that was not wholly quieted till 1787. His opponents based their claims upon a deed said to have been obtained by one Wheelwright from four Indian chiefs in May, 1629. In 1641 the province voluntarily united with Massachusetts. In 1677 a royal order fixed the northern boundary of Massachusetts at 3 miles N. of the Merrimack, and in 1679 a royal commission established a government in New Hampshire. The king appointed the governor and council, and the people elected the assembly. This plan was interrupted by the appointment in 1685 of Joseph Dudley as Governor of New England, but in 1692 the separate provincial government of New Hampshire was established, which continued till the Revolution. Owing to its frontier position, New Hampshire suffered terribly from the Indians in the French and Indian wars. It furnished 500 men for the siege of Louisburg in 1745, 500 for the attack upon Crown Point in 1755, and 2,600 for the succeeding operations of the war. The boundaries of the province were fixed by royal determination, much the same as now, the S. and E. in 1740, and the W. in 1764. The province grew rapidly in population after the quieting of the Indians, so that it had 80,000 inhabitants at the outbreak of the Revolution. In that struggle it took an active part, and one of the first assaults on royal authority was the capture of the fort at New Castle in Dec., 1774. Two regiments from New Hampshire were in the battle of Bunker Hill. New Hampshire and Vermont troops, under the command of Gen. Stark, who bore a commission from New Hampshire, gained the decisive victory of Bennington. For the whole war New Hampshire furnished 12,497 men. A State constitution was adopted in 1784, and on June 21, 1788, the Federal Constitution was adopted by a small majority. As New Hampshire was the ninth State to adopt this Constitution, the Union was thus secured. The State constitution was thoroughly revised in 1792, slightly modified in 1852, and again revised in 1877. Once in seven years by special vote is taken "the sense of the people as to the revision of the constitution and calling a convention for that purpose." In the war of 1812 New Hampshire furnished more than 2,000 men, and in the civil war she furnished 18 regiments of infantry, 1 of cavalry, 1 light and 1 heavy battery, and 3 companies of sharpshooters—in all, 32,750 men, or about 10 per cent. of the population. Portsmouth was the capital of the province. From 1775 to 1805 the Legislature met at different places, but since then Concord has been the capital.

GOVERNORS OF NEW HAMPSHIRE.

Josiah Bartlett	1792–94	William Haile	1857–59
John Taylor Gilman	1794–1805	Ichabod Goodwin	1859–61
John Langdon	1805–09	Nathaniel S. Berry	1861–63
Jeremiah Smith	1809–10	Joseph A. Gilmore	1863–65
John Langdon	1810–12	Frederic Smyth	1865–67
William Plumer	1812–13	Walter Harriman	1867–69
John Taylor Gilman	1813–16	Onslow Stearns	1869–71
William Plumer	1816–19	James A. Weston	1871–72
Samuel Bell	1819–23	Ezekiel Straw	1872–74
Levi Woodbury	1823–24	James A. Weston	1874–75
David L. Morrill	1824–27	Person C. Cheney	1875–77
Benjamin Pierce	1827–29	Benj. F. Prescott	1877–79
John Bell	1829–30	Natt Head	1879–81
Matthew Harvey	1830–31	Charles H. Bell	1881–83
Jos. M. Harper (acting)	1831	Samuel W. Hale	1883–85
Samuel Dinsmoor	1831–34	Moody Currier	1885–87
William Badger	1834–36	Charles H. Sawyer	1887–89
Isaac Hill	1836–39	David H. Goodell	1889–91
John Page	1839–42	Hiram A. Tuttle	1891–93
Henry Hubbard	1842–44	John B. Smith	1893–95
John H. Steele	1844–46	Charles A. Busiel	1895–96
Anthony Colby	1846–47	George A. Ramsdell	1897–99
Jared W. Williams	1847–49	Frank W. Rollins	1899–1901
Samuel Dinsmoor	1849–52	Chester B. Jordan	1901–
Noah Martin	1852–54		
Nathaniel B. Baker	1854–55		
Ralph Metcalf	1855–57		

AUTHORITIES.—Belknap. *History of New Hampshire*; Sanborn, *History of New Hampshire*; a series of *Provincial and State Papers* issued by the State; various town histories; annual reports of the various State commissioners; and the U. S. census reports.

JOHN KING LORD.

New Harmony: town (settled by the Harmonists under George Rapp in 1815, transferred to Robert Owen for an experiment in socialism in 1824, and seat of a "school of industry" founded subsequently by William Maclure); Posey co., Ind. (for location of county, see map of Indiana, ref. 11–A); on the Wabash river, and the Peoria, Dec. and Evansville Railway; 15 miles N. of Mt. Vernon, the county-seat, 26 miles N. W. of Evansville. It contains 4 churches, graded public school, public library in a new building costing $14,000 and containing 7,000 volumes, an art-gallery, and a museum; a private bank, 2 weekly newspapers, and saw, planing, and flour mills. Pop. (1880) 1,095; (1890) 1,197; (1900) 1,341.

EDITOR OF "REGISTER."

New Hartford: town (settled in 1733, incorporated in 1738): Litchfield co., Conn. (for location of county, see map of Connecticut, ref. 7–F); on the Farmington river, and the N. Y., N. H. and Hart., the Phila. and Read., and the N. Y. and N. E. railways; 29 miles N. W. of Hartford. It contains 7 churches, 9 public schools, a Roman Catholic parochial school, and 2 weekly newspapers, and has 4 cotton-mills, a plane, rule, and level factory, several saw-mills, brush, broom, and turning shops, and a hosiery-factory. Other industries are general farming and tobacco-growing. Pop. of township (1880) 3,302; (1890) 3,160; (1900) 3,424.

EDITOR OF "TRIBUNE."

New Haven: city; capital of New Haven co., Conn. (for location, see map of Connecticut, ref. 11–F); on the New York, New Haven, and Hartford Railroad, and four of its leased lines; 36 miles W. S. W. of Hartford, and 74 miles E. N. E. of New York city. It is the largest city in the State; is situated on a sandy plain at the head of New Haven Bay, and between West and Quinnipiack rivers, 4 miles from Long Island Sound.

Early residents laid out a large square which was divided by six streets running nearly N. and S., and six streets running nearly E. and W. As this method of construction ignored the shape of the harbor and the relation of New Haven to other cities and towns, it was rejected. Roads, running from this original square to neighboring cities and towns, were straightened and converted into avenues, and cross streets were laid out at various angles to them. The city has 140 miles of street carefully laid out and graded. Of this number 34 miles are paved with Telford and macadam pavements, and 4½ miles with Belgian and granite blocks. These streets are drained by 80 miles of sewers, constructed on the combined system. The park area, improved and unimproved, is 819·44 acres. At the center of the city is a square, known as The Green, which contains many elms of great size and beauty. This square is intersected by Temple Street, noted for a perfect arch of old and stately elms. To the N. E. and W. of the city are two mountain parks known, respectively, as East and West Rock parks. Several carriage roads, 20 feet in width, and many foot-paths wind their way to the top of East Rock, 360 feet in height, and crowned by a Soldiers' and Sailors' monument; and one carriageway and several foot-paths lead to the top of West Rock, which is 420 feet in height. The grade of these roads averages about 3 and never exceed 4 feet in 100. Four parks have been laid out at the harbor's edge.

The town of New Haven contains 68 churches, divided denominationally as follows: Congregational, 17; Methodist Episcopal, 14; Protestant Episcopal, 12; Roman Catholic, 9; Baptist, 7; Lutheran, 4; Jewish, 4; Presbyterian, 1; and Universalist, 1. New Haven has an excellent system of free public schools. The number of schoolhouses occupied and owned by the district is 32, with a seating capacity of 13,433. The number of pupils registered in 1893 was 15,453, and the average daily attendance was 10,830. The annual cost of maintaining the schools is estimated at $312,900. Hopkins Grammar School, established 1660, prepares boys for Yale. The Yale Campus, two blocks W. of the city center, is a rectangle containing two city blocks. A series of buildings, fronting in, forms an inclosed court. Two of these buildings—Vanderbilt and Osborn Halls—are the chief architectural attractions of the city. To the N. of the campus a second large quadrangle of university buildings is (1894) being constructed. The Sheffield Scientific School and the departments of law and medicine are a little removed from the campus. See YALE UNIVERSITY.

Taxable property at a little more than one-half its actual value was assessed in 1893 at $54,814,715. Church, school, and university property exempt from taxation was esti-

mated at $6,000,000. The ordinary receipts of city, town, and school district in 1893 were $1,441,035.52, and the ordinary expenses $1,396,087.02. The indebtedness, bonded and floating, of these three corporations in 1893 was $2,696,929.09. There are 13 banks, viz., 7 national, 3 State, and 3 savings-banks, and 1 building and loan association. The national and State banks form the New Haven Clearing-house. The principal business is the distribution of goods to surrounding towns and cities, and the manufacture of carriages, rifles, clocks, hardware, and corsets. The census returns of 1890 showed that 1,042 manufacturing establishments (representing 128 industries) reported. These had a combined capital of $16,826,635, employed 17,654 persons, paid $9,876,270 for wages and $13,259,097 for materials, and had products valued at $28,574,038.

Late in the autumn of 1637 Theophilus Eaton, a London merchant, and a few associates settled on one of the bays of Long Island Sound. He was joined the next spring by Rev. Mr. Davenport and a small company, who named the place New Haven. The same place had previously been named by Block, the Dutch discoverer, Roodenberg—red hills—because of the appearance of East and West Rocks. These settlers acknowledged allegiance to neither king nor government. They accepted the Scriptures as containing the only proper rule for the government of both Church and state. Under this theocracy they lived in simplicity and independence, until a liberal charter, procured by Connecticut from Charles II. in 1662, included them within its jurisdiction. By this charter, to which New Haven after much ill feeling submitted, New Haven and Hartford were made joint capitals of Connecticut. In 1873, by an amendment to the constitution, Hartford was made the sole seat of government. New Haven is now governed by three corporations—the City of New Haven, the Town of New Haven, and the New Haven School District. The town possesses the most territory and includes all of both city and school district. The school district includes all of the city, but not all of the town. Each of these corporations possesses complete autonomy, and is supreme within its own jurisdiction. The city is governed under a special charter adopted in 1881. A mayor is the nominal head of the executive division. The departments of public works, fire, and police are managed by boards of commissioners called non-partisan, but in reality bi-partisan. The legislative division consists of a court of common council, which is divided into two boards, the board of aldermen and the board of councilmen. There are 24 aldermen, two from each ward, of whom one in each ward is elected annually, and 36 councilmen, all of whom are elected annually. The administrative duties of the town are performed by a board of 7 selectmen, elected by the people. The legislature of the town is its adult male citizens acting in a properly called town meeting. The administrative duties of the school district are in the hands of a board of education, consisting of 9 members. Adult citizens of the district meet, lay a school-tax, and vote supplies. Pop. (1880) city and town reported as coextensive, 62,882; (1890) city, 81,298; town, 86,045; (1900) 108,027.

FRANK S. BISHOP.

New Heb'rides: an archipelago of Polynesia consisting of a chain of islands extending from lat. 13° S. and lon. 166° E. to lat. 20° S., lon. 170° E., a distance of over 500 miles. They are under the protection of a mixed French and British commission. The total area is about 5,100 sq. miles. There are a dozen larger islands and innumerable smaller ones. The largest is Espiritu Santo (75 miles by 40) toward the northern end of the group, discovered by Quiros in 1606. S. E. of it is Malikolo (56 miles by 20), with a fine harbor. Banks islands are in the northern part of the group. The islands are volcanic and nearly free from coral reefs. The soil is generally rich and deep. The rainfall is heavy; the principal rainy season extends from December to March. The temperature does not fall below 58° F., and seldom rises above 90°. The islands are densely wooded and the breadfruit, sago-palm, banana, sugar-cane, yam, taro, arrowroot, orange, and pineapple flourish. Mammals and birds are scarce. Whaling is extensively carried on in the neighboring seas, and one of the important products is bêche-de-mer. Imhaus estimates the population at from 75,000 to 80,000, among them 150 whites—missionaries and traders. The missions here have been successful; on the southern island (Aneiteum) the entire population is said to be Christian, and this influence predominates over the southern end of the group. The natives are Polynesian and Papuan. They are usually neat and clean, strong and often willing to work, but generally inhospitable and cruel. They vary much in the different islands. See Imhaus, *Les Nouvelles Hébrides* (1890), and Paton, *John G. Paton, Missionary in the New Hebrides: an Autobiography* (1891).

MARK W. HARRINGTON.

New Holland: See AUSTRALIA.

New Iberia: town; capital of Iberia parish, La. (for location of parish, see map of Louisiana, ref. 10–D); on the bayou Teche, and the S. Pac. Railroad; 125 miles W. of New Orleans. It is in a sugar, rice, cotton, and lumber region, and is principally engaged in the manufacture of cypress lumber. Minor industries are the manufacture of cotton-seed oil, brick, sash, doors, and blinds, soap, and mineral waters. There are 2 national banks with combined capital of $100,000, high school, 2 public schools, convent, Howe Institute, seminary, 8 churches, 2 public halls, park and race-track, electric lights, iron bridge across the Teche, and a daily and a weekly newspaper. Pop. (1880) 2,709; (1890) 3,447; (1900) 6,815.

EDITOR OF "ENTERPRISE."

New Ireland: a large island of the Bismarck Archipelago, now called NEW MECKLENBURG (*q. v.*).

New Jersey [named from the island of *Jersey* in the English Channel]: one of the U. S. of North America (North Atlantic group); the third of the original thirteen States that ratified the Federal Constitution; capital, Trenton.

Seal of New Jersey.

Location and Area.—It is situated between Delaware river and bay and the Atlantic Ocean and Hudson river, and between 38° 55′ 50·42″ and 41° 21′ 19″ N. lat., and 73° 53′ 51·25″ and 75° 33′ 2·74″ W. lon.; bounded on the N. by New York, on the E. by the Hudson river, Staten Island Sound, Raritan Bay, and the Atlantic, on the S. by Delaware Bay, and on the W. by the Delaware river, which separates it from Delaware and Pennsylvania; extreme length, 167⅜ miles (according to the State topographical survey); greatest breadth, 59 miles; least breadth, 32 miles; area, 8,224·44 sq. miles (5,263,641·60 acres), of which 7,514·40 sq. miles are land surface.

Physical Features.—A straight line drawn from Jersey City to Trenton divides the State into two strongly contrasted parts; the northern, undulating, hilly, and in places mountainous; the southern, through most of its extent almost a plain. Three mountain ranges traverse the northern part, two of which—the Blue Mountain or Blue Ridge, called also Kittatinny and known in New York as Shawangunk, and the Highland Range—belong to the Appalachian chain. The third is a part of the low range which may be traced from Massachusetts into New Jersey through Southeastern New York. The Blue Ridge, composed of quartzose conglomerate, with softer slate, crosses the Delaware river at the Water Gap, where its summit is 1,479 feet above the sea, and runs N. E. for 40 miles in an almost unbroken ridge to the New York State line, near which, at High Point, it rises to an elevation of about 1,800 feet. The Kittatinny valley lies between the Blue Ridge on the N. W. and the Highland Range on the S. E., and is noted for its rural beauty and agricultural wealth. The Highland Range occupies a belt 22 miles wide on the New York State line and 10 miles wide on the Delaware, and is composed of numerous disconnected ridges, among which are Hamburgh Mountain, reaching a height at Rutherford's Hill of 1,488 feet; Wawayanda Mountain, height 1,450 feet; Musconetcong, Schooley's, and Green Pond Mountains. The third range consists of ridges of trap rock, which diversify the red sandstone belt, a strip of an average width of 20 miles crossing the State from N. E. to S. W., the south boundary of which coincides closely with a straight line drawn from Jersey City to Trenton. The chief of these ridges are the First, a part of which is better known as Orange Mountain, 534 feet high

NEW JERSEY

Scale of Miles
5 10 20 30

County Towns ⊙

Longitude D West from Greenwich 74

at Garret Rock, near Paterson; the Second, the less continuous Third Mountain, Rocky Hill, Ten-mile Run Mountain, Long Hill, Sourland Mountain, Goat Hill, Round Mountain, Pickle Mountain, 767 feet high; and the Palisades, which wall in the Hudson on the W. from the New York State line nearly to Jersey City. In the southern part there are a few rounded hills, but no rocky eminences. The Navesink Highlands, S. of Sandy Hook, which are a seamark in approaching New York harbor, reach a height of about 400 feet. Southern New Jersey is a gently undulating plain, from 150 to 190 feet in elevation in the center, and sloping gradually to the Atlantic on the E. and the Delaware river or bay on the W. The prevailing surface is sandy. A cretaceous formation of great value, containing marls, useful in agriculture, and plastic clay and kaolin, extensively employed in the manufacture of brick, pipe, tile, porcelain, and pottery, is found in a belt bounded on the N. W. by a line drawn from Raritan Bay on the N. E. to the head of Delaware Bay on the S. W. Sand available for making glass exists throughout the southern part of the State. In the same region the cedar swamps form a curious and important deposit of timber, which is exhumed in good condition from beds in which it has lain for hundreds of years.

The Hudson river bounds the State on the E. for 28 or 30 miles. It receives from New Jersey only the Wallkill river, which reaches it at Rondout, N. Y. The smallness of the drainage into the Hudson is due to the barrier interposed by the Palisades. Newark Bay receives the Passaic and Hackensack rivers, with their tributaries. The Ramapo, Wanaque, and Pequannock rivers, whose union forms the Pompton river, and the Rockaway river, all affluents of the Passaic, yield, at a minimum elevation of 200 feet above the sea, 314,000,000 gal. of water daily, which is available for the supply of the cities of Northern New Jersey. Raritan Bay receives the Raritan river, with its north and south branches. The Elizabeth and Rahway rivers flow into Staten Island Sound. The Navesink, Shrewsbury, Shark, Manasquan, Metedeconk, Tom's, Little Egg Harbor or Mullicas, and Great Egg Harbor rivers and Cedar creek flow into the Atlantic or into bays communicating directly with the sea. Delaware Bay receives the Delaware river, with its fifteen tributaries and four affluents of these, and in the extreme S. of the State Cohansey creek and Maurice river, as well as a number of smaller streams. The tidal bays along the coast, sometimes called harbors or sounds, form a line of internal water communication from the Metedeconk river to Cape May for vessels of light draught, and abound in game, fish, and shellfish. The principal ones are Barnegat Bay, Little Egg Harbor, Great Bay, Absecom Bay, and Great Egg Harbor. In the northern part of the State are many mountain lakes and ponds, remarkable for purity of water and quite generally stocked with black bass. Greenwood Lake, partly in New York, is from a third to half a mile wide, and 7 or 8 miles long. It is drained by the Wanaque. Lake Hopatcong, the largest body of fresh water in the State, is 914 feet above mean tide, 5½ miles long, and from a third to 1¾ miles in width, and is drained by the Musconetcong. Budd's Lake, on the top of Schooley's Mountain, is nearly circular, with a circumference of about 3½ miles, and is the source of the south branch of the Raritan. Green Pond, in Morris County, 1,044 feet above the sea, is 3 miles long and a quarter to half a mile wide. These lakes and ponds are favorite places of summer resort. The Delaware river receives the drainage of 2,344·80 sq. miles; Delaware Bay of 1,060·10 sq. miles; the Atlantic Ocean, directly or through tidal sounds, of 3,857·60 sq. miles; the Hudson river of 251·90 sq. miles.

Geology.—Hardly any coal is found in New Jersey, but in other directions its mineral and geological wealth is great and remarkably diversified. In 1891 it was the ninth State in amount of product of iron ore. There were thirty-two mines, which produced 525,612 long tons of ore, of which 517,922 tons were magnetite. Official reports for 1899 give the total production (all magnetite) as 256,185 long tons. The great decrease is due to the difficulty of mining and the necessity of roasting or concentrating the ores. New Jersey supplies 3·07 per cent. of the country's total output of iron ore. Manganiferous zinc ores of excellent quality are found at Franklin, Sussex co., and supply a large part of the zinc oxide and metallic zinc used in the U. S. In 1899 there was a production of granite valued at $779,822, sandstone valued at $147,768, limestone valued at $153,025, slate valued at $1,600; total value, $1,082,215. A small quantity of minerals used as paints were also produced. Among building materials are a very fine gneiss, white and blue limestones, roofing and writing slates, and flag and paving stones. The trap ridges supply the best of road material in such abundance and at so low a cost that the northern part of the State is now covered with a network of admirable highways. Graphite or plumbago has been mined with profit. Large quantities of porcelain and pottery clays of excellent quality are found; infusorial earth, used for polishing and in the preparation of giant powder, is obtained in Morris County; and moulding sand of good quality and sand for making the brick for reverberatory furnaces abounds in Burlington and Morris Counties. Sulphate of baryta, manganese, molybdenum, iron pyrites, used largely for producing sulphuric acid, and green sand for chemical purposes and glass-making, are among the other mineral products. The sum of $8,000 has been appropriated annually for many years for the geological survey of the State.

Soil and Productions.—The soil is a sandy loam, easily tilled, and lighter in the southern than in the middle and northern parts of the State. Clay marls, pure marls, shell marls, lime, and the peat and marsh-mud of the tide-washed region are advantageously used to enrich the land. The forest area covers about one-third of the State. The prevalent timber of the southern part is pine, with some cedar in the swamps; the forest of the northern part consists chiefly of oak, hickory, chestnut, hornbeam, tulip-tree, basswood, elm, ash, pine, sassafras, and wild cherry. The magnolia glauca is found in the swamps. Wild grapes, cranberries, whortleberries, blackberries, and raspberries are abundant. The flora of the State is large. The rattlesnake and copperhead are the only poisonous reptiles.

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	34,307	30,828	10·1
Total acreage of farms	2,929,773	2,662,009	9·1
Total value of farms	$190,875,833	$159,262,840	16·6

* Decrease.

The following table shows the acreage, yield, and value of the principal crops in the calendar year 1900:

CROPS.	Acreage.	Yield.	Value.
Corn	257,364	8,493,012 bush.	$3,821,855
Wheat	122,753	2,344,582 "	1,734,991
Oats	95,003	2,812,089 "	871,748
Rye	64,717	1,029,000 "	565,950
Buckwheat	10,005	160,080 "	91,447
Potatoes	48,435	3,342,015 "	2,005,209
Hay	396,113	499,102 tons	8,010,587
Totals	994,390	.....	$17,101,787

On Jan. 1, 1900, the farm animals comprised 79,972 horses, value $5,828,258; 7,196 mules, value $679,883; 223,261 milch cows, value $8,729,505; 39,896 oxen and other cattle, value $1,224,982; 42,722 sheep, value $185,584; and about 175,000 swine, value $2,000,000; total head, 568,047; total value, $18,648,212. Much attention is paid to seed-farms and nurseries, especially in districts within easy reach of the markets of New York and Philadelphia. In 1890 the area in seed-farms was 6,272 acres, and the value of seed-farm implements and buildings more than $2,000,000. In the same year there were 145 nurseries, with an area of 5,465 acres, representing an investment of about $2,000,000. The fruit crop is large, notably in peaches, apples, and grapes.

Climate.—The following table exhibits the mean temperature (in degrees F.) and rainfall (in inches) by months, from observations taken through a series of years at different points:

MONTHS.	Temperature.	Precipitation.	MONTHS.	Temperature.	Precipitation.
January	25·7°	2·38	July	74·8°	3·89
February	32·4	3·89	August	72·0	5·64
March	37·7	3·77	September	66·0	4·08
April	50·2	2·91	October	53·3	3·73
May	59·6	5·99	November	44·4	3·02
June	69·8	4·46	December	30·8	3·64
Average for the year				51·4	47·40

Early fruits ripen from ten days to two weeks earlier in the southern counties than in the northern, although the mean temperature of the spring months is only three or four degrees higher.

Divisions.—For administrative purposes the State is divided into twenty-one counties, as follows:

COUNTIES AND COUNTY-TOWNS, WITH POPULATION.

COUNTIES.	*Ref.	Pop. 1890.	Pop. 1900.	COUNTY-TOWNS.	Pop. 1900.
Atlantic	7-C	28,836	46,402	May's Landing	.....
Bergen	2-E	47,226	78,441	Hackensack	9,443
Burlington†	5-D	58,528	58,241	Mt. Holly	.....
Camden	6-C	87,687	107,643	Camden	75,935
Cape May	8-C	11,268	13,201	Cape May C.-H.	2,257
Cumberland	7-B	45,438	51,193	Bridgeton	13,913
Essex	2-D	256,098	359,053	Newark	246,070
Gloucester	6-B	28,649	31,905	Woodbury	4,087
Hudson	2-E	275,126	386,048	Jersey City	206,433
Hunterdon	3-C	35,355	34,507	Flemington	.....
Mercer	4-C	79,978	95,365	Trenton	73,307
Middlesex	3-D	61,754	79,762	New Brunswick	20,006
Monmouth	4-E	69,128	82,057	Freehold	2,934
Morris	2-D	54,101	65,156	Morristown	11,267
Ocean†	5-D	15,974	19,747	Tom's River	.....
Passaic	2-D	105,046	155,202	Paterson	105,171
Salem	6-B	25,151	25,530	Salem	5,811
Somerset	3-C	28,311	32,948	Somerville	4,843
Sussex	1-C	22,259	24,134	Newton	4,376
Union	3-D	72,467	99,353	Elizabeth	52,130
Warren	3-C	36,553	37,781	Belvidere	1,784
Totals		1,444,933	1,883,669		

* Reference for location of counties, see map of New Jersey.
† Part of Burlington annexed to Ocean since 1890.

Principal Cities and Towns, with Population for 1900.—Newark, 246,070; Jersey City, 206,433; Paterson, 105,171; Camden, 75,935; Trenton, 73,307; Hoboken, 59,364; Elizabeth, 52,130; Bayonne, 32,722; Atlantic City, 27,838; Passaic, 27,777; Orange, 24,141; West Hoboken, 23,091; East Orange, 21,506; New Brunswick, 20,006; Perth Amboy, 17,699; Plainfield, 15,369; Union, 15,187; Montclair, 13,962; Bridgeton, 13,913; Morristown, 11,267; Kearney, 10,896; Harrison, 10,596; Millville, 10,583; Phillipsburg, 10,052.

Population and Races.—The population in 1850 was 489,555; 1860, 672,035; 1870, 906,096; 1880, 1,131,116; 1890, 1,444,933 (native, 1,115,958; foreign, 328,975; males, 720,819; females, 724,114; white, 1,396,581; colored, 48,352, of whom 47,638 were persons of African descent, 608 Chinese, 22 Japanese, and 84 civilized Indians).

Industries and Business Interests.—The manufacturing interest is of extraordinary volume and variety. In 1890 New Jersey, compared with other States, ranked fifth in combined textile products, first in silk fabrics, seventh in woolen, and eleventh in cotton. The value of silk fabrics manufactured in 1890 was $25,405,982, against $12,851,045 in 1880, and was nearly one-half greater than that of any other State. The value of woolen fabrics from 55 establishments was $9,984,640, against $6,829,074 in 1880. Seventeen establishments produced cotton fabrics worth $5,902,615. The value of the whole textile product from 199 establishments was $46,647,626, against $28,499,579 in 1880. Eighteen furnaces made 145,040 tons of pig iron in 1890, of which 41,479 tons were Bessemer, and 8 establishments made 17,999 short tons of steel. Six establishments made 185,510 tons of cast-iron pipe and fittings, value $5,032,571, more than one-third of the product of the U. S. The census reports of 1890 showed that 9,221 manufacturing establishments reported. These had a combined capital of $249,890,428, employed 186,901 persons, paid $96,509,703 for wages and $188,960,704 for materials, and had products valued at $353,179,917. See HOBOKEN, NEWARK, PATERSON, and TRENTON.

Finance.—No State tax upon individuals has been imposed for many years, except one for school purposes, apportioned among local taxing districts at the rate of $5 for each child between the ages of five and eighteen years, as shown by a school census taken annually. The amount thus collected by the State is reapportioned equitably, and paid over to the local school authorities. This is additional to the amount raised by local taxation for school purposes. Official reports of the State finances for the year ending Oct. 31, 1900, showed balance from previous year, $1,253,153.13; receipts, $3,623,796; disbursements, $2,871,726.97; balance, $2,005,222.16. The State debt on Jan. 1, 1900, was $119,000, payable in installments, the last of which will fall due in Jan., 1902. The State school fund, resulting largely from the sale of riparian lands, amounted on Oct. 31, 1893, to $3,693,621.22, from the income of which an appropriation of $100,000 is required to be made annually for the support of public schools. The assessed valuation of real and personal property in 1899 was $864,516,527.

Banking.—On Sept. 5, 1900, there were 115 national banks, with combined capital of $15,068,355, surplus and profits of $14,613,653.91, and deposits of $73,461,509.25; on June 30 there were 20 State banks, capital $1,703,750, surplus and profits $1,345,279, and deposits $8,144,031; 30 loan and trust companies, capital $5,560,800, surplus and profits $5,307,890, and deposits $40,045,780; and 26 mutual savings-banks, surplus fund $5,380,703, with $57,886,922 in savings deposits from 202,682 depositors.

Post-offices and Periodicals.—On Jan. 1, 1901, there were 921 post-offices, of which 118 were presidential (12 first-class, 43 second-class, 63 third-class) and 803 fourth-class. There were 613 money-order offices and 78 money-order stations. There were 374 newspapers and periodicals: 48 daily, 3 semi-weekly, 282 weekly, 1 bi-weekly, 3 semi-monthly, 35 monthly, 1 bi-monthly, and 1 quarterly publications.

Libraries.—In 1892 there were reported 96 public libraries of 1,000 volumes and over, which contained 655,127 bound volumes and 112,434 pamphlets. The libraries were classified as follows: General, 28; school, 27; college, 7; college society, 3; law, 3; theology, 4; public institution, 4; State, 1; Y. M. C. A., 4; social, 9; scientific, 3; historical, 1; I. O. O. F., 1; and mercantile, 1. The library of the New Jersey Historical Society at Newark contains about 14,000 volumes and 20,000 pamphlets; the State library at Trenton, about 41,000 volumes, two-thirds of which are on law.

Means of Communication.—The railway development of the State has been as follows: (1850) 206 miles; (1860) 560; (1870) 1,125; (1880) 1,684; (1890) 2,099; (1892) main track, 2,162, second track, 708, third and fourth tracks, 178, sidings, 1,206—total, 4,254. The principal main lines are the Penn., the Central of N. J., the Phila. and Reading, the N. Y., Lake Erie and W., the Del., Lack. and W., the N. Y., Susquehanna and W., the West Shore, and the Lehigh Valley. The valuation of all railway and canal property in 1900 was $223,384,249, and the taxes were: State, $1,116,921.24; local, $417,090.69—total, $1,534,011.93. The Morris and Essex Canal, built about 1830, connects Jersey City and Phillipsburg, and was formerly a general commercial route, but for many years has been used as a coal route by the Lehigh Valley Railroad, its lessee. It is about 106 miles long. The Delaware and Raritan Canal, connecting New Brunswick and Trenton, about 43 miles long, built in 1831–34, affords direct communication between New York and Philadelphia by means of the Raritan and Delaware rivers. The street-railways, chiefly electric, aggregate over 300 miles.

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	219	218	222,274	$6,050,682
Methodist Episcopal	579	584	82,955	5,009,075
Presb. in the U. S. of America	300	423	58,759	6,699,100
Baptist	224	268	38,757	2,957,628
Protestant Episcopal	184	236	30,103	3,815,850
Reformed Church in America	124	155	24,057	2,091,029
Lutheran, General Council	30	27	7,940	339,500
African Methodist Episcopal	54	69	5,851	159,850
Congregational	33	38	4,912	655,300
Methodist Protestant	39	39	3,459	181,950
Friends	43	47	3,261	267,700
African Methodist Episcopal Zion	25	25	2,954	107,700
Jews, Orthodox	19	19	2,521	44,300
Lutheran, General Synod	16	16	2,415	126,100

Schools.—The general supervision of public schools is intrusted to a State superintendent of public instruction, appointed by the Governor for a term of three years, and to one superintendent for each county, appointed by the State board of education. The school census enumeration, May 30, 1898, was: males, 236,293; females, 230,421—total, 466,714. In 1897–98 there were 304,680 children enrolled in the public schools, with an average daily attendance of 200,278. There were 1,850 schools and 6,276 teachers—834 men and 5,442 women. The average monthly salaries were, men $85.82, women $49.72. The value of school property was $14,601,840; the revenue for school purposes, $5,757,679; the total expenditure, $5,723,424. The State Normal School at Trenton, opened in 1855, has a three years' course. The New Jersey College of Agriculture, at New Brunswick, is the scientific school of Rutgers College, with a four years' course. It has a farm of 100 acres and 130 free scholarships, receives State aid to the amount of about $7,000 annually, and had, in 1892–93, 171 students. The principal higher educational institutions are the College of New Jersey, at Princeton, founded in 1746,

Rutgers College, at New Brunswick, chartered as Queen's College (1766); Burlington College (1846) and St. Mary's Hall (1837), at Burlington (Protestant Episcopal); Seton Hall College, at South Orange (Roman Catholic, 1856); Stevens Institute of Technology, at Hoboken; Theological Seminary (Presbyterian), at Princeton; Drew Theological Seminary (Methodist), at Madison; German Theological School (Presbyterian), at Bloomfield; Lawrenceville School; Peddie Institute, Hightstown; Centenary Collegiate Institute, at Hackettstown (Methodist Episcopal); Newark Academy (1792); Blair Presbyterial Academy, at Blairstown; St. Elizabeth's Academy, for girls (Roman Catholic), near Morristown; and the Pennington Seminary, for both sexes, at Pennington.

Charitable, Reformatory, and Penal Institutions.—These comprise the State prison, at Trenton, built in 1836 and since much enlarged; the State Reform School for Boys, at Jamesburg, opened in 1867, with a farm of 490 acres; the State Industrial School for Girls, near Trenton, with a farm of 79 acres; a Hospital for the Insane, at Trenton, built in 1844; a Hospital for the Insane, at Morris Plains, opened in 1876 at a cost of $2,250,000; the Institution for Feeble-minded Women, at Vineland, opened in 1888; the Training-school for Feeble-minded Children at Vineland, opened in 1888; the School for Deaf Mutes, near Trenton; and the Soldiers' Home at Kearney, near Newark. There are public county asylums for lunatics in Burlington, Camden, Cumberland, Essex, Gloucester, Hudson, Passaic, and Salem Counties.

Political Organization.—The Governor is elected for a term of three years, and can not hold the office for two consecutive terms. He appoints most of the members of the judiciary, and many heads of departments and executive officers. The Legislature consisted in 1894 of a Senate of twenty-one members, and a General Assembly of sixty members. Each county elects one Senator for a term of three years, one-third of the body being elected each year. The Legislature meets annually, with no limit of session. The right of suffrage is enjoyed by every male citizen of the U. S., of the age of twenty-one years, who shall have been a resident of the State one year, and of the county in which he claims his vote five months next before the election, excepting idiots, insane paupers, and convicts not pardoned or restored by law to the right of suffrage. A modification of the Australian ballot system is in operation.

History.—The earliest white settlers of New Jersey were the Dutch, who between 1614 and 1621 founded the colony of New Netherlands on the territory between the Hudson and Delaware rivers. In 1664 this region passed to the English, and the Duke of York, who held a grant from the king, made it over to John, Lord Berkeley, and Sir George Carteret. The province was named in honor of Carteret, who had distinguished himself while governor of the island of Jersey. The proprietors established a government, republican in its character, which continued until 1676, when the province was divided into East Jersey and West Jersey by a line drawn from Little Egg Harbor to a point on the Delaware in lat. 41° 40′ N. The two divisions remained distinct until 1702, when the proprietors surrendered their powers of government to the crown, reserving their exclusive right to dispose of the soil. Thereafter, until the Revolution, New Jersey was a royal province. From 1703 to 1738 the provinces of New York and New Jersey had the same governors. There were no Indian troubles, and the course of provincial history after 1702 was prosperous and uneventful. On July 2, 1776, two days before the Declaration of Independence, the provincial congress adopted a constitution for an independent State, which was ratified on July 18, 1776, and under this the State was governed until 1844. New Jersey was fighting-ground during most of the Revolution. The important battles of Trenton, Princeton, and Monmouth, with other minor engagements, were fought within her borders. Washington was in winter quarters at Morristown (*q. v.*) in 1777, and in 1779–80 and 1780–81. William Paterson, of New Jersey, was eminently influential in the convention that framed the Federal Constitution, which was ratified by the State on Dec. 18, 1787. In this wise and patriotic act New Jersey was anticipated only by Delaware and Pennsylvania. It is worthy of notice that the State constitution of 1776 allowed universal suffrage, both male and female, white and colored, subject to a property qualification of £50. Women continued to vote until 1807. A new constitution was adopted in 1844, and amended in 1875.

New Jersey furnished 88,305 men to the army during the civil war. The naval and marine enlistments numbered 4,853. The entire expense to the State for organizing, equipping, subsisting, supplying, and transporting her troops was $2,894,384.99.

GOVERNORS OF NEW JERSEY.

William Livingston	1776–90	Rodman M. Price	1854–57
William Paterson	1790–93	William A. Newell	1857–60
Richard Howell	1793–1801	Charles S. Olden	1860–63
Joseph Bloomfield	1801–02	Joel Parker	1863–66
John Lambert (acting)	1802–03	Marcus L. Ward	1866–69
Joseph Bloomfield	1803–12	Theodore F. Randolph	1869–72
Aaron Ogden	1812–13	Joel Parker	1872–75
William S. Pennington	1813–15	Joseph D. Bedle	1875–78
Mahlon Dickerson	1815–17	George B. McClellan	1878–81
Isaac H. Williamson	1817–29	George C. Ludlow	1881–84
Garret D. Wall (declined)	1829	Leon Abbett	1884–87
Peter D. Vroom	1829–32	Robert S. Green	1887–90
Samuel L. Southard	1832–33	Leon Abbett	1890–93
Elias P. Seeley	1833	George T. Werts	1893–96
Peter D. Vroom	1833–36	John W. Griggs	1896–98
Philemon Dickerson	1836–37	Foster M. Voorhees	1898–
William Pennington	1837–43		
Daniel Haines	1843–45		
Charles C. Stratton	1845–48		
Daniel Haines	1848–51		
George F. Fort	1851–54		

Authorities.—See the State Archives, 16 vols.; Cook, *Geology of New Jersey* (1868); publications and *Proceedings* of the New Jersey Historical Society; Elmer, *The Constitution and Government of the Province and State of New Jersey* (1872); Maclean, *History of the College of New Jersey* (Philadelphia, 1877); Mulford, *Civil and Political History of New Jersey* (2 vols., Philadelphia, 1851); Raum, *History of New Jersey*; Smith, *History of New Jersey* (Burlington, 1765; 2d ed. 1877); Gordon, *History and Gazetteer of New Jersey* (1844); Barber and Howe, *New Jersey Historical Collections.*

Frederic Adams.

New Jersey, College of: an institution of learning (whose corporate name was changed in 1896 to *Princeton University*) founded under the auspices of the Presbyterian Synod of New York, which then included New Jersey. Chartered by New Jersey in 1746, it was opened in Elizabethtown in May, 1747, received a more liberal charter in 1748, was removed to Newark, and finally to Princeton in 1757, where a large building was erected named Nassau Hall, in memory of William III. of the house of Nassau. It was occupied as a barracks and a hospital both by the colonial and the British troops in the Revolution. Gen. Washington drove the British from its walls Jan. 3, 1777. The Continental Congress met in it in 1783, and the members of Congress and Gen. Washington attended the commencement in that year. Gen. Washington presented fifty guineas to the trustees to repair the damages of war, which were appropriated for a portrait of Washington by the elder Peale. Dr. Witherspoon and two of the alumni, Richard Stockton and Benjamin Rush, were signers of the Declaration of Independence. Rev. Jonathan Dickinson was the first president from May to Oct., 1747. Rev. Dr. James McCosh was president from 1868 to June, 1888. Active and energetic, his reputation greatly advanced the interests of the college. The faculty was enlarged, the number of students increased, new studies introduced, nine large buildings erected, and the funds greatly augmented. Among its benefactors have been N. Norris Halstead, who erected the observatory, John C. Green, and Henry G. Marquand. Mr. Green gave $750,000 to found a school of science, erect a library, Dickinson Hall, and for other objects. The trustees of his estate erected Witherspoon Hall and Edwards Hall and Chemical Hall, enlarged the school of science, and endowed a number of professorships. These donations have amounted to $2,500,000. In 1882 Mr. Marquand erected a handsome chapel, costing $125,000, and other friends placed in the observatory one of the largest telescopes ever constructed. William Libbey, Sr., who founded the museum of geology and archæology at a cost of $100,000, also presented to the college the University Hotel, which cost more than $250,000.

The college year is divided into two terms; most of the studies are elective in the junior and senior years. There are many prizes and fellowships, the recipients of the latter being required to pursue a prescribed course of study for one year after graduation. The John C. Green School of Science is now in operation. There are (1899–1900) 81 professors and instructors, and 1,099 students. The post-graduate courses are increasing. In 1900 they had 132 students. President Francis L. Patton, D. D., LL. D., was inaugurated June 20, 1888. Since that time the faculty has been enlarged, the num-

ber of students increased by more than 300, and more than $2,000,000 has been given to the college, chiefly in the form of large and beautiful buildings. The college and society libraries contain more than 200,000 volumes. The number of graduates is (1900) nearly 9,000, among whom have been some of the most distinguished men in Church and state, the most eminent being James Madison, fourth President of the U. S. Within the last twenty years $4,000,000 have been contributed by friends to the college. The buildings are mostly of stone, and occupy the campus, which runs parallel with the main street of the town. The grounds are shaded with fine trees. Nassau Hall, East and West Colleges, the American Whig and Cliosophic halls form a fine quadrangle, within which are planted two Revolutionary cannon. The other buildings lie E. and S.W. of this quadrangle. The geological and archæological museum in Nassau Hall and the museum of natural history in the School of Science are rapidly growing in importance. See Maclean, *History of the College of New Jersey* (2 vols., Philadelphia, 1877). HENRY C. CAMERON.

New Jersey Tea: a small shrub (*Ceanothus americanus*) belonging to the Buckthorn family (*Rhamnaceæ*), whose leaves were used as a substitute for tea during the American Revolution. The other species of the genus *Ceanothus* are abundant in Western and Southwestern U. S. See CEANOTHUS. CHARLES E. BESSEY.

New Jerusalem, Church of the: the name taken by a body of Christian worshipers who accept as true the doctrines taught in the theological writings of Emanuel Swedenborg. (See SWEDENBORG, EMANUEL.) In 1787, fifteen years after Swedenborg's death, the first organization for worship on the basis of those doctrines was formed in London, and consisted of sixteen persons. Two years later a general conference was held, also in London, of believers in the new faith. From that time to the present similar meetings have been held annually in England, with the exception of a few years; and in 1821 a legal body was formed under the title, The General Conference of the Ministers and other Members of the New Church, signified by the New Jerusalem in the Apocalypse or Revelation of John.

This church has flourished principally in England, the U. S., and Canada, though a few scattered societies are to be found on the continent of Europe. The beginnings in the U. S. were but little later than those in England, the first regular society, with a minister at its head, having been formed in Baltimore, Md., in the year 1792. In 1817 the body now known as The General Convention of the New Jerusalem in the United States of America was organized at a meeting held in Philadelphia. From that time till 1893 it has held seventy-three annual sessions. This body was incorporated in the year 1861, under the laws of the State of Illinois, and includes the larger part of those in the U. S. and Canada who openly accept the doctrines of the New Church. It consists of eleven "associations" and other local organizations, comprising in the aggregate 107 societies, or worshiping assemblies, with 95 ministers and 6,461 members. If the isolated and scattered believers be added to the foregoing, the total would probably be, in round numbers, 10,000. Besides the above, not a few who retain their connection with other Christian bodies are known to favor the teachings of Swedenborg.

The term New Church, or Church of the New Jerusalem, is used by those who adopt it not only because Swedenborg himself uses it, but because his writings seem to them to contain a complete new system of Christian doctrine. Without setting aside anything that is true in the old Christianity, the new system claims to be a deeper unfolding of the Scriptures and of God's nature and purposes as revealed therein. Swedenborg was no organizer of religious institutions, but confined himself to a statement of the principles on which others, at their discretion, may establish them. These all center in three general or essential ones, which relate respectively (1) to God, (2) to Divine revelation or the Scriptures, and (3) to heavenly life and happiness. These three subjects may properly be considered in their order.

Concerning God.—1. God is one in essence and in person, and can never be thought of otherwise without grievous error. 2. Not only did he create all other beings in the beginning, but by the unceasing communication of his life he continually preserves them; so that preservation is perpetual creation. 3. He is, in his essence, perfect love and wisdom. Love is his inmost nature, and wisdom is the means whereby love gives itself expression and carries out its purposes. His love is absolute goodness, his wisdom absolute truth. 4. His Divine Providence is the active operation and oversight of infinite love and wisdom in the government of men. They live because he loves them, and the ruling purpose of his providence is their spiritual and eternal welfare; but true happiness can be realized only in the exercise of freedom. Man is therefore created a free agent. This freedom renders possible a reciprocal relationship between him and God on the basis of mutual love; but it also involves possibilities of an opposite character. Accordingly, the origin of evil is due to man's abuse of his freedom. 5. God can not be known or apprehended by finite men except so far as he is revealed in a manner accommodated to their limited powers of thought and sight. The theophanies, or divine appearances, recorded in the Old Testament were produced by his filling an angel with his presence, and being thus seen as a man. 6. More marked than any of these manifestations was that which found expression in the birth of Jesus Christ, which event, according to the New Church theology, was simply the way in which the one God Jehovah came into nearer and more definite relations with his human family. He clothed himself with their nature so that outwardly he was a man like themselves, but inwardly "the everlasting Father." His nature had at first its own distinct life and consciousness. Being derived, in part, from a finite human mother, it inherited her imperfections, with tendencies to evil and liabilities to temptation. By means of temptations successfully resisted he overcame evil and hell, and thus brought redemption to men. In this process, which was gradually effected, his human nature was wonderfully transformed. Its evil and limiting conditions were put away, and there came down into the place of them the perfect goodness and wisdom of the Father. In other words, his human was glorified, or made divine. He became to eternity "Emmanuel, God with us." The Lord Jesus Christ, as thus embodying in himself all of deity, is the one true object of Christian worship. 7. There is a Trinity in God, though not a Trinity of persons, but a threefold or trinal order of being, such as finds expression in the one person of our Lord Jesus Christ. Man is made "in the image, after the likeness," of God; and in him is a trinity of soul, body, and proceeding life or operation. In God likewise is the inmost and inscrutable Divinity, or the Father; the Divine Human or the Son, bringing the Father forth to view; and the Divine proceeding life or energy, pictured by the Lord's breathing on his disciples. These are the constituent parts or elements of one Divine person, each being essential to a full conception of him.

The Scriptures.—According to Swedenborg, the Bible, or Sacred Scripture, is the veritable Word of God, uttered by him through writers whose minds he used as his instruments. It is divine not only from the fact that God gave it, but also because it partakes of his nature and quality. The truth which it contains is infinite. The natural or literal sense of Scripture is its least and lowest part. Within that sense are higher senses or degrees of meaning, which are distinct from and yet make one with the letter. In other words, the Scriptures are written by what Swedenborg terms correspondences. That is to say, every object, place or person that is mentioned in them represents something that pertains to the mental or spiritual life of man. By the interpretation of these representatives or correspondences a connected spiritual sense is obtained entirely different from the sense of the letter, and serving to show that the Scriptures, though outwardly clothed in thoughts and language borrowed from natural men, are internally and essentially the living truth of God. The law of correspondence is not arbitrary, but coincides with the law of creation itself; for every natural object exists from a spiritual cause, and is the visible form and embodiment of some particular phase of spiritual life, to which it is said to correspond. Of the relation between the natural and spiritual worlds more will be said below. By means of correspondence the Word is in its literal sense brought down to all possible conditions of human character, so that it may reach every man where he stands, and help him to ascend to a higher state of life. Many correspondences are obvious, and constantly occur in common language. Heat, for instance, corresponds to love, light to wisdom, and water to cleansing truth. Most of Swedenborg's theological writings are devoted to an exposition of the spiritual sense of Scripture by applying thereto the doctrine of correspondence. Of our common Bible, the books of Ruth, Chronicles, Ezra, Nehemiah, Esther, Job, Proverbs, Ecclesiastes, and the Song of Solomon, in the Old Testament, and the Acts and Epistles in the New, have no

continuous spiritual sense, and were not written under the same full inspiration as the remaining books, which contain that sense. The first chapters of Genesis have only spiritual truth, the historical truth beginning with the life of Abraham. The remainder of the Word, with few exceptions, deals with actual history, yet holds the deeper meaning within.

Heavenly Life and Happiness.—All of Swedenborg's teachings are affected by the definite instruction which he gives respecting the other world. He shows that the latter is not far off in space, but an inner realm of being, always present, and bearing the same relation to the world of nature that a man's spirit bears to his body. Indeed, the spirits of all men are living, though unconsciously, in the spiritual world, and when their natural bodies die they wake to a clear perception of its realities. The spiritual body, of which Paul speaks, is an essential part of the human organism. The spiritual world is real and substantial, though intangible to natural senses. It is full of visible persons and objects like those on earth, as appears from the fact that they were seen by the prophets and others when the eyes of their spirits were opened. Such opening is possible to all men, but is seldom permitted, and then only for some special purpose. Swedenborg affirms that it was his own frequent experience, in order that he might understand the things which it was his office to teach; but he warns his readers against the dangers of intercourse with spirits, except when it comes unsought, and so by Divine permission.

Heaven is in its essence a state of the mind, and the same is true of hell. The one is a state which is ruled by love of the Lord and the neighbor; the other, a state in which love of self and the world is supreme. So far as man cherishes heavenly affections he is brought into harmonious relations with heaven, and is actually making heaven his home. In like manner, so far as he cherishes selfish and worldly loves, or—what is the same—indulges his evil tendencies, he brings himself under the influence of infernal spirits, and becomes identified with them. After death he finds a permanent abode in the other world, according to the choice which he has made here. No one is condemned to hell, but each one who goes there condemns himself. The pure atmosphere of unselfish love which rules in heaven is but torment to those who are confirmed in evil, and they turn away from it to a more congenial life and companionship. JAMES REED.

New Kensington: borough (founded in 1891); Westmoreland co., Pa. (for location of county, see map of Pennsylvania, ref. 5–B); on the Allegheny river, and the Allegheny Valley Railway; 18 miles N. E. of Pittsburg. It contains 4 churches, 2 school buildings, a bank, a weekly newspaper, and several glass-works, foundry and machine shop, and reduction, cold-rolled steel, stone, and white-lead works. Pop. (1900) 4,665.
EDITOR OF "DISPATCH."

New Lebanon: town; Columbia co., N. Y. (for location of county, see map of New York, ref. 6–J); on the Lebanon Springs Railroad; 24 miles S. E. of Albany. It contains the villages of Lebanon Springs, a summer resort noted for its thermal springs, New Lebanon Center, West Lebanon, New Britain, and Tilden's, and the Shaker community of Mt. Lebanon; is in an agricultural region; and contains a seminary for girls, several hotels, churches, public schools, and manufactories of thermometers, glass, machinery, flour, lumber, pharmaceutical preparations, brooms, and vinegar. Pop. (1880) 2,245; (1890) 1,765; (1900) 1,556.

New Leon: See NUEVO LEON.

New Lexington: village; capital of Perry co., O. (for location of county, see map of Ohio, ref. 6-G); on the Ohio Cent. and the Cin. and Musk. Valley railways; 21 miles S. W. of Zanesville, 53 miles S. of Columbus. It is surrounded by hills containing valuable deposits of coal, and has a court-house, completed in 1887 at a cost of $150,000, town-hall which cost $12,000, public-school building which cost $20,000, St. Aloysius Female Academy, a private bank, and two weekly newspapers. The industries are coal-mining and manufacturing. Pop. (1880) 1,357; (1890) 1,470; (1900) 1,701. EDITOR OF "HERALD."

New Light and **Old Light**: terms used for the two parties in the Associate Synods of Scotland, about 1800, and used later for the two parties in the Reformed Presbyterian Church in the U. S. See PRESBYTERIAN CHURCH.

New Lisbon (now **Lisbon**): village; capital of Columbiana co., O.; on the Beaver river, and the Erie and the Pitts., Marion and Chi. Railway; 35 miles E. of Canton, 56 miles W. N. W. of Pittsburg, Pa. (see map of Ohio, ref. 4–J). It is in an agricultural, coal, iron, and wool-growing region, and has manufactories of fire-brick, sewer-pipe, and woolen goods, a national bank with capital of $50,000, a private bank, and four weekly newspapers. Pop. (1880) 2,028;(1890) 2,278.

New London: city (founded in 1646, name changed from Naumeag in 1658, plundered and burned by the British in 1781, chartered as a city in 1784); port of entry; one of the capitals of New London co., Conn. (for location, see map of Connecticut, ref. 11–K); on the Thames river, here crossed by a noted bridge (see BRIDGES), 3 miles above its entrance into Long Island Sound, and on the Cent. Vt., the N. Y. and N. E., and the N. Y., N. H. and Hart. railways; 40 miles S. E. of Hartford, 50 miles E. of New Haven. The site rises from the river to a series of hills back of the city and commands an attractive stretch of scenery. The harbor is considered the best on the Sound, is 3 miles wide and 30 feet deep, thoroughly protected against storms and floating ice, defended at its entrance by Fort Trumbull, and was once the base of large commercial operations. New London has daily steamboat communication with New York, is much frequented in summer by tourists, and contains many summer residences of people doing business elsewhere. There are 12 churches, the Bulkeley High School for boys, the Williams Memorial Institute for girls, the Haven Public Library building, the New London County Historical Society (with valuable library), 3 national banks with combined capital of $550,000, 2 savings-banks with surplus of nearly $400,000, a State-bank with capital of $300,000, and a weekly and 3 daily periodicals. The city has ample water, sewerage, gas, and electric light plants, and contains 4 shipyards, extensive silk-mills, iron-foundries, woolen-mill, cotton-gin factory, large sawmill, printing-press manufactory, and many minor industries. The river here is a favorite racing-course for college rowing-clubs. Above the city and on the opposite side of the river the U. S. Government has established a naval station. Among the attractions is Fort Griswold, an earthwork with a small battery, the scene of a massacre on Sept. 6, 1781, which is commemorated by a shaft 127 feet high. Pop. (1880) 10,537; (1890) 13,757; (1900) 17,548. EDITOR OF "TELEGRAPH."

New London: city; Waupaca co., Wis. (for location of county, see map of Wisconsin, ref. 5–E); at the confluence of the Wolf and the Embarras rivers, and on the Chi. and N. W. and the Green Bay, Win. and St. P. railways; 21 miles W. N. W. of Appleton, 39 miles W. S. W. of Green Bay. It is in an agricultural and lumber region; has planing, saw, and flour mills, breweries, and screen door and window, furniture, excelsior, and embossed-wood factories; and contains a private bank, weekly newspaper, and water pronounced the purest in the State. Pop. (1890) 2,050; (1900) 2,742. EDITOR OF "TRIBUNE."

Newman, ALBERT HENRY: See the Appendix.

Newman, EDWARD, F. L. S.: entomologist; b. at Hampstead, England, May 13, 1801; began in childhood to study natural history, especially entomology; established and edited *The Entomological Magazine* 1833, *The Entomologist* 1840, *The Zoölogist* 1843, and *The Phytologist* 1844; became in 1840 a publisher, and issued, besides many popular works by other writers, his own *History of British Ferns* (1840); *Dictionary of British Birds* (1866); *Illustrated Natural History of British Moths* (1869); *Illustrated Natural History of British Butterflies* (1871); and several minor treatises. He gave almost exclusive attention for several years to insects injurious to vegetation. D. June 12, 1876.

Newman, FRANCIS WILLIAM, LL. D.; author; b. in London, June 27, 1805; educated at Ealing and at Worcester College, Oxford, and graduated with double first-class honors 1826; was fellow of Baliol 1826–30, when he resigned on account of theological objections to subscribing the Thirty-nine Articles; traveled extensively in the East, acquiring a familiar knowledge of Arabic and of Oriental literature, but gradually becoming widely alienated from Anglican theology; was classical tutor in Bristol College from 1834–40, Professor of Classics at Manchester New College, London, 1840–46, and Professor of the Latin Language and Literature at University College, London, 1846–63; after that time devoted himself exclusively to literature. Similar in mental characteristics to his brother, he diverged from the Church of England in precisely the opposite direc-

tion, though the title of his first book betrays the same longing for ecclesiastical unity which led Dr. John H. Newman to the Church of Rome. He is the author of *Catholic Union: Essays toward a Church of the Future and the Organization of Philanthropy* (1844); a scholarly *History of the Hebrew Monarchy* (1847); *The Soul, its Sorrows and Aspirations* (1849; n. e. 1882); a remarkable autobiography entitled *Phases of Faith, or Passages from the History of my Creed* (1850; n. e. 1881); *The Odes of Horace translated into Unrhymed English Meters* (1853); *The Iliad of Homer translated into Unrhymed English Meters* (1856); *Theism, Doctrinal and Practical* (1858; n. e. as *Hebrew Theism*, 1874); an English-Arabic *Dictionary* in Roman type (2 vols., 1871); *Early History of Cardinal Newman* (1891); besides treatises on many other subjects, including mathematics, social science, politics, elocution, philology, and general literature, which exhibit great scholarship and wonderful versatility. D. in Weston-super-Marc, Somerset, Oct. 4, 1897.

Revised by S. M. Jackson.

Newman, John Henry, D. D.: religious leader; b. in London, Feb. 21, 1801; educated at Ealing and at Trinity College, Oxford; graduated B. A. 1820; was chosen a fellow of Oriel 1823; took Anglican orders 1824; was vice-principal of St. Albans Hall 1825–26; tutor of Oriel 1826; opposed Catholic emancipation 1829; was one of the university preachers 1830; joined with Hurrell Froude in forming a conservative Anglo-Catholic party within the Church of England; visited Rome and Sicily 1832–33; took part with Keble and Pusey in originating the Oxford Movement; was a leader in the propaganda of High Church doctrines by means of the celebrated *Tracts for the Times*; rapidly developed his tendencies toward Roman Catholicism; was in 1828–43 incumbent of St. Mary's, Oxford, and chaplain of Littlemore, and acquired great fame as a preacher and writer; founded at Littlemore in 1842 a community of ascetics. In 1845 he joined the Roman Catholic priesthood, and in 1849 established a branch of the brotherhood of St. Philip Neri at Edgbaston, where he took up his residence. He delivered lectures on *Anglican Difficulties* in 1850, and on *Catholicism in England* in 1851. The latter, in which he depicted the popular prejudices against Roman Catholics with great powers of irony and satire, gave rise to an action for libel by Dr. Giovanni Giacinto Achilli. The verdict went against Newman, and he was condemned to pay £100, after a famous trial which cost him upward of £10,000, for which he was reimbursed by his friends. He wrote a number of the *Tracts for the Times* (1833–41), including the famous *Tract No. 90*; *Parochial Sermons* (6 vols., London, 1834–42); *Essay on Development of Christian Doctrine* (1845); *Arians of the Fourth Century* (1833); *Theory of Religious Belief* (1844); *Loss and Gain* (1848); *Callista, a Sketch of the Third Century* (1855); *Apologia pro Vita Mea* (1864), afterward recast as *A History of my Religious Opinions* (1865); *An Essay in Aid of a Grammar of Assent* (1870); *A History of Arianism* (1875); many sermons, lectures, essays, poems, and other works, including a reply to Gladstone's pamphlet on *The Vatican Decrees* (1875) and *A Letter addressed to His Grace the Duke of Norfolk*. He was made a cardinal May 12, 1879. D. at Edgbaston, Birmingham, Aug. 11, 1890. See his *Letters*, written while in the Church of England (2 vols., 1891), and E. A. Abbott, *Anglican Career of Cardinal Newman* (2 vols., 1892).

Revised by S. M. Jackson.

Newman, John Philip, D. D., LL. D.: bishop; b. in New York city, Sept. 1, 1826; educated at Cazenovia Seminary; became a minister of the Methodist Episcopal Church: was for several years pastor of the Metropolitan Methodist Episcopal Church, Washington, D. C., and chaplain of the U. S. Senate 1869–74; was pastor Madison Avenue Congregational Church, New York, 1882–84. In 1886 he again became pastor of the Metropolitan Methodist Episcopal Church. He was elected bishop May 24, 1888, and settled in Omaha, Neb. He was a member of the Society of Biblical Archæology, and author of *From Dan to Beersheba*; *The Thrones and Palaces of Babylon and Nineveh* (1875); *Christianity Triumphant* (1884); *America for Americans* (1887); *The Supremacy of Law* (1890). D. in Saratoga, N. Y., July 5, 1899.

Newmarket: town of England; partly in the county of Cambridge, partly in that of Suffolk; 69 miles N. N. E. of London (see map of England, ref. 10–K). It is the seat of the most famous race-course in England, and in 1891 had 6,213 inhabitants, most of whom are jockeys, grooms, trainers, and stablemen.

Newmarket: post-village of York County, Ontario, Canada; on the Northern Railway; 34 miles N. of Toronto (see map of Ontario, ref. 4–D). It has two weekly newspapers, important manufactures, and trade. Pop. of sub-district (1891) 2,143.

New Market: town; Rockingham co., N. H. (for location of county, see map of New Hampshire, ref. 10–G); on the Lamprey river, and the Boston and Maine Railroad; 14 miles W. of Portsmouth, 38 miles E. of Concord. It contains a national bank with capital of $80,000, a town library (founded 1872), and a daily and two monthly periodicals, and is principally engaged in the manufacture of cotton goods. Pop. (1880) 2,368; (1890) 2,742; (1900) 2,892.

Editor of "Advertiser."

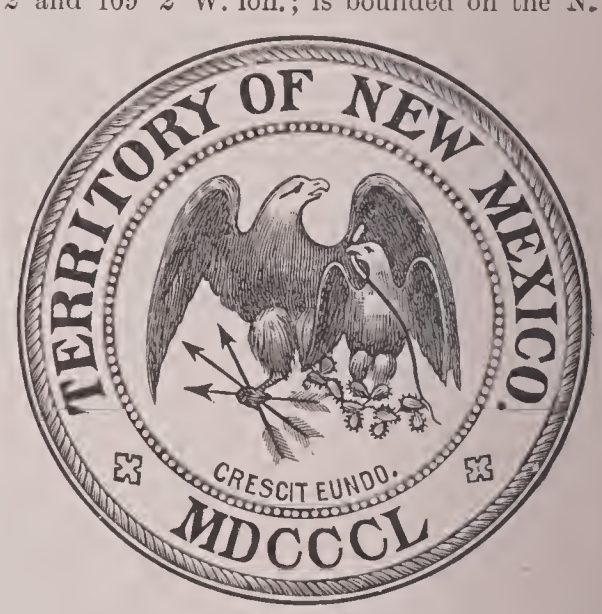
Newmarket Road, Battle of: See Fraziers Farm, Battle of.

New Mecklenburg, or **New Ireland** (native *Tambara*): an island of the Bismarck Archipelago, N. E. of New Guinea. It is the second largest island of the group, and is separated from the largest (New Pomerania) by a strait so narrow that it was long undiscovered, and was later half choked by a volcanic eruption near it. It is about 200 miles long by 20 or 30 broad, lies N. W. and S. E., and contains about 4,000 sq. miles. It is generally mountainous, higher at the western end. It is but little known, and attempts to colonize have been unsuccessful. In climate and population it is similar to New Pomerania (*q. v.*). It is under German protection.

M. W. Harrington.

New Mexico: one of the Territories of the U. S. of North America (Western group); organized Sept. 9, 1850; capital, Santa Fé.

Location and Area.—It lies between 31° 20′ and 37° N. lat., and 103° 2′ and 109° 2′ W. lon.; is bounded on the N. by Colorado, on the E. by Indian Territory and Texas, on the S. by Texas and Mexico, on the W. by Arizona; length from N. to S., 345 miles on the east side, 380 miles on the west side; breadth from E. to W., 330 miles on the north line, 352 miles on the south; area, 122,580 sq. miles (78,451,200 acres).



Seal of New Mexico.

Physical Features.—New Mexico forms a part of the lofty table-land which is the foundation of the Rocky Mountain ranges, as well as those of the Sierra Madre. This table-land gradually slopes southward to the Llano Estacado, or Staked Plain, and to El Paso. The Llano Estacado is a broad, almost level, treeless, and waterless plain, extending over three or four degrees of longitude and nearly as many of latitude, which is apparently barren, but is capable, if irrigated, of yielding large crops. From the elevated table-land there rise hundreds of summits of the Rocky Mountains, and W. of the Rio Grande the peaks of the Sierra Madre lift themselves from 3,000 to 10,000 feet above the *mesa* or plateau. The mountain chains E. of the Rio Grande valley are known locally as the Guadalupe, Sacramento, and Organ Mountains, and still farther E. the Sierras Blanca, Hueca, Capitana, etc., which form the western boundary of the valley of the Rio Pecos. W. of the Rio Grande the Sierra Madre is divided into numerous chains and some isolated peaks. The principal of these mountain chains are the Sierra San Mateo, the Zuñi Mountains, the Sierra del Datil, and the Sierra Mimbres. Still farther W. the San Juan Mountains enter New Mexico from Colorado, and the heavy masses of the Mogollon Mountains and the Pinaleno, Peloncito, and Chiricahua Mountains from Arizona. The principal river of New Mexico is the Rio Grande, which has a general direction from N. to S., but is not navigable in any part of its course through New Mexico. It re-

P 109 Q 108 Longitude R107 West from S106 Greenwich 105T 104U 103 V

NEW MEXICO

Scale of Statute Miles
0 10 20 40 60 80 100

32 P 31 Q Longitude 30 R West from 29S Washington T28 U27 V

W.P. Speller sculp

ceives from the W. two tributaries, the Rio Chama and the Rio Puerco, and from the E. several smaller streams. The Rio Pecos, a large affluent of the Rio Grande, drains the southeastern and eastern portion, and the Canadian river and two or three of its branches the northeastern. The western portion is drained by the large tributaries of the Colorado river and their affluents, and particularly by the San Juan, Little Colorado, and Gila, each of which has three or four considerable tributaries.

Soil and Productions.—The mountain ranges are partially covered (where they are not basaltic) with pine, cedar, spruce, and other evergreens. The foot-hills have extensive tracts of piñon or nut-pine and a smaller cedar, and in the river-bottoms are belts of cottonwood, sycamore, and other deciduous trees. In the southern part there are numerous groves of oak and walnut; in the Llano Estacado the mesquite grows to a varying height of from 5 to 20 feet. In the southern and southwestern portions the tree-cactus is a marked feature in the landscape. There are many indigenous grasses, the most widely spread and valuable of all being the nutritious *mesquite* or *grama* grass, which grows during the rainy season of July and August, ripens in the autumn, and dries on its stalk, furnishing to cattle, in its stalks and rich seeds, a valuable and natural hay of which they are exceedingly fond. The arable soils, under the influence of irrigation, yield fair crops. The U. S. census of 1890 showed a total of 3,085 farms under irrigation in New Mexico, not including those of Pueblo Indians. The irrigated area actually in crop amounted to 91,745 acres. The average value of products per acre was $12.80, and the average annual cost of water $1.54 per acre. The following summary from the census reports of 1880 and 1890 shows the extent of farm operations in New Mexico:

FARMS, ETC.	1880.	1890.	Per cent.
Total number of farms	5,053	4,458	*11·8
Total acreage of farms	631,131	787,882	†24·8
Total value of farms	$5,514,399	$8,140,800	†47·6

* Decrease. † Increase.

The following table shows the acreage, yield, and value of the principal crops in the calendar year 1900:

CROPS.	Acreage.	Yield.	Value.
Corn	25,216	554,752 bush.	$355,041
Wheat	183,207	3,847,347 "	2,616,196
Oats	7,641	229,994 "	110,397
Barley	1,076	31,204 "	19,346
Potatoes	976	18,544 "	21,140
Hay	37,544	77,341 tons	765,676
Totals	255,660		$3,887,796

On Jan. 1, 1900, the farm animals comprised 83,184 horses, value $1,680,945; 3,298 mules, value $112,323; 19,510 milch cows, value $618,467; 659,849 oxen and other cattle, value $12,301,571; 3,973,439 sheep, value $8,022,362; and about 28,000 swine, value $200,000; total head, 4,767,280—total value, $22,935,668.

Minerals.—Gold and silver are abundant. The oldest mining districts are the Old and New Placers, Pinos Altos, Cimarron, Arroyo Hondo, Manzano, and Moreno, and tracts in the Organ Mountains, the Sierras Blanca, Carriza, Jicarilla, and the Mogollon and Magdalena Mountains. The director of the U. S. mint estimated the value of the product of gold from New Mexico mines in 1899 at $584,100, and of silver at $650,731. The output of both silver and gold has decreased greatly since about 1890. Copper is found in very rich ores in several parts. The product in 1899 was 3,935,441 lb. Galena mines in the Organ Mountains yield 80 per cent. of pure lead, besides about $50 worth of silver to the ton. The lead output in 1899 was 4,856 short tons. Iron and salt are abundant. Anthracite coal is found in the Placer Mountains on the east border of the Rio Grande valley, 30 or 40 miles S. S. W. of Santa Fé, and bituminous in nearly every county. The production in 1899 by counties was, Bernalillo, 493,310 short tons; Colfax, 368,373 tons; Lincoln, 12,737 tons; and Rio Arriba, San Juan, Santa Fé, and Socorro, 176,294 tons; total, 1,050,714 tons. Gypsum is found in several counties, and a remarkably large and pure deposit exists on the San Augustin Plains in Donna Ana County, near an extinct volcano and a salt lake. Adjoining this deposit is an extensive one of carbonate and sulphate of soda, in the bed of an ancient river or lake. Valencia, Mora, and Taos Counties also contain carbonate of soda. Valuable deposits of fine clay have been found near Socorro and near Santa Fé, and there is a bed of superior kaolin in the suburbs of Santa Fé. Large beds of alum have been discovered, and some of them worked, on the Gila river. New Mexico is rich also in precious stones, and the production is steadily increasing. The most valuable are emeralds, turquoise, euclase, sapphires, garnets, milk and fire opals, peridots, and agates. The petrified woods are largely used by jewelers for inlaid work. There are numerous mineral springs in New Mexico, and the hot springs, about 5 miles from Las Vegas, and at Ojo Caliente, in Taos County, have a very high reputation. The temperature varies from 80° to 140° F.

Climate.—The climate, though varied, is dry. In the N. the range of the thermometer is between 10° and 75° F. In the S. the temperature is very mild, the thermometer rarely indicating as low a temperature as 32°. The rainy season in the southern part is in July and August. The amount of annual rainfall is 15·80 inches. The prevalent winds are E. S. E., S. W., W., and N. The climate has justly a high reputation for healthfulness.

Divisions.—For administrative purposes New Mexico is divided into nineteen counties, as follows:

COUNTIES AND COUNTY-TOWNS, WITH POPULATION.

COUNTIES.	* Ref.	Pop. 1890.	Pop. 1900.	COUNTY-TOWNS.	Pop. 1900.
Bernalillo	10-Q	20,913	28,630	Albuquerque	6,238
Chaves†	12-U	.....	4,773	Roswell	2,049
Colfax	9-T	7,974	10,150	Raton	1,240
Donna Ana	14-R	9,191	10,187	Las Cruces	.....
Eddy†	14-U	.....	3,229	Eddy	963
Grant	14-P	9,657	12,883	Silver City	2,735
Guadalupe†	11-U	.....	5,429	Puerto de Luna	.....
Lincoln	12-S	7,081	4,953	Lincoln	.....
Mora	9-T	10,618	10,304	Mora	.....
Otero †	13-S	.....	4,791	Alamogordo	1,524
Rio Arriba	9-R	11,534	13,777	Tierra Amarilla	.....
San Juan	9-P	1,890	4,828	Aztec	.....
San Miguel	10-S	24,204	22,053	Las Vegas	3,552
Santa Fé	10-S	13,562	14,658	Santa Fé	5,603
Sierra	13-R	3,630	3,158	Hillsboro	.....
Socorro	12-Q	9,595	12,195	Socorro	1,512
Taos	9-R	9,868	10,889	Taos	.....
Union†	9-U	.....	4,528	Clayton	.....
Valencia	11-Q	13,876	13,895	Los Lunas	.....
Totals		153,593	195,310		

* Reference for location of counties, see map of New Mexico.
† Formed since 1890 census.

Principal Cities and Towns, with Population for 1900.—Albuquerque, 6,238; Santa Fé, 5,603; Las Vegas, 3,552; Raton, 3,540; Gallup, 2,946; Silver City, 2,735; Roswell, 2,006; Alamogordo, 1,524; Socorro, 1,512.

Population and Races.—1860, 93,516; 1870, 91,874; 1880, 119,565; 1890, 153,593 (native, 142,334; foreign, 11,259; males, 83,055; females, 70,538; white, 142,719; colored, 10,874, comprising 1,956 persons of African descent, 361 Chinese, 3 Japanese, and 8,554 civilized Indians).

Industries and Business Interests.—The principal industries are silver, gold, and coal mining, stock-raising, and agriculture. Manufacturing is in its infancy. The census of 1890 showed that 127 manufacturing establishments reported. These had a combined capital of $965,938, employed 944 persons, paid $532,727 for wages and $691,420 for materials, and had products valued at $1,516,195.

Finance.—In 1900 the assessed valuation of taxable property was $38,452,181.30. The rate of taxation in 1897 was 10·80 per cent. against 7·75 per cent. in 1896. From Nov., 1896, to June, 1899, the revenues were $287,046.96; the expenditures for the same period were $347,315.15. The Territorial debt June 30, 1899, was $1,243,400; the total indebtedness of the counties, $2,997,665. On June 30, 1900, the total indebtedness, including county debt, was $4,178,123.09. There were also old militia warrants outstanding aggregating $650,000, a portion of which was believed to be fraudulent, and none of which is officially included in the statements of public indebtedness.

Banking.—On Sept. 5, 1900, there were 9 national banks, with a combined capital of $710,000, surplus and profits of $245,227.42, and deposits of $3,558,210.52; and on June 30, 6 State banks, combined capital $344,650; surplus and profits, $84,437; and deposits, $1,688,996.

Post-offices and Periodicals.—On Jan. 1, 1901, there were 324 post-offices, of which 13 were presidential (3 second-

class, 10 third-class), 311 fourth-class, and 117 money-order offices. The newspapers and periodicals comprised 4 daily, 1 semi-weekly, 45 weekly, and 3 monthly; total, 53.

Libraries.—In 1892 there were reported 5 public libraries of 1,000 volumes and over, which contained 11,154 bound volumes and 3,230 pamphlets. The libraries were classified as follows; College, 3; law, 1; and garrison, 1.

Means of Communication.—The total railway mileage of New Mexico on June 30, 1899, was 1,706·12. In 1893 the Legislature passed an act exempting from taxation for six years after completion any new railway lines or extensions of existing ones begun and partially opened for traffic within three years.

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	317	347	100,576	$296,755
Methodist Episcopal	32	22	1,750	71,200
Presb. in the U. S. of America	39	39	1,275	45,675
Methodist Episcopal South	25	25	548	32,600
Church of Jesus Christ of Latter-day Saints	5	5	442	1,432
Baptist	15	5	355	22,000
Congregational	4	4	175	17,800

Schools.—In 1891 the Legislature passed an act establishing a common-school system under direction of a board of education, consisting of the Governor, the superintendent of public instruction, and the presidents of the university, of the Agricultural College, and of St. Michael's College. According to the official report of Dec. 31, 1900, there were 52,652 children of school age, of whom 27,173 were enrolled in the public schools, and 15,832 were in average daily attendance. There were 506 schools, and 706 teachers whose average monthly pay is $39.19, many of whom taught both in English and Spanish; but English is required to be taught by law, and is taught in every public school in New Mexico. The total receipts for public-school purposes are about $200,000 annually. The institutions for advanced instruction are the University of New Mexico, at Albuquerque; Agricultural College, at Las Cruces; School of Mines, at Socorro; and the New Mexico Military Institute, at Roswell. Under the supervision and control of the Roman Catholic Church are public schools in Albuquerque, San Miguel, and Los Alamos; parochial and select schools in Albuquerque, San Miguel, Santa Fé, Mesilla, Los Alamos, and Las Vegas; St. Vincent's Academy, in Albuquerque; an academy in Silver City; Academy of Our Lady of Light, in Santa Fé; St. Joseph's Convent, in Fernandez de Taos; Annunciation Convent, in Mora; Academy of the Immaculate Conception, in Las Vegas; Academy of the Visitation, in Las Cruces; Convent of Our Lady of the Sacred Heart, in Bernalillo; Convent of Our Lady of Mount Carmel, in Socorro; and St. Michael's College, in Santa Fé; and a number of schools for Indian children.

Charitable, Penal, and Reformatory Institutions.—An orphan asylum, a hospital, and a sanitarium are maintained in Santa Fé under the direction of Roman Catholic Sisters of Charity. Silver City has a hospital conducted by the Sisters of Mercy. The New Mexico penitentiary and a public deaf and dumb asylum are maintained in Santa Fé.

History.—At the time of the discovery of the American continent New Mexico had a large and industrious population, either Aztec or Toltec, who had their walled towns, their stone dwellings several stories in height, their manufactures of cotton and wool, their rude but effective weapons of war, and who cultivated and irrigated the soil and gathered therefrom large crops. They were idolaters. The Spanish adventurers Alvar Nuñez, Marco de Niza, and Coronado penetrated to this region in 1537, 1539, and 1540. In 1581–82 the country was explored by Spanish adventurers, from whose account it was named New Mexico. Between 1595 and 1599 Juan de Oñate was sent thither by the Viceroy of Mexico to establish forts, colonies, and missions, and to take possession of the whole country in the name of the King of Spain. Oñate was successful, but in 1680 the Indians rose and drove the Spaniards out of the country. In 1698 the Spaniards regained a portion of their former power. In 1822 the inhabitants of New Mexico united with those of Mexico in throwing off the yoke of Spain, and thenceforward, until 1846, they were governed in the same way with the other states of Mexico. In 1846 Gen. Stephen Kearny, with a small U. S. force, captured Santa Fé, and soon after conquered the whole Territory and raised the U. S. flag there. In 1848 the region was ceded to the U. S. by the treaty of Guadalupe Hidalgo. By the treaty of Dec. 30, 1853, what was known as the Gadsden purchase was added to the Territorial area, which then comprised the whole of Arizona and a portion of what is now Colorado. Arizona was set off from it in 1863 and the portion of Colorado in 1865. During the early part of the civil war New Mexico was the scene of a protracted and bloody strife. In 1859 the Legislature passed a law recognizing the existence of slavery in the Territory, but this was repealed in 1861, and with it was abolished the system of peonage—a modified slavery which had existed for two and a half centuries.

Efforts to secure the admission of New Mexico into the Union as a State were begun prior to its creation as a Territory. In 1874–75 both Houses of Congress adopted a bill to provide an enabling act for the admission of the Territory as a State, but some Senate amendments were not voted on in the House, and the bill failed. In 1876 the Senate again adopted its bill, but it was not acted on by the House during that Congress. Nothing further was done till the summer of 1894, when both Houses passed an enabling act. This bill made the usual provision for the formation and ratification of a constitution and the organization of a State government. It provided for the guarantee of perfect toleration of religious beliefs, for the assumption and payment by the State of the debts and liabilities of the Territory, and for the establishment and maintenance of a system of public schools free from sectarian control. The bill also appropriated 64,000 acres of land for the erection of public buildings at the capital; 100,000 acres for the support of an agricultural college; 500,000 acres for permanent water-reservoirs; 46,000 acres for the support of a State university; 100,000 acres for an insane asylum; 200.000 acres for State normal schools; 100,000 for a State school of mines; 100,000 for a deaf and dumb asylum; 100,000 for a State reform school; and 8,600,000 acres for miscellaneous purposes—in all, 9,910,000 acres.

GOVERNORS OF NEW MEXICO.

James S. Calhoun	1851–52	Lewis Wallace	1878–81
William C. Lane	1852–53	Lionel A. Sheldon	1881–85
Solon Borland	1853	Edmund G. Ross	1885–89
David Merriwether	1853–57	L. Bradford Prince	1889–93
Abraham Rencher	1857–61	W. L. Thornton	1893–97
Henry Conolly	1861–65	Miguel A. Otero	1897–
Robert B. Mitchell	1865–67		
W. F. M. Arny (acting)	1867–69		
William A. Pile	1869–71		
Marsh Giddings	1871–76		
Samuel B. Axtell	1876–78		

Revised by ANTONIO JOSEPH.

New Milford: town (founded in 1703); Litchfield co., Conn. (for location of county, see map of Connecticut, ref. 9–D); on the Housatonic river, and the N. Y., N. H. and Hart. Railroad; 16 miles N. of Danbury, 36 miles N. by W. of Bridgeport. It contains five churches, several public and private schools, library (founded 1886), a national bank with capital of $125,000, a savings-bank, a private bank, and a weekly newspaper. It is the center of the tobacco industry of the Housatonic valley, and has two hat-factories, a pottery, and minor industries. Pop. (1880) 3,907; (1890) 3,917; (1900) 4,804.

EDITOR OF "GAZETTE."

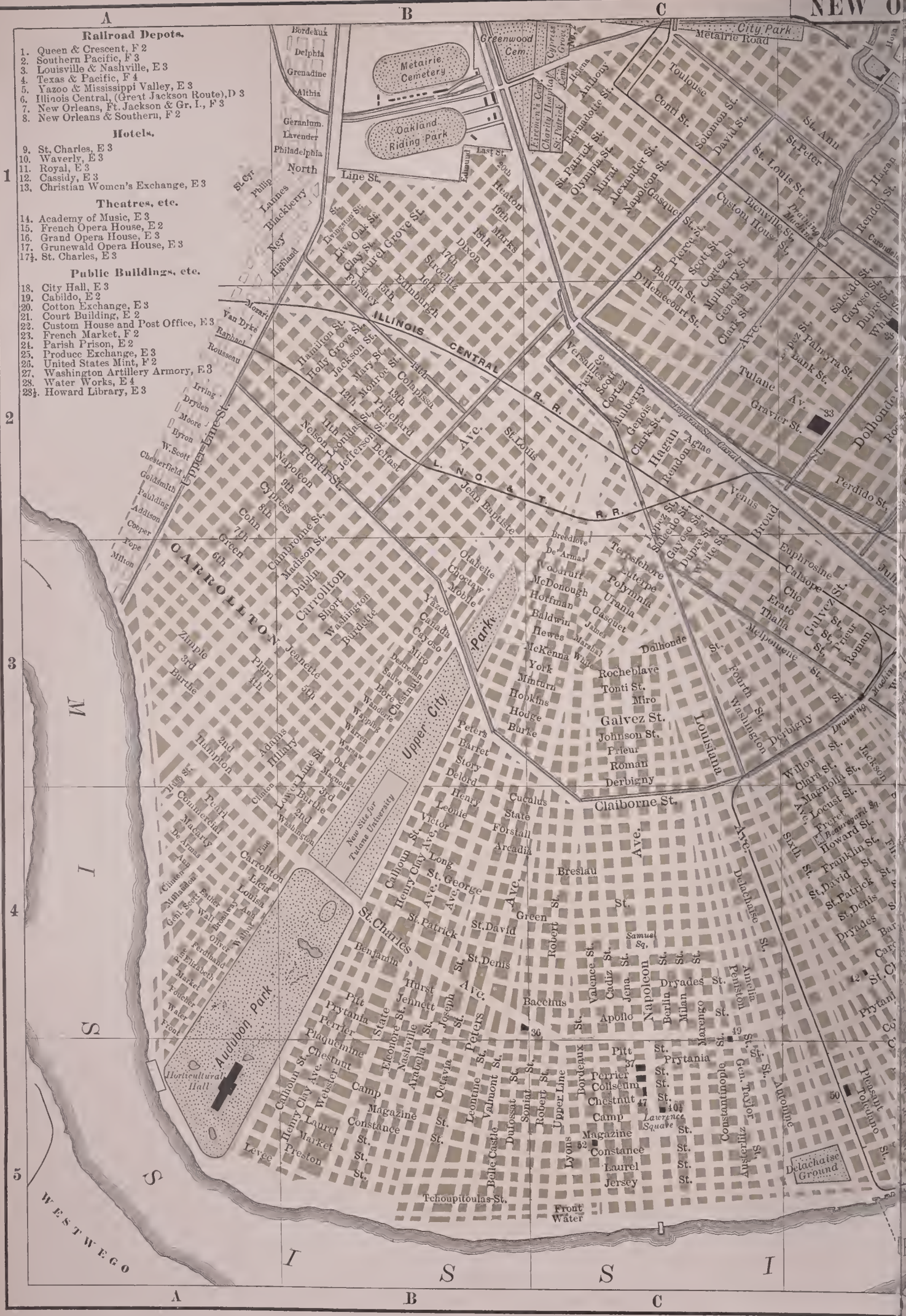
Newnan: city; capital of Coweta co., Ga. (for location of county, see map of Georgia, ref. 3–F); on the Atlantic and W. Point and the Cent. of Ga. railways; 39 miles S. of Atlanta. It contains 7 churches, 2 national banks with combined capital of $150,000, Walker High School, College Temple Library (founded 1853), and a weekly newspaper. There are harness, furniture, and cigar factories, marble-works, cottonseed-oil mill, ice-factory, cotton-mills, distilleries, a manufactory of engines, boilers, saw and grist mills, cotton-presses, and several tanneries. It is the center of a large fruit-growing and market-gardening region. Pop. (1880) 2,006; (1890) 2,859; (1900) 3,654.

EDITOR OF "HERALD AND ADVERTISER."

New Nantucket: See BAKER ISLAND.

New Netherlands: the old name of the country situated between Delaware and Connecticut rivers. The exclusive right to trade here was granted Oct. 11, 1614, by the states-general to the explorers. In 1623 New Netherlands was made a province or county of Holland, and the states-general granted it the armorial distinction of a count. In Sept., 1664, the colony of New Netherlands, which Charles

NEW O



Railroad Depots.

1. Queen & Crescent, F 2
2. Southern Pacific, F 3
3. Louisville & Nashville, E 3
4. Texas & Pacific, F 4
5. Yazoo & Mississippi Valley, E 3
6. Illinois Central, (Great Jackson Route), D 3
7. New Orleans, Ft. Jackson & Gr. I., F 3
8. New Orleans & Southern, F 2

Hotels.

9. St. Charles, E 3
10. Waverly, E 3
11. Royal, E 3
12. Cassidy, E 3
13. Christian Women's Exchange, E 3

Theatres, etc.

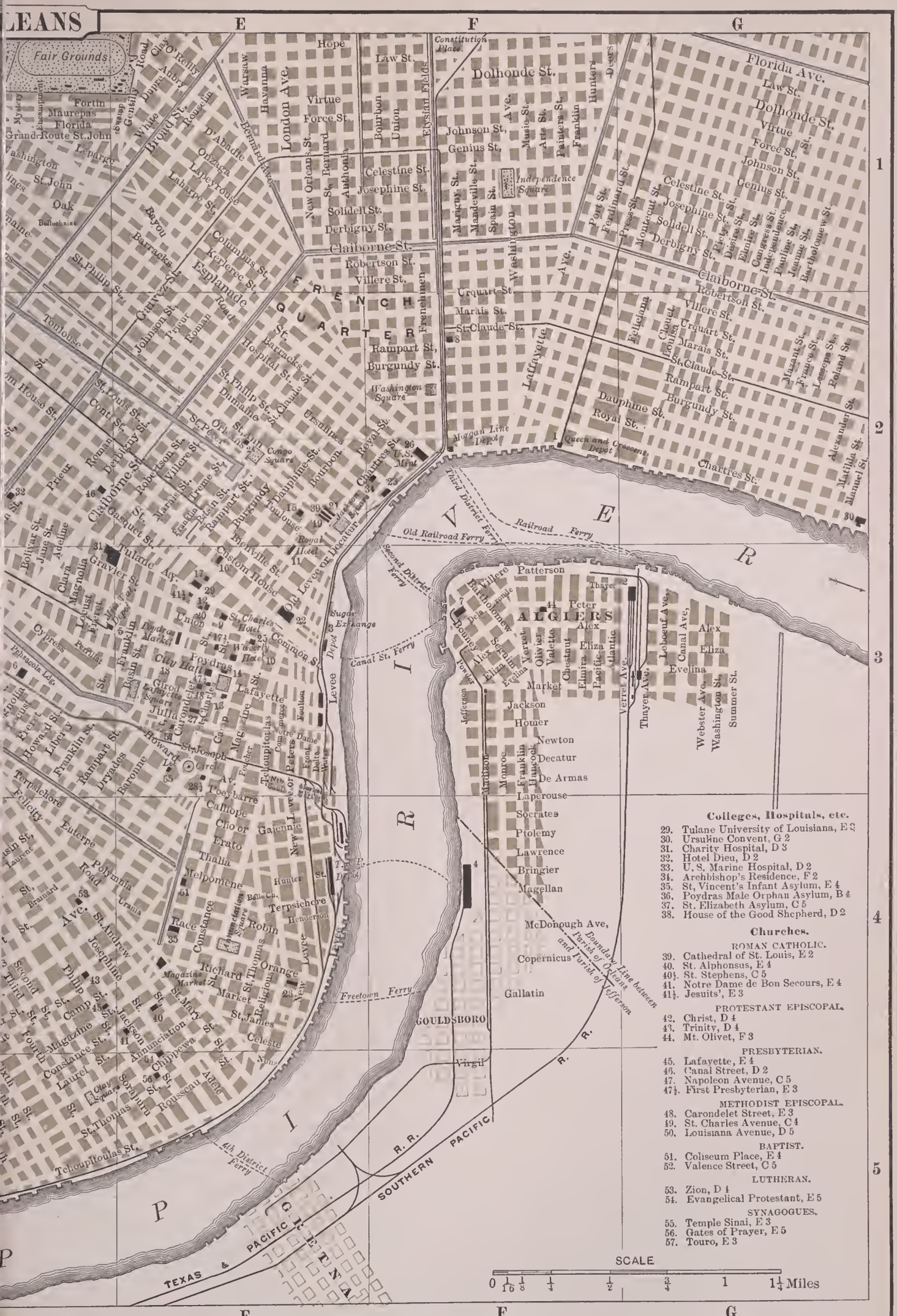
14. Academy of Music, E 3
15. French Opera House, E 2
16. Grand Opera House, E 3
17. Grunewald Opera House, E 3

17½. St. Charles, E 3

Public Buildings, etc.

18. City Hall, E 3
19. Cabildo, E 2
20. Cotton Exchange, E 3
21. Court Building, E 2
22. Custom House and Post Office, E 3
23. French Market, F 2
24. Parish Prison, E 2
25. Produce Exchange, E 3
26. United States Mint, F 2
27. Washington Artillery Armory, E 3
28. Water Works, E 4

28½. Howard Library, E 3



Colleges, Hospitals, etc.

29. Tulane University of Louisiana, E 3
30. Ursuline Convent, G 2
31. Charity Hospital, D 3
32. Hotel Dieu, D 2
33. U. S. Marine Hospital, D 2
34. Archbishop's Residence, F 2
35. St. Vincent's Infant Asylum, E 4
36. Poydras Male Orphan Asylum, B 4
37. St. Elizabeth Asylum, C 5
38. House of the Good Shepherd, D 2

Churches.

ROMAN CATHOLIC.

39. Cathedral of St. Louis, E 2
40. St. Alphonsus, E 4
40½. St. Stephens, C 5
41. Notre Dame de Bon Secours, E 4
41½. Jesuits', E 3

PROTESTANT EPISCOPAL.

42. Christ, D 4
43. Trinity, D 4
44. Mt. Olivet, F 3

PRESBYTERIAN.

45. Lafayette, E 4
46. Canal Street, D 2
47. Napoleon Avenue, C 5
47½. First Presbyterian, E 3

METHODIST EPISCOPAL.

48. Carondelet Street, E 3
49. St. Charles Avenue, C 4
50. Louisiana Avenue, D 5

BAPTIST.

51. Coliseum Place, E 4
52. Valence Street, C 5

LUTHERAN.

53. Zion, D 4
54. Evangelical Protestant, E 5

SYNAGOGUES.

55. Temple Sinai, E 3
56. Gates of Prayer, E 5
57. Touro, E 3

II. had granted to his brother, the Duke of York, was conquered by the capitulation of New Amsterdam.

Newnham College: an institution at Cambridge, England, formed by the amalgamation of an association for providing lectures for women in Cambridge and an association for providing a hall of residence for women attending the lectures. It was incorporated in 1880. The college stands on a site of about 8½ acres, and contains accommodations for the principal and vice-principals, with resident lecturers, and about 140 students. The main buildings are Clough Hall, Old Hall, and Sidgwick Hall. The library numbers 7,400 volumes. The average number of resident tutors is ten, of students 150. In 1881 the University of Cambridge opened to students of Newnham and Girton Colleges its tripos and previous examinations. There is a system of instruction by correspondence in connection with the college. Instruction is provided for partly by lectures given at Newnham College, and partly by lectures of the university and the colleges of the university that are open to students. A complete course of study involves preparation for a tripos examination for which the usual length of residence is three years. There are a considerable number of scholarships of the annual value of £50. The first principal, Miss A. J. Clough, died in 1892, and was succeeded by Mrs. Henry Sidgwick, the wife of Prof. Sidgwick. Miss Helen Gladstone and Miss Jane Lee are the vice-principals. The college is governed by a council, most of the members of which are connected with Cambridge University. C. H. Thurber.

New Orleans [named in honor of the Duke of Orleans]: city; in Orleans parish, La. (for location, see map of Louisiana, ref. 10–F); on both banks of the Mississippi river, 107 miles from its mouth. It is 960 miles in direct line S. W. of Washington, and 700 miles from St. Louis. From the fact that it was originally built within a great loop of the Mississippi, the city derived its sobriquet of the Crescent City. The present form, due to gradual expansion along the banks of the river, is rather that of the letter S. The city embraces the whole of the parish of Orleans, or about 196 sq. miles; but the settled area hardly exceeds 44 sq. miles. The Mississippi in front of the city has a width in places of 3,000 feet, and a maximum depth of 208 feet; total length of actual harbor, 7 miles on each bank. The jetties at the mouth of the river permit vessels of the highest tonnage to come directly to the city. By a canal in the rear New Orleans has communication with Lake Pontchartrain. The chief railways are the Illinois Central, Southern Pacific, Louisville and Nashville, Texas and Pacific, New Orleans and Northeastern, and the Yazoo and Mississippi Valley. Of street-railways there are about 163 miles.

Plan and General Appearance.—New Orleans was laid out in rectangular form, with ramparts on three sides and a fort at each corner. The plan of the city is now very irregular, as the streets follow the curving lines of the river. The land is low and flat, its greatest elevation being 10 ft. 8 in. above sea-level. It is protected from the waters of the river by a high levee; but during the spring floods these waters occasionally overflow and submerge portions of the city. The drainage is toward the lake, which in times of high wind overflows the settlements in the rear of the city.

The city is divided by Canal Street into two portions, the Creole and the American. In the Creole quarter or *Vieux Carré* the streets are narrow and the houses are welded into compact blocks, except at the lower extremity, or Esplanade Avenue. It is, however, the most interesting portion of the city, for here are the old cathedral, the Cabildo, and many other relics of French and Spanish domination. In the American quarter, besides the business portion, are residences surrounded by stretches of green turf, beds of flowers, and clustering trees, among which are the great magnolia, the palmetto, the palm, the fruit-bearing banana, the fig, and the orange-tree. The climate is tropical. The proximity of the lake and the river renders the atmosphere very moist and equalizes the temperature. The highest average summer temperature is 94° F., and the lowest average in winter is 27° F. The total length of the streets is about 750 miles, of which only about 205¾ miles are paved.

The area of public squares and parks is about 660 acres. Chief among the parks are the City Park and Audubon Park, at the western end of the city, which contains 250 acres and was the site of the Cotton Exposition of 1884–85. There are, besides, numerous well-kept open squares, among them Congo Square, where the slaves once held the voodoo rites, Lafayette Square, which fronts the city-hall, and Jackson Square, the old Place d'Armes, the scene of some of the most important events in Louisiana history.

Buildings.—Among the notable buildings are the U. S. custom-house and post-office, covering a whole square and built of granite; city-hall, of granite, modeled after the Temple of Minerva at Athens; the cathedral on Jackson Square, the Supreme Court buildings (old Cabildo), the mint, the cotton exchange, the archbishop's palace, the Howard Library, and the new buildings of Tulane University. The Howard Memorial Hall is a repository for Confederate relics. The St. Charles Hotel, the most famous hostelry in the South, was destroyed by fire in 1894, but was rebuilt on a larger scale in the following year. The old St. Louis Hotel, in "reconstruction" days the State Capitol, afterward a famous hotel, is not now in use.

As water is usually found at a depth of a few feet, burial of the dead is in most places impossible, and it is customary to place the remains in tombs of brick or marble rising in several tiers above ground.

Churches and Schools.—There are 124 churches for whites and 83 for colored persons. The public-school system is supported partly by a municipal appropriation of $75,000, but chiefly from the income of a fund established in 1850 by John McDonogh, and now amounting to about $1,000,000. There are 55 public schools for whites and 10 for negroes; and there are 145 private schools for whites and 14 for negroes. The public-school enrollment is: Teachers, 752; pupils, 31,521, of whom 6,000 are colored. The total value of the public schools is $1,600,000. There are no mixed schools.

The only university for white people is Tulane University (*q. v.*). There are four universities for colored people: Southern University, a State institution which receives $10,000 a year from the State; Straight University, Congregational, established in 1869 by the American Missionary Association; New Orleans University, opened in 1865 and supported by the Freeman's Aid Society of the Methodist Church; and Leland University, Baptist, incorporated in 1870. Among the colleges for white people are Soule's Business College, the College of the Immaculate Conception (Jesuit), and Ursuline Convent for women (Catholic), founded early in the eighteenth century.

Charitable Institutions.—The most notable charitable institution is the Charity Hospital, built in 1832, which receives from the State $80,000 annually. It contains 850 beds, and handles annually about 7,000 patients. The Touro Infirmary was endowed by a Hebrew philanthropist, Judah Touro, and costs for maintenance about $30,000 annually; it accommodates about 400 patients. There is also a Jewish Home for Widows and Orphans. The institutions supported by the city are the Home for Aged and Infirm, House of Refuge for Boys, and an insane asylum. The charitable institutions maintained by the Catholics are numerous and important. Among them may be mentioned the New Orleans Female Orphan Asylum, St. Vincent's Infant Asylum, St. Elizabeth's Asylum, and the House of the Good Shepherd. The Seventh Street Protestant Orphans' Home is a large institution. The Thomy Lafon Asylum for Boys and the Lafon Home for the Aged are for colored people; they were founded by a colored philanthropist.

Libraries.—The chief public libraries are the State, which contains 39,000 volumes, exclusively on legal subjects; the Howard, 30,000 volumes; and the Fisk Free and Public Library, 28,000 volumes.

Finances.—The city comptroller's report for 1900 gave the following figures: Receipts, $2,427,784.30; expenditures, $2,351,847.88. The bonded debt is $14,132,530, exclusive of a fund of $12,000,000 voted for drainage at an election held in 1899. The valuation of real estate is $103,000,000, of personal property $38,000,000—total, $141,000,000. The city tax-rate is $2.20 per $100; the State tax-rate, $7 per $1,000.

Commerce.—The exports in 1900 were valued at $118,858,764; the imports at $17,490,811. The tonnage of vessels engaged in the foreign export trade entered was 1,627,478 tons; cleared, 1,676,027 tons; in the coastwise trade entered, 518,127 tons; cleared, 511,918; tonnage of foreign vessels in the coastwise trade entered, 56,604 tons; clearances, none. The total exports of cotton in 1900 aggregated 1,667,126 bales, valued at $65,648,390. The exports of breadstuffs were valued at $20,139,504; the exports of tobacco at $35,431,945. The valuation of domestic products received by river, lake, and rail was $162,430,412.47. The amount of freight received by the railroads was 2,568,543 tons, and the amount forwarded 3,270,054.

Manufactures.—Statistics of manufactures are not regularly kept. In 1900 the refineries made 744,392 tons of refined sugar; the rice-mills barreled for market 113,064,268 pounds of rice; 80,000 tons of cottonseed, valued at $1,160,000, were manufactured into oil and cake; and 79,500,000 feet of lumber and staves, valued at $2,779,000, were manufactured. The manufactured tobacco was valued at $31,749,642. There were 6 breweries, 14 shoe-factories, 22 clothing-factories, 20 cotton-presses, and many other large manufacturing concerns.

Drainage and Sewage.—Steps are now being taken to provide the city with modern systems of drainage and sewage, and bonds to the amount of $12,000,000 have been voted to carry out these works. The preliminary work on the drainage system was begun in 1893, but the actual work not till Sept., 1897. The plan comprises a large main-canal in Broad Street, along the lowest level in the city-limits; a system of lateral canals fed by branch canals, and supplemented by surface gutters. The total cost will be $7,933,691. The drainage is pumped into Bayou Bienvenu by five pumping stations, equipped with pumps having a capacity of 250 feet per second and a lift of 10 feet. The preliminary engineering work has been completed for the sewage system, but no actual work has been done. The sewage will be discharged into the Mississippi river. Plans are also being made to supply the city with drinking-water from the Mississippi. This will involve the construction of a filtering plant with a capacity of 40,000,000 gallons per day. At present the city depends upon rain-water caught and preserved in wooden vats or cisterns.

Banking.—In 1900 there were 8 national banks and 5 State banks, having a combined capital of $4,880,200; 3 savings-banks, with capital of $300,000; 2 private banks and a commercial bank. The bank clearances for the twelve months ending June 1, 1900, were $595,157,688.33.

The Mardi-gras Carnival.—A unique feature of New Orleans is the annual celebration of the carnival, which takes place on Shrove Tuesday, or Mardi gras. It originated some twenty years before the civil war, but since then the celebration has been on a grander scale. It compares with the carnivals of Nice, Rome, and other continental cities, and annually attracts to New Orleans thousands of visitors.

History.—The city was founded in 1718 by Sieur de Bienville, second governor of Louisiana under the French domination; was named in honor of the Duke of Orleans, regent of France; and was the capital of Louisiana in 1722–1852 and 1865–80. For many years the city experienced the usual vicissitudes of French colonial settlements. On the transfer of the province to Spain, the city was the scene of an unsuccessful conspiracy to establish a republic. In the last decade of the eighteenth century the invention of Whitney's cotton-gin and the successful granulation of sugar by de Boré gave a vast impetus to the progress of the State and city. In 1801 the production of sugar rose to 5,000,000 lb., and of molasses to 250,000 gal., and the exports of cotton were 34,000 bales. The purchase of the Louisiana territory further stimulated local development.

The early settlers were a motley collection. All classes and conditions were represented, from the French and Spanish officials to the sturdy *coureurs de bois*, or Canadian adventurers. At first some women from the houses of correction in France were sent over as wives for the colonists; but fortunately these were supplemented by the famous *filles à la cassette*, or casket girls, who were of good family and good morals, and who made excellent wives. Soon after Louisiana became a part of the U. S. there was an influx of persons from other parts of the republic seeking their fortunes, as well as a large number of French planters and their slaves from Santo Domingo. The Creoles, or descendants of French and Spanish ancestors, gradually assimilated themselves to U. S. institutions, and fought bravely against the British in the battle of New Orleans.

The battle-field of Chalmette lies 5 miles below the city. When the approach of the British forces was announced, Gen. Andrew Jackson had been busy in New Orleans for three weeks in reviewing and disciplining the militia and other troops, and as he had been informed that there were spies in the city he proclaimed martial law. On Dec. 23, 1814, he marched out of the city and boldly attacked the enemy on the evening of the same day. The British had nearly 5,000 men, while Jackson had only 2,100, though the latter received material assistance from the Carolina, a U. S. gunboat, which anchored opposite the British camp and bombarded it. The action was indecisive, but it retarded the progress of the British and gave Jackson the necessary time to fortify the plain of Chalmette. On Jan. 8, 1815, the British made a final attempt to storm Jackson's breastworks, and were repelled with great slaughter.

The city experienced great losses during the years 1812–15 from the suspension of banks and other financial troubles, but from 1816 to 1840 there was a period of marvelous expansion. The arrival in 1812 of the first steamboat marked the beginning of an immense trade with the Mississippi valley, and large crops of sugar and cotton were raised. The only impediments to growth were the almost annual overflows of the Mississippi and the terrible epidemics of yellow fever. In twenty-seven years fifteen of these epidemics occurred, together with a visitation of the cholera in 1831. In 1834 gas was introduced, and in 1836 a system of water-works. In 1837 New Orleans suffered greatly from the financial panic. Fourteen of its banks suspended in one day; but with a return to more cautious business methods there came a restoration of confidence and more prosperity than before. The cotton exports rose to 1,000,000 bales, and the population was tripled in ten years, causing an enlargement of the corporate limits. In 1841–42 a system of free schools was established; in 1853–55 there were visitations of yellow fever, and of a population of 150,000 nearly 37,000 persons died; in 1860 the city reached the acme of its prosperity, the exports, imports, and domestic products amounting in value to $324,000,000.

In 1862 Louisiana was closely blockaded by a Federal fleet under Admiral Farragut. On Apr. 24 he succeeded in passing the forts that defended the river, and on the following day he anchored in front of the city. In order that the enemy might not profit by the stores laid up in the city, 12,000 bales of cotton had been piled upon the levee and set on fire, and hundreds of barrels of sugar and molasses were added to the burning mass. After a few days of negotiation the city surrendered and was handed over to Gen. B. F. Butler, who had followed Farragut with a large army. After the period of "reconstruction" New Orleans renewed its career of prosperity. Moreover, the manufacturing interests, which before the war were insignificant, now rapidly grew more important.

In 1897 and 1898 yellow fever appeared in the city, but in so mild a form as to deprive the outbreak of all its terrors. The death-rate during these years was, respectively, 24·47 and 24·82. These figures were below the normal, the death-rate for 1896 having been 27·61, and for 1899 26·31 per thousand of the population. The death-rate of the city for 1899, excluding deaths in the Charity Hospital (which receives patients from other parts of Louisiana and from Mississippi and Texas, as well as from the city), was 17·24 per thousand. Pop. (1880), 216,000; (1890) 242,039; (1900) 287,104. JOHN R. FICKLEN and JOHN S. KENDALL.

New Philadelphia: city; capital of Tuscarawas co., O. (for location of county, see map of Ohio, ref. 4–H); on the Tuscarawas river, the Ohio Canal, and the Cleve., Lorain, and Wheel. and the Penn. railways; 24 miles S. by W. of Canton, 98 miles N. of Marietta. It is in a coal, iron-ore, and salt region; has a national bank with capital of $50,000, 3 private banks, and 5 weekly newspapers; and has manufactories of agricultural implements, woolen goods, roofing tile, wire nails, iron pipe, sewer-pipe, brooms, flour, carriages, paper, and machinery. Pop. (1890) 4,456; (1900) 6,213.

New Philippines: The CAROLINE ISLANDS (*q. v.*).

New Pomerania (in Germ. *Neu-Pommern*; native *Birara*), formerly **New Britain**: the largest island of the Bismarck Archipelago. It lies off the northeast coast of New Guinea, from which it is separated by a strait 50 miles wide, extends E. and W., and is about 300 miles long, with 75 miles of greatest breadth; area about 9,000 sq. miles. It is composed of several mountainous masses connected by low land, and the isthmus that connects the body of the island with the northeastern part, called Gazelle Peninsula, is very narrow. The mountains are more or less volcanic, especially at the ends of the island. Several volcanoes are active, and a severe eruption occurred in 1878. The island is very picturesque. The contours of the mountains are attractive, the vegetation is luxuriant, and the foliage rich with a variety of tints. The climate is like that of New Guinea. The southeastern monsoon occurs from May to September, and is accompanied by heavy rains. The dry season is with the northwestern monsoon during the rest of the year, but it is frequently broken by rain. The inhabitants are Melanesian, less attractive than these people generally are. They are

warlike, and are cannibals. They possess considerable manual talent, and carry on some commerce with the neighboring islands. The S. coast is the more densely populated. The population is estimated at 100,000. They were placed under German protection in 1884. M. W. Harrington.

Newport: town; in the county of Monmouth, England; on the Usk; 145 miles W. of London (see map of England, ref. 12–F). It has a very large export trade in coal and iron, over 80 acres of docks, iron-foundries, and manufactures of India-rubber, pottery, etc. In 1839 a Chartist insurrection in which ten persons were killed occurred here. Pop. (1901) 61,474.

Newport: city (settled in 1791); Campbell co., Ky. (for location of county, see map of Kentucky, ref. 1–I); on the Ohio river at the mouth of the Licking river, and on the Louis. and Nash. and the Ches. and Ohio railways; opposite Cincinnati, O., and Covington, Ky., with both of which cities it is connected by railway and foot and wagon bridges. It contains 22 churches, 3 national banks with combined capital of $400,000, gas, electric light, water, sewerage, and street-railway services, public park, Masonic temple, Odd Fellows' library (founded 1868), and a weekly and monthly periodical. The industries include the manufacture of iron and steel, nuts and bolts, watch-cases, stoves, shoes, and piping. The Highland suburbs are very picturesque, and contain the costly residences of many Cincinnati business men. Pop. (1880) 20,433; (1890) 24,918; (1900) 28,301.

Editor of "Journal."

Newport: town (settled in 1763); capital of Sullivan co., N. H. (for location of county, see map of New Hampshire, ref. 8–D); on the Sugar river, and the Boston and Maine Railroad; 40 miles W. by N. of Concord. It contains 5 churches, the Richards Free Library, Antiquarian building, public high and graded schools, and 2 weekly newspapers, and has manufactories of boots and shoes, flannel goods, ladies' underwear, woolen goods, and lumber. It is a summer resort, and 5 miles distant is Austin Corbin's noted Blue Mountain Park. Pop. (1880) 2,612; (1890) 2,623; (1900) 3,126.

Editor of "Argus and Spectator."

Newport: borough (laid out by Paul, John, and Daniel Rider and named Ridersville in 1805; name changed to its present one in 1820; incorporated as a borough in 1840); Perry co., Pa. (for location of county, see map of Pennsylvania, ref. 5–F); on the Juniata river, the Pennsylvania Canal, and the Penn. and the Newport and Sherman Val. railways; 6 miles N.E. of New Bloomfield, the county-seat; 28 miles N. W. of Harrisburg. It is in a grain-growing region; contains 6 churches, 7 public schools, 2 hotels, a national bank with capital of $50,000, a private bank, water-works completed in 1893, and 2 weekly newspapers; and has planing, saw, and grist mills, iron-furnaces, and tanneries. Pop. (1880) 1,399; (1890) 1,417; (1900) 1,734.

Editor of "Ledger."

Newport: city; formerly a capital of the State of Rhode Island, capital of Newport County, and port of entry (for location, see map of Rhode Island, ref. 5–H); on Narragansett Bay, and the Newport and Wickford and the N. Y., N. H. and Hart. railways; 5 miles N. of the Atlantic Ocean, 19 miles S. by W. of Fall River, Mass., 30 miles S. of Providence. It was settled by colonists from Roger Williams's party in 1638 and by Quakers in 1643; was chartered with Providence and Portsmouth under the name of Providence Plantations in 1643; was one of the most important commercial points in the colonies prior to the Revolutionary war, and for some years preceding 1769 had a larger foreign commerce than New York; was captured by the British on Dec. 6, 1776, and occupied till Oct. 25, 1779; and was the headquarters of Rochambeau's French fleet in 1780. It has become one of the most popular places of summer resort in the U. S. Besides its location on a grand and commodious harbor, its bathing facilities, its superb drives and costly summer residences, it has many natural attractions and several objects of large historical interest. The harbor is defended by modern fortifications at Fort Adams, Fort Greble, and Fort Wetherell, the last named on the site of the old Dumplings, where a Revolutionary fort formerly stood. The Hanging Rocks, Spouting Cave, and the chasm, 50 feet deep, locally known as Purgatory, attract many tourists. On Coaster's Harbor island are the U. S. Naval Training Station and Naval War College, and on Goat Island the U. S. Naval Torpedo Station. Newport claims, and the claim is disputed by Providence, to have had the first Baptist church building erected in America (1640). The city also claims to have had the first public school opened in America (1640) and the first synagogue (1762), and to have the oldest newspaper in the U. S., the *Mercury*, established by James Franklin, a nephew of Benjamin, in 1758. Among the notable buildings are the Old Stone Mill, or Round Tower, in Touro Park, said by some antiquaries to have been built by the Norsemen 500 years before the arrival of Columbus, and by others to have been the stone windmill of Gov. Benedict Arnold, mentioned in his will; Trinity church (Protestant Episcopal, erected 1725); First Baptist church (erected 1735); the Redwood Library (erected 1750); State-house (erected 1742); old city-hall (erected 1763); Jewish synagogue which, with its ancient cemetery, is cared for from the income of a special trust fund bequeathed by the late Judah Touro; the Channing Memorial church; the Perry mansion; a new city-hall; the Public Library and the Home for Friendless Children (both founded by Christopher Townsend); and the Industrial School. Touro Park contains a bronze statue of Com. Matthew C. Perry, the gift of Mrs. August Belmont, and a statue of William Ellery Channing; Washington Square, one of Com. Oliver H. Perry; and Equality Park, a Soldiers' and Sailors' Monument. The city has regular steamboat communications with New York and Providence. There are 26 wharves, 16 churches, 10 public-school buildings, the Rogers High School (endowed by William S. Rogers with $100,000), 14 public fountains, 4 libraries (People's, Newport Historical Society, Redwood, and Fort Adams Post) containing over 70,000 volumes, 6 national banks with combined capital of $795,250, 2 State banks with capital of $175,000, 3 savings-banks, electric street-railway, public park (land presented by Levi P. Morton in 1886), and 2 daily and 2 weekly newspapers. In 1900 the assessed valuations were: Real estate, $32,171,300; personal, $7,600,700—total, $39,772,000; and on Jan. 1, 1901, the net bonded debt was $912,000. The city owned property valued at $816,170. Pop. (1880) 15,693; (1890) 19,457; (1895) 21,537; (1900) 22,034.

Editor of "News."

Newport: town (incorporated in 1781, settled in 1793, chartered under the name of Ducasbow in 1802, name changed to present one in 1816); capital of Orleans co., Vt. (for location, see map of Vermont, ref. 2–D); on Lake Memphremagog (*q. v.*), and the Boston and Maine and the Canadian Pac. railways; 44 miles N. by W. of St. Johnsbury. It contains 5 churches, 1 high, 2 graded, and 15 district schools, several manufactories, and a weekly newspaper: is a popular summer resort; and is in an agricultural region. Pop. (1880) town, 2,426, village, 920; (1890) town, 3,047, village, 1730; (1900) town, 3,113, village, 1,874.

Publisher of "Express and Standard."

Newport News: Va.; town, port of entry (for location, see map of Virginia, ref. 7–I); on the James river, Hampton Roads, and the Ches. and Ohio Railway; 14 miles N. of Norfolk, 70 miles S. E. of Richmond. It is in a rich trucking section, has one of the best harbors in the world, and is connected with Hampton and Old Point Comfort by two electric railways. It has an extensive ship-building plant employing 6,000 hands, with dry docks large enough to take in the largest steamships; extensive warehouse piers; two grain elevators with a capacity of 2,850,000 bush.; improved system of water-works, electric-light and gas plants, 5 wood-working mills, ice-factory, a national bank with capital of $100,000, a State bank with capital of $100,000, a private bank, and several guarantee and trust companies, and 3 weekly and 4 daily newspapers. The foreign commerce of the port is carried on principally by the Chesapeake and Ohio Railroad and the United States Shipping Co., making direct connection with England and other European countries, and in grain shipments the port has become the fourth in the U. S. In the calendar year 1900 the exports of domestic merchandise amounted to $35,000,000. Pop. (1890) 4,449; (1901) estimated, 19,500.

John Whitehead.

New Providence: See Bahama Islands.

New Red Sandstone: an important geologic formation of Great Britain. The rocks included under this term belong partly to the Triassic period and partly to the Permian epoch, which is usually regarded as part of the Carboniferous period. For many years the name of the British formation was used to designate a unit of the geologic time scale, and formations in other countries, especially America, received the same name. This usage survives to a great extent in Great Britain, but is obsolescent elsewhere. The

American formation to which the name was most frequently applied is now called NEWARK SYSTEM (*q. v.*). See also OLD RED SANDSTONE. G. K. GILBERT.

New Richmond (RICHMOND JUNCTION Station): village; Clermont co., O. (for location of county, see map of Ohio, ref. 7–C); on the Ohio river, and the Cin., Portsmouth and Va. Railroad; 20 miles E. of Cincinnati. It contains 7 churches, a Roman Catholic and 2 public schools, a national bank with capital of $80,000, and a weekly newspaper, and has woolen, saw, and grist mills, 2 furniture-factories, foundry, and brick and cooperage factories. Pop. (1880) 2,545; (1890) 2,379; (1900) 1,916.

EDITOR OF "INDEPENDENT NEWS."

New Richmond: city (settled in 1855, incorporated as a city in 1885); St. Croix co., Wis. (for location of county, see map of Wisconsin, ref. 4–A); on the Willow river, and the Chi., St. P., Minn. and Omaha and the Wis. Cent. railways; 18 miles N. E. of Hudson, the county-seat, 35 miles N. E. of St. Paul, Minn. It is in an agricultural region, is a milk, cream, and butter center, and the principal industries are lumbering, flour and feed milling, and the shipping of live stock, grain, and farm produce. There are 8 churches, a public and a Roman Catholic parochial school, each graded and with a high-school department, 2 State banks with combined capital of $85,000, electric-light plant and waterworks owned by the city, and 2 weekly newspapers. Pop. (1880) 729; (1890) 1,408; (1900) 1,631.

EDITOR OF "REPUBLICAN."

New Rochelle: village; Westchester co., N. Y. (for location of county, see map of New York, ref. 8–J); on an inlet of Long Island Sound, locally known as New Rochelle harbor, and on the N. Y., N. H. and Hart. Railroad; 20 miles N. E. of the New York city-hall. Its situation and proximity to the metropolis make it the place of permanent residence of many New York business men and a popular summer resort. The village contains several colonial Dutch and English mansions, public-school property valued at over $100,000, a State bank with capital of $30,000, and four weekly newspapers. Pop. (1880) 5,276; (1890) 9,057; (1900) 14,720.

New Siberian Islands: an archipelago N. of Asia and N. E. of the mouth of the Lena delta, so called from the name given to one of them (1806) by a Russian merchant. Being not far distant from the mainland and often connected with it by an ice-bridge, the fauna of these Arctic islands is particularly rich, and includes white bears and foxes, reindeer, and many birds. The islands are also rich in fossil woods and the remains of extinct animals, notably those of the mammoth. In the island of New Siberia is a range of hills, partly composed of carbonized wood, apparently belonging to the Jurassic period. See De Long, *The Voyage of the Jeannette* (2 vols., 1883); Nordenskjöld, *The Voyage of the Vega* (1886). C. C. ADAMS.

New South Shetland Islands: See SOUTH SHETLAND ISLANDS.

New South Wales: the oldest of the seven Australasian colonies of Great Britain. It is the middle colony on the east coast of Australia, with Queensland on the N., South Australia on the W., and Victoria on the S. It lies between lats. 28° and 38° S. and the meridians 141° and 154° E. The western boundary is the meridian of 141° E.; most of the southern is formed by the Murray river, and of the northern by the parallel of 29° S. lat. The area is given officially at 310,700 sq. miles, but planimetric measures make it 308,560. It is a fifth larger than Texas and larger than any state of Europe, Russia only excepted. Three distant and isolated islands—Norfolk, Pitcairn, and Lord Howe—are politically under the supervision of the governor. Their combined area is less than 15 sq. miles.

The name of New South Wales was given to Southeast Australia by Capt. Cook, on his exploratory voyage in 1770, from a fancied resemblance of the coast to that of South Wales. It was afterward applied to the first colony, which took in all Australia E. of the 135th meridian, and was later cut down to its present limits.

Physical Configuration.—The coast is over 700 miles long, with numerous capes, headlands, and bays. It extends N. to Point Danger and S. to Cape Howe. Many of the bays are excellent natural ports. Of these, Port Jackson, about the middle of the coast, has attained the greatest commercial importance, as on it is situated Sydney, the capital. A little farther S. is BOTANY BAY (*q. v.*). Many rivers from the mountains inland empty at the coast, where their mouths give a series of ports capable of improvement by the removal of their sandbars. At the mouth of the Hunter river is Newcastle, the port second in importance.

The surface of the colony falls naturally into three divisions—the coast lands, the table-lands just behind these, and the great interior plains. The coast lands embrace the strip between the coast and the Great Dividing Range of mountains, which runs nearly parallel to the coast, and is from 20 to 120 miles distant from it, farther at the N. than at the S. They are usually flat, fertile, and well adapted to agricultural operations. The eastern versant of the mountains is generally rugged and sometimes precipitous, while the streams that descend it are generally rapid and shallow, and flow through deep and rugged valleys. Of the fourteen rivers on this slope, the longest are the Hawkesbury (330 miles); the Hunter (300 miles); the Shoalhaven (260 miles); and the Clarence (240 miles). Many of these streams form large lagoons at their outlets.

The Great Dividing Mountains include several distinct ranges. At the S. the Australian Alps come in from Victoria. They are the highest mountains in Australia, and the culminating point is Mt. Kosciusko, 7,350 feet high, in the extreme S. of this colony near the headwaters of the Murray river. Though it does not reach the perpetual snow-line by several hundred feet, snow is seldom entirely absent from it. The next range on the N. is that of the Blue Mountains, so called from the tint of the eucalyptus forests which clothe their sides. They are not sharply divided from the Alps, but they are lower and their crest is broader, forming practically a series of table-lands. N. of the Blue Mountains is the Liverpool Range, striking a bold arc from the coast inland to beyond the Darling river. Farther N. is the New England Range, which resumes the direction, parallel to the coast, broken by the Liverpool Range. Inland from the New England Range is a mountain complex, of which the highest known is Ben Lomond (5,070 feet high). The chain is in places 60 or 80 miles wide.

W. of this is the great interior basin of the Darling river. Next the mountains it is well forested and well watered, but with progress westward it becomes smoother, the trees disappear, and the water becomes more scanty. This is the salt-bush country, consisting of red loamy plains with loose soil, with some grass which dries up and disappears in the dry season, and with abundant growth of ill-looking weeds and low brush. This area stretches in the N. into Queensland, and in the W. it is separated from the still more alkaline and arid interior of the continent by broken ranges of low mountains, called the Barrier or Stanley Mountains and the Grey Range. The interior basin is not far above sea-level (300 to 500 feet), but in it are found the great rivers of the continent. The Murrumbidgee (1,350 miles long) and the Lachlan (700 miles) are right-hand affluents of the Murray. The Darling river rises in the northeast angle of the colony, and empties into the Murray near the southwest angle after a course of 1,160 miles. Its right-hand tributaries are in several cases longer than it is itself above their respective mouths, and rise far N. in Queensland. Of the left-hand tributaries which lie in New South Wales the most important are the Macquarie (750 miles long); the Namoi (600 miles); the Bogan (450); and the Gwydir (445). These streams receive very few affluents after leaving the mountains in which they rise, and as they pass through an arid region they are commonly smaller below than above. Sometimes they fail to reach the stream to which they ordinarily contribute. In the N. W. there are many streams which are permanently lost in lagoons or in the sand.

Climate.—The climate is as distinct for the three districts of the coast, mountains, and the interior basin as are the physical features. The coast climate is warm and moist, and is rendered mild and agreeable by an ocean current which passes along it from N. to S., tempering both summer and winter. The mean annual temperature in the coast lands ranges from 60° F. in the S. to 68° in the N., and is somewhat higher a few miles inland than on the immediate coast, on account of the sea-breeze extending but a short distance inland. The summer mean temperatures range from 67° to 76° F., and the winter from 51° to 56°. At Sydney, lat. 33° 51′ S., the mean annual temperature is 63°, that of summer 71°, and that of winter 54·5°. The rainfall is heaviest on the coast, and increases from S. to N. from 36 to 73 inches annually. At the base of the mountains it is 10 or 15 inches less. The rainy season comes in late summer, and the fall is sometimes torrential.

In the mountain district the temperatures are as varied as the elevations. In inhabited altitudes the mean annual temperatures run from 46° around Mt. Kosciusko to 60° in the N. Frost and snow are well known in the S. The mean annual rainfall is more uniform from S. to N. and varies from 25 to 35 inches.

In the interior valley the rainfall varies from 25 inches in the E. to 9 or 10 in the extreme W., and this is likely to fall in heavy rains. The summers are hotter and the winters colder than on the coast, while the mean annual temperature is not very different. The drier air makes the extremes more endurable, and the climate is considered tonic.

In general, the winters throughout the colony are especially mild. Occasionally hot winds from the interior make a great discount on the character of the climate, as also do the "southerly busters," a wind like the Texan northers. On the whole, the climate is healthful and agreeable, and the only serious maladies depending on it are dysenteries and inflammation of the eyes.

Flora and Fauna.—These have the general Australian character and are not sharply divided from those of the adjoining colonies. The flora gives the impression both of novelty and monotony. The director of the Sydney Botanic Gardens has said that no country gives a greater variety and abundance of trees yielding strong, beautiful, and durable timber than New South Wales, and claimed that good timber can be obtained in all parts of the colony, except in some areas of the Monaro, Murrumbidgee, and Murray districts. The banks of the coast rivers, especially, are thickly covered with forest trees. In the W. they are reduced to scrub, except where the ground is subject to overflow. The forests are largely composed of *Myrtaceæ*, characteristic among which are a numerous species of eucalyptus. The members of the Pea family and the composites are especially common, and of the genus *Acacia* the colony has over 100 species. The alpine flora is less different from that of the rest of the world, and a considerable number of its species are the same as those of Europe. The grasses of the interior are especially nutritious for stock, which in cases of drought may find sustenance in the saltworts, composites, umbellifers, and plants of the Geranium family. Five species of palms extend southward into the colony, two of them beyond Sydney.

The native mammals are marsupial, with very few exceptions, and there are many fossil marsupials of enormous size. The domestic animals have all been introduced. A less desirable immigrant was the rabbit, which has multiplied so enormously as to have become a serious pest. Among the birds, many families elsewhere familiar, as the vultures and woodpeckers, are unknown. Among the more characteristic species are the emu, bustard, brush turkey, lyre-bird, honey-sucker, and morepork. Lizards are very numerous, crocodiles unknown, and while some families of well-known poisonous snakes are wanting, their places are taken by others equally dangerous. Insects are especially numerous and varied, though butterflies are represented by relatively few species. Fish are abundant, but the fisheries are little developed. One species of shark receives its name from Port Jackson. Oysters abound, are of good quality, and are for sale throughout the year.

Minerals and Mines.—Gold has been found at many places, especially in the mountain district. It had long been known to exist, but it was not until 1851 that it was found in such paying quantities as to attract general attention. This was in the Ballarat district, now in Victoria, which colony and Queensland now surpass New South Wales in the annual output of gold, but some remarkable finds have been made in the latter colony. About 1881 a nugget was found on the Temora which weighed 116 lb., and in 1851 one was found on the Turon which weighed 106 lb. In 1873 a mass of ore weighing 630 lb. was exhibited, which was estimated to contain £2,000 worth of gold. It was from Hill End. The total value of the gold coined and exported from 1851 to 1899 inclusive is £47,546,013, but the production is at present decreasing. Of silver and silver-lead ore, New South Wales produces more than 90 per cent. of all the silver in the Australasian colonies. The leading mines are at Boorook, in the New England district, near Bathurst, W. of Sydney, and in the Western Barrier Range. The last is a recent discovery and has already proved to be of immense value. In 1899 the output was 692,036 oz. of silver, and 444,627 tons of silver-lead ore. The total value of silver and silver-lead ore exported to the end of 1899 was £27,882,997, and the annual output is increasing. Copper ore was discovered in 1858, and is known to come to the surface in many places. The total output to the end of 1899 has been to the value of £5,019,480. Tin is found in the granitic and basaltic regions in the extreme N., and has been profitably worked since 1872. The output to the end of 1899 was of the value of £6,382,538, but the annual production is now decreasing. The tin has so far been taken from alluvial deposits in existing or ancient stream beds, but this source has now been exhausted and lode-mining undertaken. The stanniferous area probably covers 10,000 sq. miles. Coal was discovered in 1797, but no serious attempt was made to mine it for fifty years. The coal measures extend along the seacoast from lat. 31° 30′ to lat. 35° 30′ S., and are exposed above sea-level at each end. The seams of coal are nearly horizontal and are from 3 to 40 feet in thickness. The total area underlaid by the coal measures is estimated at 24,000 sq. miles. The output of coal is greatest at Newcastle, on the Illawarra coast, and at the western foot of the Blue Mountains. The Illawarra coal is more anthracitic. A sort of cannel coal, called kerosene shale, is mined for use in enriching illuminating gas. In 1847 40,732 tons of coal were raised in the Newcastle region, and this was the total output for the year. This has grown steadily, until in 1899 there were 88 coal mines employing 10,339 men, with an output of 4,597,028 tons of coal. The value of the total production to the end of 1892 was £35,647,004. Iron exists in abundance, and many of the rarer metals are known. The diamond, sapphire, emerald, ruby, opal, and many other precious stones have been found, and building-stones, limestone, fireclay, and clay for brick and pottery are abundant. In 1899 there were 42 smelting furnaces in operation, and 46,159 persons were employed in mining and smelting.

Agriculture.—The industrial life of the colony began in grazing, and pastoral pursuits still continue to form an important element of its wealth. West of a line drawn from lat. 36° S. and lon. 145° E. to lat. 29° S. and lon. 150° E. the land is almost exclusively pastoral, and there are many considerable areas of pastoral land E. of this line. In the pastoral district the climate is so mild that stock require no feeding in winter. The sheep district is to the W. of the line above mentioned. The chief limitations to the development of the flocks are the general aridity and the occasional droughts. Careful breeding for nearly a century has developed an especial race of Australian merino sheep with several good qualities, aside from adaptation to the climate. They are rather more free from disease than other breeds. The land in the pastoral region is largely owned by the state and rented to the graziers. The total number of sheep on Jan. 1, 1900, was 36,213,514. The chief dairy district is on the coast S. of Sydney. Pleuro-pneumonia has become epidemic among the cattle several times and proved very destructive. The total number of horned cattle on Jan. 1, 1900, was 1,967,081. Horses are raised for home use and for the supply of the cavalry in India. Swine are apparently reared only for domestic use.

About 0·5 per cent. of the land is under cultivation, and this is principally in holdings of less than 500 acres. The laws are favorable to *bona-fide* settlers for the acquirement of the title to lands in small holdings. The chief crops are wheat, maize, barley, oats, potatoes, hay, tobacco, sugar, wine, and oranges. Lucerne is much used for hay, and in the Hunter river district six crops are taken annually. Much wheat, oats, and barley is cut for forage. Wheat is grown less than formerly because of the rust, and the production is now insufficient for home needs. The average yield is 13 bush. per acre, while for all Australasia it averages 10, for the U. S. 12, and for Russia 7. The annual consumption of wheat per person in the colony is 6·5 bush., while in the United Kingdom it is 5, and in Russia 2. Maize is cultivated for horse food, especially on the coast N. of Port Stephens; the average yield is 31 bush. per acre. The tobacco-crop has decreased of late years. Sugar can be profitably raised in the extreme N. E., but the production is small. The vine flourishes generally in the coast and mountain districts, and the production of native wines is limited only by the demand. Most of the fruits of the warm and temperate zones are grown, but the orange is the principal fruit product. It does best on the west versant N. of Sydney. The production of 1900 was estimated at 536,640 cases. In 1899–1900 there were 122,224 persons engaged in agriculture. A forest conservation department was created in 1887. There are twenty-one state forests and 1,058 timber reserves, with a combined area of 5,946,355 acres. The

amount of lumber sawn increases slowly from year to year. In 1892 it was nearly 230,000,000 sq. feet.

The need of irrigation has not been very seriously felt because of the sparseness of population and the utilization of the arid area for grazing. A hydrographic survey was recently begun. Irrigation in 1891 was employed only for 23,106 acres, but this is rapidly increasing by private enterprise.

Population.—The aborigines have nearly all disappeared from this colony. The census of 1891 gave their number at 5,097 full blacks and 3,183 half-castes, or 8,280 in all, of whom 4,559 were males. By the same census the total population was 1,132,234, with 20 per cent. more males than females. On Dec. 31, 1892, the population was officially estimated at 1,197,650, an increase of nearly 6 per cent. More than 64 per cent. were born in the colony and nearly 72 per cent. in Australasia. The Chinese formed 1·16 per cent. of the population, and there were very few other aliens. Only 12,478 were dependent on charity. Of the total, 411,710 lived in Sydney, more than one-third of all. The next largest town is Broken Hill, with a population of 23,500, and there are only five other towns with more than 6,000. The average density of population is four per square mile when Sydney is included. Outside of Sydney the density is greatest in the counties to the W. of Sydney, E. of and over the Blue Mountains, next in the coast counties. Over much of the interior basin there is an average of less than one person to the square mile.

In 1899 there were 9,275 marriages, 36,461 births (2,609 illegitimate), and 15,901 deaths. The excess of births over deaths was 20,560, and this excess in the decade ending with 1899 gave 83 per cent. of the increase of population. The average annual death-rate is 14·65 per 1,000, while that of the United Kingdom is 19·07, and of Germany 25·31. From 1888 to 1892, inclusive, the average annual immigration was 65,000, but the number of emigrants was large, averaging 55,000. Assisted immigration became the policy of the colony in 1832, but practically ceased in 1887. The number of assisted immigrants in 1892 was only 179. The influx of Chinese became so embarrassing that in 1881 a poll tax of £10 was placed on each immigrant, and this was made £100 in 1888.

State aid to religion was abolished in 1862. About half of the population are classified as adherents of the Church of England, one-fourth Roman Catholics, one-tenth Presbyterians, and one-tenth Methodists.

Commerce.—The value of the total imports in 1899 was £25,594,315, and of the exports £28,445,466, somewhat less than the average for five years. Wool is the staple export—about half of the total in value—then come tin, copper, tallow, and leather. The chief imports are iron goods, clothing, and cotton and woolen cloths. The trade of the U. S. with Australasia is chiefly with New South Wales and New Zealand. The main exports to the U. S. are specie, coal, and wool, especially the first, so that the trade value is even less than the nominal valuation would indicate. About 10 per cent. of the total exports go to the U. S., and 5 per cent. of the imports are from that country. The tariffs in force in 1890 were less in this colony than in the others, and were on few articles and were specific. In 1891 the tariffs were changed in the direction of higher duties and more of them. The chief revenue from duties is derived from stimulants and narcotics. The total registered shipping consists of 502 sailing vessels and 498 steamers, with a combined capacity of 122,747 tons. About 3,000 foreign vessels annually enter and clear, of which over 90 per cent. are British. About one-third enter Port Jackson and nearly as many the port of Newcastle.

The colony is ill supplied with navigable rivers, and railway transportation is consequently of the highest importance. The construction of railways was begun in 1855, and they are now extended until connection with the neighboring colonies is complete. Intercolonial commerce is, however, hampered by the difference of gauges, that of New South Wales being the English standard of 4 ft. 8½ in., while that of Victoria is 5 ft. 3 in., and the narrow-gauge of 3 ft. 6 in. is often used. From Sydney and Newcastle the railways pass to the W. of the Dividing Mountains and then extend N. and S. One runs N. W. to Bourke, on the Darling. The important mining region in the Barrier Range is reached by a railway from Adelaide, in South Australia. The average cost per mile of railways in the colony is high, being £14,559. This is higher than elsewhere in these colonies, and £3,400 higher than the average in the U. S. The total mileage on June 30, 1900, was 2,771 belonging to the Government and 85 to private persons; also 71 miles of tramway belonging to the Government, built at a cost of £1,924,720. At the end of 1899 there were 13,663 miles of telegraph and telephone lines, with a service of 945 stations, receiving and sending 4,000,000 messages per year; net revenue, £168,758.

The money in circulation in 1892 was: Gold, £9,000,496; notes, £1,439,872; silver, £578,452; other, £139,095. The money coined in 1899 amounted to £3,388,630, and was mostly gold. The total bank assets were £42,194,661, of which 10 per cent. was in coin, and the total liabilities were £33,055,059. The number of depositors in savings-banks was 260,826, with an average deposit of £38 each. During a very severe financial crisis in 1893 eight banks failed, but reopened afterward on a reconstructed basis.

Administration.—The executive is vested in a governor appointed by the British crown, who is commander of the troops, has an annual salary of £7,000, and is assisted by a cabinet of ten ministers. The legislative power is intrusted to a parliament of two houses—the Legislative Council of 73 members (in 1892), appointed by the crown for life, and the Legislative Assembly of 125 members (1893), elected one each from the same number of districts, and receiving £300 per annum. The suffrage is restricted only by sex and residence. (For Federation, see AUSTRALIA.) Education is under state control, and is compulsory between the ages of six and fourteen. It is free for the poor only. In 1899 there were 2,693 public schools (4 of which were high schools), with 233,233 pupils enrolled and 4,884 teachers; cost £737,080; also 1,053 private schools, of which 318 were Roman Catholic. In 1899 the University of Sydney had 519 students and 49 professors and lecturers; the revenue for 1899 was £34,467. There is also a technical college, which with its branches had in 1899 an attendance of 10,256 pupils. A free public library in Sydney has 144,244 volumes.

In 1899 the colony had 58 jails, with 1,984 prisoners (on Dec. 31), and a police force of 2,016 men. During the year 44,722 persons were convicted before magistrates.

The public debt on June 30, 1900, was £65,332,993, with an average rate of interest of 3·63 per cent. The money had been mostly expended in public works, which yield an annual return of 2·93 per cent. of the entire indebtedness. The total revenue for 1899–1900 was £9,973,736, and the expenditure £9,811,402. The entire wealth of the colony at the end of 1898 was estimated at £547,821,500. The military and naval force contains 9,978, mostly militia. The postal department has 1,626 offices, with an income barely covering the expenditure.

History.—Capt. Cook and Sir Joseph Banks landed at Botany Bay Apr. 27, 1770. They made some inspection of the bay, and on Banks's recommendation the home Government finally decided to employ this remote spot as a penal colony. In 1787 Capt. Arthur Phillip was accordingly appointed governor of the new colony of New South Wales, occupying the whole of Australia E. of the meridian of 135° E. and some small islands. He was sent out with about 800 convicts and a small military force. They arrived at Botany Bay Jan. 19, 1788, but as Phillip did not find this bay suitable he removed seven days after to Port Jackson, 6 miles N., and founded the city of Sydney. Thus the colony began with a convict settlement and with the arbitrary government necessary to such a population. Convicts continued to arrive from time to time until 1841. The total number was about 83,000, of whom 43,000 were living when their importation ceased. Of these, 18,000 had become free either by expiration of sentence or by pardon. In the meantime there had been a large immigration of free men and women, and their number was increased by births in the colony. The census of 1841 gave a total population of 114,601, or a ratio of 8 persons without to 3 with convict history, or 9 free persons to every 2 convicts. The history from 1788 to 1841 is that of a penal colony with a rapidly growing ratio of free persons. After 1841 the convict peculiarities slowly, and after 1851 rapidly, disappeared until they were extinguished.

An important element in the history of the colony was the development of the production of wool, still its greatest staple, largely due to the importation of superior breeding animals by Capt. Macarthur.

On the cessation of convict importation the colony suffered from lack of labor, and this want became more urgent during ten years, when, happily, the discovery of gold-fields in 1851, of such a character as to attract worldwide attention, caused an enormous influx of strong and healthy men,

and put an end to the labor famine, while adding materially to the colony's wealth.

When the colony was established, in 1787, the instructions issued to Governor Phillip and the government established by him were thoroughly autocratic. In the course of time, and especially under arbitrary governors, they became intolerable to the free settlers. Agitation resulted in an investigation in 1819 by Bigge of the judicial establishment and the appointment in 1823 of a Legislative Council of five persons appointed by the crown, and the number was afterward increased. In 1824 the liberty of the press was obtained, in 1828 the right of trial by jury, and in 1836 the principle of religious liberty was settled. In 1842 the right of municipal election was first exercised, and in 1843 the Legislative Council was made partly elective. In 1855 the Queen assented to an act conferring a constitution on the colony, and in 1856 came the first ministry under a responsible government. In 1857 Victoria and in 1859 Queensland were separated from the parent colony. Under its present institutions New South Wales has continued to prosper.

References.—The official publications are numerous and useful. Besides the usual blue books and reports may be mentioned: Barton, *History of New South Wales from the Records*, vol. i., 1783–89 (1889). *The Statistician's Report on the Eleventh* (1891) *Census*, first installment (1893), contains a review of all the statistics of the population since the establishment of the colony. Russell has published separately (n. d., but probably 1893) a *Diagram of the Isothermal Lines of New South Wales*, and in his annual *Results of Rain, River*, and *Evaporation Observations made in New South Wales in 1892* (1893) an average rainfall chart of the colony. See also Robinson, *New South Wales, the Oldest and Richest of the Australian Colonies* (1873); Lang, *Historical and Statistical Account of New South Wales* (4th ed. 2 vols., 1874); Reid, *An Essay on New South Wales, the Mother Colony of Australia* (1877); Woods, *Fish and Fisheries of New South Wales* (1882); Liversidge, *Minerals of New South Wales* (1888); and Coghlan, *A Statistical Account of the Seven Colonies of Australasia* (1892).

Mark W. Harrington.

New Spain: See Mexico (*History*).

Newspapers: printed sheets containing news, issued at regular intervals—usually each day or each week—and intended for distribution by sale or gratis. Modern journals convey intelligence of current events, report the transactions of public bodies, officials, etc., and contain also editorial comments on public questions, items of interest in the various fields of human activity, announcements, advertisements, market reports, communications from public and private persons, and in many cases short works of fiction.

The periodical collection and publication of the news of the day began in Europe with the weekly issue of *Das Frankfurter Journal*, by Egenolf Emmel, at Frankfort, Germany, in 1615, 163 years after the discovery of printing from metal types. There had been news-sheets long before; in Europe the earliest were manuscript papers prepared with some regularity, and known in Rome as the *Acta Diurna* and in Venice as the *Gazzetta*. According to tradition, the first printed news-sheet appeared at Nuremberg in 1457, and was called the *Gazette*, but no copy is extant. In 1534 a news-sheet was printed in the same city, of which there was a copy in the Libri collection, with a description in the catalogue. This sheet was entitled the *Neue Zeitung aus Hispanien und Italien*. Ulric Zell, it is believed, printed a news-sheet in Cologne as early as 1499, called the *Chronicle*; and in 1598 another, the *Mercurius Gallo-Belgicus*, was printed there. Some 800 of these occasional news-sheets, all issued before 1610, are preserved in libraries.

The issue of the *Frankfurter Journal* was followed the next year (1616) by that of the *Nieuwe Tijdinghen*, at Antwerp; and in 1622 by the first newspaper in the English language, *The Weekley Newes*, begun by Nathaniel Butter, on May 23 of that year. Butter is mentioned as early as 1611, occasionally printing a news-slip, and in 1621 he published one or two numbers of *The Courant or Weekley Newes from Forain Parts*. He served several of the nobility and gentry as a gatherer of news, which he regularly dispatched in written communications to his patrons in the country. This system of manuscript news-letters in England did not disappear with the establishment of printed newspapers. Those who insisted most on precise and full information continued, especially in the country, to depend more or less upon them until nearly the middle of the eighteenth century. The first daily paper in England, *The Daily Courant*, was issued in 1702, and the first penny paper, *The Orange Postman*, in 1709.

Théophraste Renaudot issued the *Gazette de France*, the first French newspaper, on May 30, 1631. The *Gazette*, with an occasional interruption, has been published from 1631 to the present day, and is one of the oldest papers in the world. Renaudot was a physician and a gossip, and became one of the best-informed men of his day. Like Butter in England, he wrote news-circulars prior to the establishment of the *Gazette*, and, like Butter, he sold his papers in the streets by newsboys and newswomen, who were known as "hawkers" and "Mercury-women." The *Gazette* was under the patronage and control of Richelieu. The first daily paper in France, the *Journal de Paris ou Poste au Soir*, appeared in 1777. The *Journal de la Ville de Paris* was published a century earlier, but only once a week, with the daily occurrences recorded in the style of a diary of events.

The *Post och Inrikes Tidning* was founded in 1644 as the official organ of Sweden. The *Haarlemsche Courant* appeared in 1656. *The St. Petersburg Gazette* was established in 1703, and printed under the authority of Peter the Great, who took an active interest in its management. The first Spanish paper, the *Gaceta de Madrid*, appeared in 1704. There were a *Gazette* and a *Courant* in Amsterdam in 1705. The first paper in India was issued in 1781, and the first in Turkey was printed in Smyrna in 1827 by M. Bleeque, just a century after the introduction of printing in the Ottoman empire. It was called the *Spectator of the East*.

A chronological list of a number of the earliest newspapers of Europe still in existence is appended:

NAMES.	When established.
Frankfort Gazette (first year called Journal)	1615
Gazette de France	1631
Leipzig Gazette	1660
London Gazette	1665
Stamford (Eng.) Mercury	1695
Edinburgh Courant	1705
Rostock Gazette	1710
Newcastle (Eng.) Courant	1711
Leeds (Eng.) Mercury	1718
Berlin Gazette	1722
Berlingske Tidende	1749
Leicester (Eng.) Journal	1752
Dublin Freeman's Journal	1755
Morning Post (London)	1772
The Times (London)	1785
Journal des Débats	1789
Allgemeine Zeitung	1798

All the governments of Europe were early represented by newspaper organs, which are an easy means of communicating orders in council, special edicts, proclamations, and laws to the people. *The London Gazette* was the first of these; it was established in 1665, and is still published. It was originally *The Oxford Gazette*. *Le Moniteur Universel, Journal Officiel de l'Empire Français*, was started in 1789; but Louis Napoleon abandoned the paper in 1869, because it was owned by private individuals, and established another with the simple title of *Journal Officiel de l'Empire Français*. Italy is represented by the *Gazzetta Officiale*; Spain, by the *Gaceta de Madrid*, and Russia by the *Pravitelztaennii Vystaik*. The *Invalide Russe* of St. Petersburg was the organ of the Russian Government for many years. It was established in 1813 to raise a fund for the relief of wounded soldiers. Russia is also represented in Brussels by *Le Nord*, the utterances of which are considered semi-official. Austria is officially heard through the *Gazette* of Vienna.

Comment as an accompaniment of the news, and particularly of the political news, did not begin in England until about 1704, when Swift, Bolingbroke, De Foe, and others began political discussions in various newspapers, which ultimately developed into the "leaders" and "paragraphs" of the present day. The "editorial" as an essential feature of the newspaper did not appear in France until during the Revolution of 1789; in Germany, not till a few years later; and elsewhere in Europe, not until the nineteenth century. Editorial discussion has rarely been long conducted anywhere else with what would be regarded in the U. S. as legitimate and desirable freedom, excepting in Great Britain and her colonies. Great progress in these directions, however, has been made during the latter half of the nineteenth century in France, Italy, parts of Germany, and among the Scandinavian races. In the three countries in which the newspaper development has been greatest, it may be said that in general the most attention has been given in Great Britain to editorial discussion, in France to art, the drama,

light literature, gossip, and *persiflage*, and in the U. S. to news.

The leading English newspapers are those of London, among which the most important are *The Times*, *Daily Telegraph*, *Standard*, *Daily News*, *Morning Post*, and *Daily Chronicle*, all morning dailies; *The Pall Mall Gazette* and *The St. James's Gazette*, afternoon dailies; and *The Observer*, a Sunday newspaper. *The Times* has long been considered the most influential and profitable newspaper in Europe. Its circulation (for some time probably much above 60,000 copies daily) was affected by the growth of the cheap press after the repeal of the stamp-tax in 1855, and by its own adherence to the high price of fivepence for a long time after good eight-page journals were sold in London for a penny. Its circulation is thought to be below 50,000, but it is still justly recognized as the leading journal, and its advertising patronage is enormous. The most widely circulated of the cheap papers is *The Daily Telegraph*, closely followed by *The Standard*, *The Daily Chronicle*, and *The Daily News*; while *The Morning Post*, which was originally a high-priced journal of Tory politics, giving especial attention to social affairs, has, since reducing its price to one penny, made rapid strides. A number of the provincial journals in Great Britain have also large circulations and great influence.

French journalism deals less with news, and in many instances seems less successful in developing great permanent properties. Among the leading Paris journals are *Le Temps*, *La France*, *La Presse*, once conducted by Girardin, *Le Siècle*, *Le Constitutionnel*, to which Saint-Beuve was long a brilliant contributor, the *Débats*, which enjoyed the services of both Girardin and Prévost-Paradol, *La Justice*, the organ of Clémenceau, and *La République Française*, once identified with Gambetta. *Figaro*, a paper devoted chiefly to paragraphs, the drama, Paris gossip, and general flippancy, made the fortune of its founder, Villemessant, and attained a circulation greatly larger than that of any of the papers before mentioned. It now presents also acute political and literary criticism, and it is generally read by the educated classes of all parties. *Le Gaulois* is a younger paper, successfully following in part the same lines. The most widely circulated newspaper in the world is *Le Petit Journal*, which often prints over 1,000,000 copies per day, sold at five centimes. Several newspapers in Germany, although hampered by the restrictions on the press, have attained great prominence, notably the *Vossische Zeitung*, the *Norddeutsche Allgemeine Zeitung*, the *Neue Preussische Zeitung*, the *Volkszeitung*, the *Cologne Gazette*, and the *Hamburgsche Correspondent*. In Russia newspapers are not permitted to discuss political questions, and a rigorous press censorship is maintained. Periodicals entering or leaving the empire are frequently mutilated or defaced in parts by the authorities. The *Journal de St. Pétersbourg*, established in 1824, is a semi-official organ, and the *Novoe Vremya* (New Times), and the *Novosti* (Latest News) are daily papers of large circulation. In Spain freedom of the press has been tolerated only since about 1855. The most influential papers are the *Correspondencia de España* and the *Imparcial*, both in Madrid. Holland has many newspapers of note, the best known being the *Allgemeene Handelsblad* and the *Courant*, of Amsterdam, the *Haarlemsche Courant*, and the *Journal de la Haye*, *De Nederlandsche Stoompost*, and the *Staats-Courant*, of The Hague. The most widely known newspaper of Belgium is the *Indépendance Belge*, which from a news point of view is one of the most important in Europe; next are the *Journal de Bruxelles* and the *Étoile Belge*. In Austria the most influential newspapers are the *Neue Freie Presse* and the *Neue Wiener Tagblatt*. The principal paper of Sweden is the Stockholm *Dagblad*; of Norway, *Den Morgenblad*; of Denmark, the *Aftenposten* of Copenhagen; and of Italy, the *Secolo* of Milan.

The oldest existing official journal is that known to foreigners as the *Peking Gazette*, but among the Chinese as *King Pao*, or Metropolitan Announcements. The exact date of its establishment is not known, but it is mentioned as early as the period K'ai-yuen (713–741). It is issued daily, is printed from movable wooden type, and consists of ten or twelve leaves of thin brown paper ($7\frac{1}{2}$ by $3\frac{3}{4}$ inches), stitched with paper twine in pamphlet form, with yellow paper covers, and contains a brief abstract of the record kept by the imperial household of audiences, presentations, and imperial movements, the names of the officials on palace duty for the day, etc., followed by decrees, rescripts, memorials from the provincial governments and from the censorate, appeal cases, ordinances of appointments, promotions, etc.

The whole management of the *Gazette* is in the hands of sixteen post-officials, military mandarins nominated by and representing as many provinces and regions, who are charged with the transmission of official documents and correspondence to their respective districts. Their scribes attend daily at the chancery of state and copy such documents as the grand council of state (see CHINA) may see fit to give out for publication. As soon as printed, copies are dispatched to the provinces, where extracts are usually published locally for more general circulation, and many persons make a livelihood by furnishing written copies to subscribers.

Modern Chinese newspapers are few in number, and are found chiefly in Hongkong and the treaty-ports. Several of these are owned and conducted by foreigners, and all are the result of foreign influence. The most important are those published at Hongkong (4), Canton (2), and Shanghai (3 or 4). Of these the *Shin Pao* and *Hu Pao*, published at Shanghai, have a large circulation, even in the interior, though postal facilities are practically non-existent. The chief foreign papers are in English, and are published at Shanghai. The most important are *The North China Herald*, *The Celestial Empire*, and *The China Gazette*. Three dailies are issued at Hongkong—the *Press*, the *Mail*, and the *Telegraph*, and several Portuguese papers at Macao.

In Japan, as in China, vernacular journalism dates from the arrival of foreigners in the country. The first real newspaper, the *Nisshin Shinjishi*, was established by a Scotchman, J. R. Black, in 1872. Twenty years later there were 648 newspapers and periodicals in Japanese, all owned and conducted by natives. The most influential are published at Tokio, the capital, and include besides the *Kwampo*, or Official Gazette, the *Shimpo* and *Kokkai*, which are semi-official, the *Shū-sei* and the *Nippo* (conservative), the *Mainichi Shimbun* and the *Yomiuri Shimbun* (liberal), the *Jiyu* and the *Minken* (radical), the *Nichi-nichi Shimbun* (opportunist), and the *Chō-ya Shimbun* and *Kokumin Shimbun* (independent). The press laws are very severe, and suspensions, confiscations, imprisonment, and fines are almost daily occurrences. Indeed, so common is imprisonment that some newspapers maintain a "prison editor," whose duty is simply to go to jail when the paper has been convicted (without trial) of some press offense. The chief foreign papers published at the treaty-ports are in English. The most important are the *Japan Mail* (weekly and daily), the *Gazette* and the *Herald* (dailies with large "mail" editions), and the *Kōbé Herald*. The *Echo du Japon* (in French) is published at Yokohama.

The most remarkable field for newspaper enterprise and newspaper literature has been the U. S.; and, in proportion to population, the development of newspapers has been far greater here than anywhere else. The colonial press first appeared in Boston, Mass., in 1690. On Sept. 25 of that year Benjamin Harris published a sheet with the title of *Publick Occurrences both Foreign and Domestick*. It was the intention of the publisher to issue this paper once a month. Its size was three pages of a folded sheet, leaving one page blank, with two columns to a page, and each page was about 11 by 7 inches. The effort failed, however, in consequence of the opposition of the provincial authorities, who suppressed it after its first issue. The only copy known to be extant is on file in the state paper office in London. A reprint of *The London Gazette* was issued in New York in 1696 which gave the news of an important battle in Europe leading to the Peace of Ryswiek. This was done by William Bradford on the order of Gov. Fletcher, but it was not intended as a regular newspaper. In general, the colonists relied upon a few London papers, received by occasional vessels arriving from England, for news from Europe, and on the gossips at the coffee-houses for local intelligence. Meanwhile, John Campbell, the postmaster of Boston, became a news-gatherer, and furnished the New England governors and a few friends with periodical news-letters or circulars. These led on Apr. 24, 1704, to the publication of *The News-Letter*, which has often been called the first newspaper printed in America. This is Campbell's prospectus:

ADVERTISEMENT.

This News-Letter is to be continued weekly; and all persons who have any Houses, Lands, Tenements, Farms, Ships, Vessels, Goods, Wares or Merchandizes, &c. to be sold or let: or Servants Run-away, or Goods Stole or Lost; may have the same inserted at a Reasonable Rate, from Twelve Pence to Five Shillings and not exceed: Who may agree with John Campbell Post Master of Boston.

All persons in Town or County may have said News-Letter every Week, Yearly, upon reasonable terms, agreeing with John Campbell, Post-master for the same.

The News-Letter, in its early days, was sometimes printed on a single sheet, foolscap size, but oftener on a half sheet, with two columns on each side. It went out of existence when the British troops evacuated Boston in 1776. It enjoyed a monopoly of journalism in America for fifteen years, and yet had a circulation of only 300 copies. In 1719 William Brooker was appointed postmaster of Boston in the place of Campbell, and in consequence of some difficulty about *The News-Letter* and the mails the new postmaster thought it expedient to establish another newspaper. On Dec. 21 of that year he issued *The Boston Gazette*. The appearance of this sheet, added to the loss of office, fired the indignation of Campbell, and thereupon began in America a "war of editors" which has never ceased.

On Dec. 22, 1719, the day after the *Gazette* appeared, the initial paper in Philadelphia, *The American Weekly Mercury*, was issued by Andrew Bradford, a son of the first printer in Pennsylvania. A paper that attracted more attention was *The New England Courant*, established by James Franklin Aug. 7, 1721. Benjamin Franklin began his career as a printer's apprentice on this paper. The *Courant* created a sensation, and its publisher was soon in difficulty. First it had a wordy war with *The News-Letter*. Then James Franklin had a good deal of trouble with the clergy, especially with Cotton and Increase Mather, and finally the journalist and the Government officials had their differences. The communications in the *Courant* produced so much talk and scandal in the quiet town of Boston that its publisher was forbidden to issue his paper except under very arbitrary restrictions, and for attempting to evade these he was thrown into prison. On Feb. 11, 1722, Benjamin Franklin, then only sixteen years of age, was placed in charge as editor and publisher, and he remained for several months in this position. There continued to be the same independent spirit in the management of the paper, and its troubles finally induced James Franklin to abandon its publication. He went to Newport, R. I., where he established the *Gazette* in 1732.

The next paper that appeared in America was *The New York Gazette*, the first in that province. It was published by William Bradford, and the first number was issued on Oct. 23, 1725. In 1727 *The New England Weekly Journal* was published by Samuel Kneeland. *The Maryland Gazette* also appeared in 1727, the first in that colony. It was published till 1736, and revived in 1749. In 1728 Benjamin Franklin made his reappearance as a journalist. Samuel Keimer had started a paper in that year in Philadelphia, which he named *The Universal Instructor in all the Arts and Sciences, and Pennsylvania Gazette*. Franklin had contemplated such an enterprise, and had confided his intention to a fellow-printer, who treacherously informed Keimer of the plan, and the *Instructor* was the result. Franklin, in order to prevent the success of Keimer's journal, immediately began writing "several amusing pieces for Bradford's paper [the *Mercury*], under the title of Busy Body." In less than a year Keimer sold his paper, with its ninety subscribers, to Franklin, who condensed its name to *Pennsylvania Gazette*, and made it a success. On Jan. 8, 1731, *The South Carolina Gazette* was issued, the first in that province. It was printed in Charleston, and lived a year, but was revived in 1734.

The most important newspaper, politically, in early colonial times was started in New York in 1733. On Nov. 5 of that year John Peter Zenger issued the first number of *The New York Weekly Journal*. It was a rival of Bradford's *Gazette* professionally and politically, and Zenger was a fearless journalist. The *Journal* made war on the administration of Gov. Cosby, and in 1734 its editor was arrested for libel on the Government and thrown into prison, and in the hope of crushing the paper the authorities kept him nine months in confinement. In spite of the imprisonment of its editor, the *Journal* continued to appear regularly: and on Aug. 5, 1735, the case was brought before the court for trial. It was the first action for newspaper libel on the American continent. Zenger was acquitted, and the verdict was greeted with the utmost enthusiasm by an immense audience. *The Virginia Gazette*, the first in that province, made its *début* in Williamsburg in 1736; and two newspapers printed in German, the pioneers in any foreign language in the U. S., appeared—one in Germantown, Pa., in 1739, and the other in Philadelphia in 1743.

Most of these colonial papers confined themselves strictly to the merest mention of the news of the day. If any opinions were uttered, they were subservient to the authorities. The Franklins and Zenger were the exceptions, and they originated and practiced that independent spirit which was infused in a new class of papers that appeared subsequent to 1745. This new class was the Revolutionary press. It was still of the colonial stamp, because the country was yet composed of colonies, with governors appointed to rule over them by Great Britain, but the people and the press had become restless, more self-reliant, and more independent of the colonial authorities. The pioneer was *The Independent Advertiser*, issued in Boston on Jan. 4, 1748, under the inspiration of Samuel Adams. One of its contributors was Jonathan Mayhew, who, on the occasion of an election, preached a sermon strongly advocating the republican form of government. David Fowle, the printer of the paper, having issued a pamphlet which severely denounced the Legislature for certain acts, was arrested and imprisoned. On his release he quitted Boston and went to Portsmouth, N. H., where he started *The New Hampshire Gazette* in 1756, and the young patriots of the *Advertiser* had to bide their time. One or two new papers appeared in Boston and New York, and pamphlets were issued by the opponents of the Government in the next year; but the real organ of the Revolutionary party made its appearance on Apr. 7, 1755. It was named *The Boston Gazette and Country Gentleman*, and all the vigorous writers for *The Independent Advertiser* contributed to its columns. The Newport (R. I.) *Mercury* was established on June 12, 1758, by James Franklin, a nephew of Benjamin Franklin. The press on which the elder James Franklin and his brother Benjamin so often worked in Boston remained in the *Mercury* office for 100 years. It was then presented to the Massachusetts Charitable Mechanics' Association. On Feb. 16, 1759, the old *Gazette* of William Bradford was revived, and afterward immortalized by Freneau. On Oct. 29, 1764, *The Connecticut Courant* was issued in Hartford, and is still published there as a weekly.

In opposing the Stamp Act of 1765 the patriotic newspapers had a prodigious influence on the colonists. *The Maryland Gazette*, the Newport *Mercury*, and many other papers printed the resolutions of the Virginia House of Burgesses against it, and several suspended publication in consequence of the act—notably *The Pennsylvania Journal and Weekly Advertiser*. In 1766 a second *Gazette* appeared in Williamsburg, printed by William Rind. The first printed statement of the adoption of the Declaration of Independence on July 4, 1776, was made in the *Gazette* on the 19th of that month, and the document in full appeared in the same paper on the 26th. On May 29, 1767, *The New York Journal, or General Advertiser*, was brought out under the inspiration of George Clinton and Philip Schuyler. It was a revival of Zenger's paper, and was edited by Alexander McDougall. Alexander Hamilton, when only sixteen years of age, was a clever contributor to its columns.

Opposite in political sentiment to these patriot journals was *The Royal Gazetteer*, which was established in New York in 1762 by James Rivington. The leading contributors to the *Gazetteer* were Attorney-General Seabury, Myles Cooper, president of King's (now Columbia) College, the Rev. John Vardill, and the Rev. Samuel Chandler. Major André also wrote for the paper, and his well-known satire, *The Cow Chase*, appeared in the *Gazetteer* on the very day of his capture. It was subsequently called *Rivington's Royal Gazette*, with the royal arms over the office door. It was an ably conducted newspaper. Its office was twice mobbed for its zeal for the crown—once by the Sons of Liberty, and once by a party of Connecticut militia. After enjoying royal favor for many years, Rivington, in 1782, who then saw the "end of things," shaped his course to meet coming events. The title *Royal* was dropped, and the paper was afterward known as *Rivington's New York Gazette and Universal Advertiser*, and the royal arms were removed from over the door of the office. The circulation of the *Gazette* reached, in its best days, the large number of 3,000. Another organ of the crown was started in Boston in 1767. It was *The Chronicle*, and the handsomest journal, typographically, published in the colonies. It exhibited great pretensions to literature. John Mein, one of its publishers, assisted by a pre-Revolutionary wit of Boston named Joseph Green, and a few others, was very severe on the Whigs of those days, but popular sentiment became so inimical to him that he was compelled to stop the publication of *The Chronicle* and leave the country.

The Massachusetts Spy, "calculated on an entire new plan," was the next influentially patriotic paper started in the colonies. Its first number came out in July, 1770, under

the auspices of Isaiah Thomas, the author of the *History of Printing in the United States*. It was a power with the people, and early in 1771 urged a recourse to arms. On the night of Apr. 18, 1775, the material of the *Spy* was conveyed across the Charles river and carried to Worcester, where the paper was ever afterward printed, and where it is now known as *The Worcester Spy*. On May 3, 1775, it first appeared there with the motto in large type: "Americans! Liberty or Death! Join or Die!" The Government, to stem this revolutionary tide after the suspension of *The Chronicle*, resorted to the old *News-Letter*, which was then known as *The Massachusetts Gazette and Weekly News-Letter*.

In the first year of the Revolution eight newspapers were started—four in Philadelphia, where Thomas Paine and Philip Freneau lived and wrote. The first newspaper in New Jersey, the *Gazette*, was issued on Dec. 3, 1777; the first in Mississippi Territory appeared in 1779, a pioneer among the pioneers; and in 1781 the first, *The Gazette or Green Mountain Post Boy*, was published in Vermont. Forty-nine newspapers were established in the colonies from 1745 to 1783, but of all those publications not one appeared daily. While New York was occupied by the British troops four papers were published there, and an arrangement was made in their days of publication by which the public had a newspaper each day. The first daily paper in America was not issued till 1784. It was *The American Daily Advertiser*, and was published in Philadelphia by Claypoole, who was the first to introduce reporting on the continent. Of the 63 newspapers which had been started in America from 1690 to 1783, only 43 were in existence on the conclusion of peace with Great Britain.

When the Constitution went into operation in 1789 there were printed in each week, in the U. S., 76,438 copies of newspapers. Many foreign writers of ability were employed by both the great political parties on the press, and many of the political chiefs wrote for the journals. There were few or no regular editorial articles, but the topics of the day were warmly discussed in communications over all sorts of signatures. Most of the foreign writers were political exiles, and they naturally fell into the ranks of the Democrats and wrote for the papers of that party, strongly against Great Britain and in favor of aiding republican France; and they were very severe on the administrations of Washington and Adams. One of these papers, *The National Gazette*, was established in Philadelphia in Oct., 1791, by Philip Freneau while a clerk under Jefferson in the State Department. Jefferson placed a high estimate on his services as a journalist. The *Gazette* was published till 1793. In 1797 Freneau started *The Time Piece* in New York, which was afterward edited by Matthew L. Davis, and subsequently by John Daly Burk, one of the United Irishmen. Two influential journals were established in 1793: *The New England Palladium* in Boston, and *The Minerva* (afterward and still known as *The Commercial Advertiser*) in New York. Noah Webster, the lexicographer, previously a lawyer in Hartford, was induced to take charge of the latter, and thereby strengthen the Federal party. William L. Stone was subsequently and for many years its editor. It was afterward conducted by Thurlow Weed, and has since had a variety of changes in editors and politics. It is the oldest paper in New York. *The Palladium* was merged with *The Boston Advertiser*. The newspapers that attracted the most attention in the latter part of the eighteenth and the early part of the nineteenth century were *The Aurora* in Philadelphia and *The Evening Post* and *American Citizen* in New York. *The Aurora* was edited by Benjamin Franklin Bache, a grandson of Benjamin Franklin, till 1798, and then passed under the editorial care of William Duane, who had become very much embittered against Great Britain. It was a powerful organ of Jefferson's. *The Evening Post* was started on Nov. 16, 1801, and was strongly Federal in its politics. Alexander Hamilton, John Jay, and their friends established it, and placed William Coleman in the editorial chair, where he remained for nearly thirty years, and was succeeded by William Leggett and William Cullen Bryant. *The American Citizen* was a continuation of *The New York Journal and Argus*. James Cheetham became its editor in 1801, and acted with that portion of the Democratic party of which the Clintons were leaders. The bitterness of these three journals kept up the political excitement in New York to a high pitch and for a long time. Another Democratic paper was issued in New York in 1802 by the friends of Aaron Burr, in opposition to the *Citizen*. It was *The Morning Chronicle*, and edited by Dr. Peter Irving. Washington Irving made his first appearance as a writer in *The Chronicle*, over the signature of "Jonathan Oldstyle." It ceased to exist in 1805.

With the increase of population in the Northwest, the necessity of newspapers became evident, and on Nov. 9, 1793, *The Centinel of the Northwestern Territory* was founded in Cincinnati by William Maxwell, the first newspaper and the first printing-office beyond the Ohio. Nathaniel Willis, an old Boston printer, started *The Scioto Gazette* in Chillicothe in 1796, and in 1799 *The Western Spy and Hamilton Gazette* was issued. Singular as it may seem, some of these newspapers appeared in advance of any in Central or Western New York. *The Otsego Herald*, or *Western Advertiser*, was the first newspaper printed in Central New York. It appeared (18 by 21 inches in size, each of the four printed pages being 9 by 15½ inches) at Cooperstown Apr. 3, 1795, and was continued until 1821. Elihu Phinney was its founder, editor, and the pioneer journalist in that section of the country. William L. Stone, Thurlow Weed, and other distinguished journalists, worked at the case in his office, and J. Fenimore Cooper often "set type" there for amusement, and he described in *The Pioneers* the printing-establishment of the *Herald* in its days of infancy.

The Richmond Enquirer, edited for forty years by Thomas Ritchie, started on May 9, 1804, became a leading and powerful organ of public opinion for half a century. Among other prominent journals that appeared at that time was *The Albany Register*, established in 1803 or 1804, an influential paper, especially under the care of Solomon Southwick, who was its chief editor in 1808. In the overthrow of factions it succumbed to *The Albany Argus*, which was started in 1813, and managed with ability and skill by Edwin Croswell till the defeat of Martin Van Buren in 1840. It was the mouthpiece of the Albany Regency, as the *Enquirer* was of the Richmond Junta. Another paper of note was *The Hudson Balance*, a leading Federal paper in 1804, edited by Harry Croswell. It had to carry on the contest against the Democratic organs with *The Commercial Advertiser* and *The Evening Post* of New York. New party papers continued to make their appearance, and were at that time mostly Democratic. They grew out of the troubles and jealousies of the party-leaders. After the death of Cheetham, the Tammany Hall Democrats set up a paper named *The National Advocate*. Henry Wheaton was its editor for a number of years. It then passed into the hands of Mordecai Manasseh Noah; James Gordon Bennett was also one of its editors. Other influential party papers of that period were *The Portland* (Me.) *Argus*, established in 1803, *The New Hampshire Patriot* in Concord in 1808, *The Hartford* (Conn.) *Times* in 1817, *The Charleston* (S. C.) *Mercury* in 1822, *The Globe* in Washington, and *The Post* in Boston in 1831, the *Nashville* (Tenn.) *Union*, and *The Columbus* (O.) *Statesman*. The newspapers in opposition a large portion of this time, although some of these were originally Democratic, were *The National Intelligencer*, issued in Washington in 1799–1800; *The Providence* (R. I.) *Journal*, established in 1820; *The Boston Courier*, started by Joseph Tinker Buckingham in 1824; *The Richmond* (Va.) *Whig*, in 1826; *The New York Courier and Enquirer*, in 1827; *The Albany Evening Journal*, originally established by Thurlow Weed as an Anti-Masonic organ in 1830; *The Louisville* (Ky.) *Journal*, first issued in 1831, and edited for thirty years by George D. Prentice; *The Boston Atlas*, started by John H. Eastburn and the Webster Whigs in 1832; and *The New York Express*, set up by the Clay Whigs in 1836. These journals represented the National Republican and Whig parties, and made their mark on the pages of political history; but they were not confined wholly to politics. With the progress of the country, and with the discussions of the great questions that came up before the people, they expanded their field of discussion and enlarged their collections of news. Especially in New York, in order to obtain large circulations, efforts were made to acquire the earliest news in advance of one another. More attention was devoted to commercial and foreign intelligence, and they became large advertising mediums. Other papers were established during this long period which were not strictly party papers, but the number was small. One of the most valuable was *Niles's Weekly Register*, which was brought out in Baltimore in 1811, and continued till 1848.

The "organs" at the national capital were an important feature of the party journalism of the period. The first of this class was *The National Intelligencer and Washington Advertiser*. This paper had been removed from Philadel-

phia, where it was known as *The Independent Gazetteer*, on the removal of the seat of government from that city. This was in 1799–1800. The *Intelligencer*, then owned by Samuel Harrison Smith, became the organ of Jefferson. In 1810–12 it passed into the hands of Gales & Seaton, and these journalists introduced the full reports of the debates in Congress. On the advent of Jackson on Mar. 4, 1829, the *Intelligencer* ceased to be the organ of the Government, and became that of the Whig party, and *The United States Telegraph*, edited by Duff Green, was accepted as the organ of Jackson's administration; but a rupture between President Jackson and Vice-President Calhoun caused the establishment (in 1831) of *The Globe*, with Francis P. Blair and Amos Kendall as editors, and this journal became the organ of the Democratic party, continuing till the advent of Harrison in 1841, when the *Intelligencer* resumed its old position. The early death of Harrison, throwing the Whig party into confusion, led John Tyler to select *The Madisonian*, started in 1841, to be his organ. On the election of James K. Polk in 1844 *The Globe* did not return to power with its party, but a new paper, called the *Union*, was established, with Thomas Ritchie as editor, and that journal became the official organ. On the election of Gen. Taylor in 1848 a new paper was started for his organ, as the *Intelligencer* favored the Webster wing of the Whig party. The new paper, *The Republic*, was edited by Alexander Bullitt and John O. Sargeant. The *National Era* served the Free-Soil party in the national capital from 1847, and, besides other powerful contributions to the growing anti-slavery excitement, first gave *Uncle Tom's Cabin*, by Mrs. Stowe, to the world. When Franklin Pierce came into power in 1852–53, *The Union* resumed its position with the Government, but with Gen. Robert Armstrong as editor and Caleb Cushing and A. O. P. Nicholson as contributors, and continued, with John Appleton (previously editor of *The Portland Argus*) as conductor, through the administration of James Buchanan. *The Union* was the last of the official organs at the national capital.

The Rev. John Andrews established in Chillicothe, O., the first religious newspaper in the U. S. It was entitled *The Recorder*, and the initial number was issued in 1814. Nathaniel Willis thought and talked of such an enterprise in Portland, Me., in 1808, but did not receive sufficient encouragement to carry out his plans till 1816. On Jan. 3 of that year he issued the first number of *The Boston Recorder*. *The American Farmer* was the first of the agricultural press. It was published in Baltimore by John S. Skinner, and the first number appeared on Apr. 2, 1818. *The Ploughboy*, managed by Solomon Southwick, followed in 1821, and was published in Albany. *The New England Farmer* next appeared in Aug., 1822. As far back as 1795 *The Boston Prices Current and Marine Intelligencer* was published, but in a few years it became a political newspaper; and the first successful commercial paper was *The New Orleans Prices Current*, established in 1822.

Up to 1833 newspapers in the U. S., whether daily or weekly, were distributed almost exclusively by subscription, and at a price which, considering their size and the amount of reading-matter they gave, would now seem high. Their advertisements, however, were cheap, as was natural, considering that the circulations were small. It was only by becoming an annual subscriber that one could obtain a city paper for less than six cents. There were no street sales, no news-stands or news-agencies, and but small sales at the offices. No paper in the country in 1835 circulated over 5,000 copies; very few over half that number. With all the enterprise that James Watson Webb, of *The Courier and Enquirer*, and Hale and Hallock, of *The Journal of Commerce*, of New York, and Richard Houghton, of *The Boston Atlas*, displayed between the years 1830 and 1840 in news-schooners and pony expresses, not one of these journals could boast of a subscription-list of over 5,000 names.

The penny press appeared in New York in 1833. The *Morning Post* was started on the first day of that year. Horatio David Shepard was the editor, and Horace Greeley and Francis V. Storey were the printers. It was first sold for two cents, and then for one cent. In three weeks it was dead. On Sept. 3, 1833, *The Sun* was issued by Benjamin Day, and sold at one cent per copy. At first it depended for its success on local news, and largely on piquant police reports. It gradually gained a large circulation, and espoused the Democratic side in politics. In 1867 it was reorganized, and came for the first time under the direction of a forcible political editor, Charles A. Dana, who had enjoyed large experience on political journals and as Assistant Secretary of War. Under him it became an influential political journal, and also by a careful selection and skillful condensation of news commended itself to many political opponents. For years it sold from 120,000 to 140,000 copies daily, adhering to its four-page size and two-cent price.

Nearly two years after *The Sun* (on May 6, 1835), another small, cheap paper, *The New York Herald*, made its first appearance, edited by James Gordon Bennett, who had also enjoyed large previous experience on other journals. Within twenty years it attained a circulation of 36,000 copies, and has since that time greatly increased, though with varying prices and success. It displayed great enterprise in the collection of news. In the latter years of his life Mr. Bennett gradually yielded the management of the *Herald* to his only son, bearing his name, who on his father's death succeeded to the absolute control. The son made a liberal use of a portion of the large fortune left him in equipping an expedition in search of Livingstone, which, besides discovering the African explorer, made important contributions to geographical science. He also fitted out a generous but unfortunate Arctic exploration enterprise. He gave great attention to yachting, coaching, base-ball, lawn tennis, racing, polo, and other sports, and continued the policy of his father in making the most energetic and far-reaching collection of all manner of news likely to interest a miscellaneous public his first object.

On Apr. 10, 1841, Horace Greeley, who had already attained distinction as the most forcible political editor then in the Whig ranks, issued the first number of *The New York Tribune*, which he continued to conduct until his nomination for the presidency in 1872, and of which he remained one of the proprietors until his death. The *Tribune* also was at the outset a penny paper, but it differed from the other cheap journals of that period in giving larger attention to politics, literature, and social discussions. Contributors to its columns set forth and advocated the system of Fourier. It encouraged efforts to establish communistic and educational associations. It gave almost the first serious attention to the Rochester knockings and other alleged manifestations of Spiritualism; it pressed upon workingmen the advantages of co-operation and arbitration, instead of trades-unionism and strikes, as a method for securing their best interests; and it became the most conspicuous champion of the warfare through political agencies upon the system of slavery. It made the first great use of the Atlantic cables for transmitting war correspondence. It translated the famous cipher dispatches relating to alleged illegal attempts by Mr. Tilden's partisans to secure electoral votes for him in the disputed election of 1876. It established and has conducted for many years the pioneer Fresh Air Fund, by which large numbers of poor children from the most destitute portions of the city are taken to country homes for a two weeks' vacation during the stifling heat of summer. This is of especial importance as the type of numerous charitable undertakings by other newspapers. The *Tribune* established, within a few months after its first issue, regular weekly and semi-weekly editions, and its weekly soon became the most widely circulated political journal in the U. S.

The New York Times was established by Henry J. Raymond, who had formerly been on the editorial staff of the *Tribune*, in Sept., 1851. It was designed to fill substantially the same field with the *Tribune*, but in a more conservative and moderate way. It also began as a penny paper, and attained success almost at the outset. Its greatest reputation was achieved after Gov. Raymond's death by its vigorous exposure of the Tweed ring, in which it displayed courage and pertinacity, and from which it derived great profit. During Gov. Raymond's life and for some years afterward it was Republican. It gradually displayed free-trade leanings, in 1884 supported the Democratic presidential ticket, and has since formally declared itself a Democratic journal.

On June 1, 1860, *The New York World* was established by a number of religious gentlemen, for the purpose of having a newspaper in the metropolis without the police reports and the theatrical advertisements and notices that occupied so much space in the other city journals, and with a distinctly evangelical tone. After spending a large sum of money this idea was abandoned, and the *World* passed into Democratic hands. On July 1, 1861, the *World* and *The Courier and Enquirer* were united. It had a long and doubtful struggle, but at last under Joseph Pulitzer attained an unusually large circulation.

The *Herald*, *Tribune*, *Sun*, *Times*, and *World* all became large quarto or eight-page newspapers. As their system of collecting news extended, and the labor and expense bestowed upon its preparation increased, the price of all of them except *The Sun* was raised, first to three, and finally, during the civil war, to four cents. They also one after another began the issue of regular Sunday editions, for which the price was five cents, the *Tribune* being the latest to yield to this innovation. After some fluctuations the *World* fixed the price at two cents, and was followed in this for a time by the *Times* and *Herald*, but these returned later to the *Tribune's* price, three cents. All these papers also advanced again to five cents the price of their Sunday issue, which had now become a magazine in itself, ranging according to the pressure of news and advertisements from twenty to forty-eight pages for each issue. The size of the paper in the week-day issues was also gradually increased. It is rarely that any of these papers has now less than ten pages, while twelve, fourteen, and sixteen pages are more common. This great increase in size and in the quantity of reading-matter furnished has been made practicable by several causes: (1) The enormous reduction in the cost of the paper on which they are printed. In 1872 white news print cost from twelve to thirteen cents a pound; in 1894 it could be bought for two and a quarter cents. (2) The introduction in most of the papers of machinery for type-setting, which can be made to reduce greatly the cost of composition. (3) The introduction of improved printing-machinery, by which the papers are printed, cut, pasted, folded and counted, ready for delivery by a single machine, needing only three operators, at the rate of from 20,000 to 40,000 copies per hour. (4) Great reductions in the cost of telegraphing both on the ocean cables and by the domestic lines, coupled with the system of leasing telegraph lines between important news-points for an individual newspaper or a few associates, and the liberal use of long-distance telephone lines. (5) A vast increase in the number of newspaper readers, thus increasing the profit both on circulation and from the consequent advertising. Seventy columns of news and editorial comment, besides many pages of advertisements, are now often sold for two or three cents. Nearly all news is now received by telegraph, and a large part of it is specially collected for each paper by its own corps of correspondents. The expenses for the collection of city news have also immensely increased since 1860. Where eight or ten reporters formerly served a newspaper it now often has sixty to seventy. Counting "casuals" and "special assignment men," it is common for a New York newspaper of the first class to have 100 or more men serving almost every night in its city department. The editorial department has made a similar advance, while specialists are retained in large numbers for the treatment of literary, artistic, musical, dramatic, and other topics.

The same increase in labor and expense and improvement in the collection of news which have been noted in the New York papers, especially since 1860, may be observed proportionately throughout the press of the country. The great distances in the U. S., the excellent telegraphic service, and the facilities afforded by the United and the Associated Presses stimulate the growth of first-class newspapers in all large cities. Thus Philadelphia, Cincinnati, Chicago, St. Louis, New Orleans, and San Francisco have come to possess strong and enterprising journals, many of them as large as, or larger than, the New York papers, and sometimes conducted on a scale of equal expenditure. In Chicago, the *Tribune*, *Herald*, *News*, *Times*, and *Inter-Ocean* are of this class; in St. Louis, *The Globe-Democrat* and *Republic*; in Cincinnati, *The Commercial-Gazette* and *Enquirer*; in New Orleans, *The Times-Democrat* and *Picayune*; and in San Francisco, the *Chronicle*, *Examiner*, *Bulletin*, and *Call*.

A large number of the more substantial newspapers now erect large buildings of their own wherein they establish their machinery and offices, while they derive a handsome income from the rent of the portions of the building not occupied by themselves. In New York, the *Tribune* was the first to construct a large eleven-story fire-proof building of this class. It has since been followed by the *Times*, *World*, and some others; while the *Herald*, adopting a different idea, has constructed a large but low building in the heart of the up-town amusement and advertising quarter, entirely for its own use. In most of the great cities of the country the leading newspapers now own buildings, often the most conspicuous in the place, accommodating many tenants as well as themselves. Even on the Pacific coast the buildings of *The San Francisco Chronicle*, *Portland Oregonian*, and *Seattle Post-Intelligencer* are of the most approved modern, high, fire-proof class, and among the most prominent in their respective cities.

The period since the civil war has been marked also by the rapid development of local journalism throughout the U. S. Nearly every city of 15,000 inhabitants must have its own daily paper—often, indeed, when not half that size. Nearly every county-seat must have its weekly paper, and in the more populous counties some village in almost every township will also have a weekly issue. An immense system of printing what are called "patent outsides" for such papers has sprung up, under which two pages of news and miscellany are edited and printed at some central office for a great multitude of smaller papers, the half-printed sheets being then forwarded to the several offices, to be filled out, in each, with the local news and editorial comment of its own locality. Another economical device for the small country papers is the use of what is called "plate matter." Late news, correspondence, and miscellany likely to be generally acceptable for such papers is put in type in a central office, say in New York or Chicago, and stereotype plates of it are then made and sold to the country press. Thus a country paper often presents to its few hundred readers four pages of attractive reading matter, of which less than a page has been prepared and put in type in its own office.

The Daily Graphic of New York is believed to have been the first illustrated daily newspaper in the world. It regularly printed engravings, often of considerable merit, on four of its eight pages. Its system, however, proved too expensive, and it led a precarious existence, finally dying in 1888. Meantime many of the larger daily journals gradually adopted the plan of illustrating their news columns with portraits of the leading persons referred to, and this proved so popular that the system was largely extended. Many of the newspapers established art departments in their offices. Here they accumulated enormous collections of photographs of almost every prominent personage in America and Europe, together with engravings of public buildings, and every other species of information likely to be useful in enabling them suddenly to produce pictures in illustration of any news article. Various new methods of reproducing photographs on metal and then transferring them to the stereotype pages were introduced. Skillful artists were also employed to attend important public trials, conventions, sessions of Congress and of the Legislature, etc., and to make spirited sketches of the principal speakers and the surrounding scenes. In this manner a large number of newspapers not only in New York but in the other principal cities of the country are liberally illustrated every day. The system has also been seized upon by the offices furnishing "plate matter" to country papers, and the remotest rural weekly can now accompany its news of the latest nomination for Governor or Congress with a portrait of the candidate, or its mention of the latest noted death, whether of prince, or president, or opera-singer, with a tolerable representation of the features of the deceased. Illustrated weeklies are numerous, and some of them have great circulations, *Harper's Weekly* and *Frank Leslie's* being the most prominent in New York. Comic newspapers were for a long time unsuccessful in the U. S., but since 1880 several have become profitable, *Puck*, *Judge*, and *Life* being those best known in New York. Of class-papers the name is legion; half a dozen are devoted exclusively to the affairs of Wall Street. Every trade has its own organ, and often numerous competing organs. The growth of the religious press has been marked by great steadiness, and many of the journals belonging to the larger denominations are among the most stable and successful newspaper properties in the country.

An estimate of the number of newspapers in the world in 1891 showed a total of 41,000, of which 24,000 were published in Europe. The distribution was approximately as follows: The U. S., 12 500; Germany, 5,500; France, 4,100; Great Britain and Ireland, 4,000; Austria–Hungary, 3,500; Italy, 1,400; Spain, 850; Russia, 800; Switzerland, 450; Belgium, 300; Holland, 300. Of this total 17,500 were published in the English language, 7,500 in the German, 6,800 in the French, 1,800 in the Spanish, and 1,500 in the Italian. In 1893 the *Newspaper Press Directory*, of London, gave the number of newspapers in the United Kingdom as 2,268, and of magazines, including the quarterly reviews, as 1,961—a total of 4,229 periodicals.

The following table, from the *American Newspaper Directory* for 1901, shows the number and frequency of issue of newspapers and periodicals in the U. S. and in Canada:

STATES.	Daily.	Tri-weekly.	Semi-weekly.	Weekly.	Bi-weekly.	Semi-monthly.	Monthly.	Bi-monthly.	Quarterly.	Totals.
Alabama	20	..	4	190	1	6	18	..	..	239
Alaska	2	..	..	6	..	..	...	..	..	8
Arizona	11	..	..	38	..	..	1	..	..	50
Arkansas	25	..	3	214	..	3	24	..	1	270
California	111	2	21	435	1	6	100	3	2	681
Colorado	42	1	2	253	..	3	28	..	..	329
Connecticut	46	..	8	98	2	..	28	1	7	190
Delaware	6	..	1	28	..	..	6	..	..	41
D. of Columbia	4	..	..	30	2	2	38	4	4	84
Florida	11	..	4	124	..	2	17	1	..	159
Georgia	26	..	7	280	..	6	39	..	1	359
Hawaii	5	..	2	10	..	..	5	..	1	23
Idaho	4	..	5	59	..	2	2	..	..	72
Illinois	182	3	48	1,104	6	29	326	10	18	1,726
Indiana	149	..	25	592	1	10	81	1	3	862
Indian Territory	9	..	..	81	..	..	3	..	1	94
Iowa	63	8	37	880	1	8	81	1	3	1,082
Kansas	49	..	5	596	1	7	46	..	3	707
Kentucky	28	1	18	239	..	7	24	1	2	320
Louisiana	24	..	3	146	..	6	14	..	..	193
Maine	15	..	5	96	..	2	34	..	3	155
Maryland	17	..	1	145	2	1	33	2	7	208
Massachusetts	86	..	6	334	5	6	153	4	25	619
Michigan	77	5	21	604	1	6	89	3	5	790
Minnesota	36	..	4	560	2	19	58	1	3	683
Mississippi	14	1	5	181	1	11	11	..	..	224
Missouri	84	..	9	780	4	13	143	3	9	1,045
Montana	12	2	2	74	..	1	4	..	..	95
Nebraska	28	1	12	523	..	2	42	..	..	608
Nevada	7	..	2	20	..	1	...	..	..	30
New Hampshire	14	1	..	72	..	1	9	..	1	98
New Jersey	48	..	3	282	1	3	35	1	1	374
New Mexico	4	..	1	45	..	..	3	..	..	53
New York	185	6	43	1,048	8	47	544	15	40	1,936
North Carolina	27	..	14	180	1	7	24	..	..	253
North Dakota	7	..	1	142	..	..	8	..	..	158
Ohio	168	5	40	793	6	14	178	4	10	1,218
Oklahoma	13	..	..	126	..	1	12	..	..	152
Oregon	17	..	7	144	1	2	22	..	..	193
Pennsylvania	197	6	35	908	3	9	219	8	13	1,393
Philippines	4	..	..	....	..	..	...	..	..	4
Porto Rico	8	..	..	....	..	..	...	..	..	8
Rhode Island	12	1	2	30	1	..	11	..	1	58
South Carolina	10	1	14	94	..	2	8	2	..	131
South Dakota	17	..	..	235	..	3	18	..	..	273
Tennessee	14	..	7	220	2	5	36	1	3	288
Texas	71	..	14	646	1	14	68	..	1	815
Utah	5	1	6	51	..	3	7	..	..	73
Vermont	9	..	2	55	1	..	10	..	..	77
Virginia	31	2	6	161	..	2	39	2	1	244
Washington	16	2	1	174	2	1	28	..	2	226
West Virginia	20	..	2	154	1	2	11	..	1	181
Wisconsin	6	..	12	520	2	2	52	1	4	657
Wyoming	4	..	2	32	..	..	1	..	..	39
Totals, U. S.	1,896	49	472	11,816	60	277	2,562	69	175	20,848
Cuba	11	2	1	9	..	..	4	..	..	27
Brit. Columbia	9	..	7	29	..	..	2	..	..	47
Manitoba	6	..	3	57	..	2	4	1	..	73
New Brunswick	8	..	7	28	..	1	6	..	..	50
N.W. Territories	2	..	3	22	..	1	...	..	..	28
Nova Scotia	7	3	3	54	..	1	4	..	..	72
Ontario	63	..	12	374	10	1	69	..	1	530
Prince Ed. Isl'd.	3	..	1	11	..	..	...	..	..	15
Quebec	12	1	3	68	1	4	26	..	..	115
Totals, Canada	110	4	39	643	11	10	111	1	1	930
Newfoundland	3	..	..	5	..	..	...	..	..	8
Grand totals	2,020	55	512	12,473	71	287	2,677	70	176	21,813

Revised by WHITELAW REID.

New Style: See CALENDAR.

Newt: a name applied to various small, tailed batrachians belonging to the genera *Triton*, *Salamandra*, etc., but particularly applicable to *Triton cristatus* of Europe. The newts have vertically flattened tails, and some have fleshy ridges along the back. They frequent ditches and sluggish water generally, feeding on insects and other animal matter. They are harmless, although they are popularly regarded as venomous. F. A. L.

New Tacoma, Wash.: See TACOMA.

New Testament: See BIBLE, THE.

Newton: city (settled in 1826, made the county-seat in 1831); capital of Jasper co., Ill.; on the Embarras river, and the Peo., Dec. and Evans, and the Ind. and Ill. S. railways; 140 miles E. N. E. of St. Louis and 220 S. of Chicago (see map of Illinois, ref. 8–G). It is in an agricultural, coal, and dairy region; has steam and water power saw, flour, and grist mills, creamery, and canning and egg-case factories; and contains 6 churches, public schools with grammar and high grades, a high-school library, a private bank, and 3 weekly papers. Pop. (1890) 1,428; (1900) 1,630.

Newton: city; capital of Jasper co., Ia. (for location of county, see map of Iowa, ref 5–H); on the Iowa Cent. and the Chi., Rock Is. and Pac. railroads; 35 miles E. of Des Moines. It is in an agricultural, horse-breeding, and stock-raising region; has 2 foundries and machine-shops, 2 canning-factories, flour-mills, and harvesting-machine works; and contains 9 churches, Normal College (built in 1893 at a cost of $25,000), a national bank with capital of $50,000, a savings and 2 private banks, and 4 weekly newspapers. Pop. (1880), 2,607; (1890) 2,564; (1900) 3,682.

Newton: city, capital of Harvey co., Kan. (for location of county, see map of Kansas, ref. 7–G); on the Atch., Top. and S. Fé and the Mo. Pac. railways; 135 miles S. W. of Topeka. It is in a fruit and grain growing region, with valuable coal mines and stone quarries in its vicinity. There are 13 churches, public-school buildings that cost $90,000, Free Library (founded 1885), 2 national banks with combined capital of $1000,000, a State bank with capital of $41,000, and a daily and 4 weekly newspapers. The manufactories include railway machine-shops, iron-foundries, carriage and sugar factories, and brick-works. Pop. (1880) 2,601; (1890) 5,605; (1900) 6,208. EDITOR OF "REPUBLICAN."

Newton: city (settled in 1630, separated from Cambridge and incorporated as a town in 1679, chartered as a city in 1873); Middlesex co., Mass. (for location of county, see map of Massachusetts, ref. 2–H); on the Charles river, and the Boston and Albany Railroad; 7 miles W. of Boston. It contains 13 villages, derives large water-power for manufacturing from the river, and is the place of residence of many people doing business in Boston. The city is noted for the healthfulness and beauty of its location. There are more than 30 churches, 2 academies, the New Theological Institution, Lasell Female Seminary, a lyceum, public library (founded 1869) containing over 35,000 volumes, a national bank with capital of $200,000, a savings-bank, and a monthly and 3 weekly periodicals. The manufactories include rolling, paper, and print-cloth mills, and boot and shoe, hosiery, carriage, cordage, emery-cloth, glue, dye, ink, and soap factories. In the center of the city is a cemetery of about 90 acres. Pop. (1890) 24,379; (1900) 33,587.

Newton: town; capital of Sussex co., N. J. (for location of county, see map of New Jersey, ref. 1–C); on the Del., Lack. and W. Railroad; 25 miles N. N. W. of Morristown, 62 miles N. W. of New York city. It is in an agricultural, copper, and iron region; contains a non-sectarian collegiate institute, the Dennis Library (founded 1873), 2 national banks with combined capital of $300,000, and 2 weekly newspapers; and is principally engaged in mining and in the manufacture of shoes and paper boxes. It is a summer resort. Pop. (1880) 2,513; (1890) 3,003; (1900) 4,376.

Newton, ALFRED: ornithologist; b. at Geneva, Switzerland, of English parents, June 11, 1829. He is a fellow of Magdalene College, Cambridge, England, where he is Professor of Zoölogy and Comparative Anatomy. Prof. Newton has a wide acquaintance with ornithology, and his writings abound in numerous references to its literature, especially to that of an early date. His published papers are numerous; he is the author of the article *Ornithology* in the ninth edition of the *Encyclopædia Britannica*, as well as of the shorter ornithological articles, and—with Dr. Parker—of the article *Birds*. A more recent work, in conjunction with Dr. Gadow, is *A Dictionary of Birds*. F. A. LUCAS.

Newton, Sir CHARLES THOMAS, K. C. B., D. C. L.: archæologist; b. at Bredwardine, Herefordshire, England, in 1816; was educated at Shrewsbury School and Christ Church, Oxford, graduating with honors in 1837. He was assistant curator of antiquities in the British Museum from 1840 until 1852, when he was appointed vice-consul at Mytilene. He explored the islands and coasts of the Ionian Archipelago, making extensive excavations at Budrum (Halicarnassus) on the site of the mausoleum erected by Queen Artemisia, and at Cnidus and Branchidæ. At Constantinople he disinterred the Serpent of Delphi. His splendid collection of coins, inscriptions, sculptures, and vases, acquired by excavation or purchase, he deposited in the British Museum. He was named consul at Rome (1860), was keeper of the Greek and Roman antiquities of the British Museum (1861–85), and was appointed Professor of Archæology at University College, London (1880). In Mar., 1861, he married Ann

Mary (1832–66), daughter of the painter Joseph Severn, the friend of Keats. She was an accomplished artist and made copies of the treasures discovered by her husband. He died at Westgate-on-the-Sea, England, Nov. 28, 1894. E. A. G.

Newton, Sir Isaac: physicist; b. at Woolstrop, Lincolnshire, England, Dec. 25, 1642 (old style); posthumous and only child of Isaac Newton, a farmer of good family. Young Newton was early sent to the village school, and afterward to the free grammar school at Grantham. His mother's only wish was to give him sufficient education to enable him to fulfill with credit the duties of a country squire. She therefore removed him early from school, and intrusted him with some share in the management of his own estate of Woolstrop. The boy's passion for mechanics and science was so strong that he entirely neglected his less congenial duties. He constructed mechanical toys of great delicacy; one sun-dial, made in his boyish days, is still in the house at Woolstrop, and another in the Royal Society rooms. His mother, wisely regarding his passion for study, sent him again to school, and in 1660 he entered Trinity College, Cambridge. The same year Dr. Barrow was appointed Professor of Greek; Newton soon found in him a safe guide and cordial helper, not only in the classics, but also in mathematics. When Newton entered Cambridge the philosophy of Descartes reigned supreme; one of the first books read by the student was undoubtedly Descartes's *Analytical Geometry*. This new application of algebra to geometry had opened up a whole world of new possibilities. Yet, strange to say, Newton scarcely speaks of the Cartesian method, and later, in his *Optics*, fails to do simple justice to Descartes in regard to the theory of the rainbow. Newton had the habit of noting down, as he read, points which admitted of further development. His jottings and the subsequent developments of certain points in Wallis's *Arithmetica Infinitorum* led him to many remarkable discoveries. (See Binomial and Fluxions.) These discoveries with which he enriched mathematical science were made before he had completed his twenty-fourth year. It would seem that he recognized the powerful instrument which lay in his hand for the solution of the many problems in physical science, for he neither published his discoveries nor made them known to his friends. Having secured these treasures, he turned his attention toward natural philosophy. In 1661 he had been made sub-sizar, and in 1664 scholar; in 1665 he took his degree as B. A.; in 1667 became junior fellow and M. A.; in 1668 senior fellow; and in 1669 he succeeded Dr. Barrow as Lucasian Professor of Mathematics. The plague in 1665 drove him to his country-seat at Woolstrop; while there he turned his attention to the subject of *gravity*. Whether the story of the falling apple be true or not, he certainly began to connect the mysterious force which draws bodies toward the center of the earth with that which holds the planets in their orbits. Taking the known velocity of falling bodies, he made a calculation upon the force necessary to deflect the moon from a right line and make it revolve in its orbit round the earth. One of the quantities in this problem is the semi-diameter of the earth, which he took too small by nearly one-sixth, supposing a degree on the earth's surface to be only 60 miles. There was a discrepancy between the results of his calculation and the known facts amounting to about one-sixth, which caused him to reject his theory as incomplete, and the magnificent discovery of *universal gravitation* lay neglected for sixteen years. In 1668 Mercator published his *Logarithmotechnia*. His quadrature of the hyperbola involved some of the first principles of the method long before perfected by Newton. Mercator's discovery was sent by Collins to Barrow, and shown by Barrow to Newton. At once the young mathematician laid before his master his own MSS. Barrow was struck by the riches of the collection, and wrote to Collins of it. The copy made at that time was found among Newton's papers at his death; the MSS. were sent to Collins, and their value at once acknowledged by the first mathematicians of the age; but he still refused to publish. Newton's attention was now directed toward the subject of light. By repeated experiment he showed that light is not homogeneous, but that a ray of white light is the resultant of innumerable rays of light possessing different colors, rates of vibration, and refrangibility. In 1672 he was elected a member of the Royal Society of London. Soon after a communication on light was read before that society, which stirred up a violent controversy. Newton advocated the material or corpuscular theory; Hooke, the undulatory theory of light. Newton brought forward many remarkable experiments and much mathematical knowledge to his support. Hooke had little more than an hypothesis to offer. The undulatory theory has since been accepted as the true one, though its foundation is far deeper and surer than that laid by its earlier advocates. In 1671 Newton completed a reflecting telescope made with his own hands, which is still in the library of the Royal Society. About this time, in investigating the colors of thin plates, he invented his very ingenious hypothesis of "fits of easy reflection and transmission." In 1682 a new measurement of an arc of the meridian came to his knowledge; this gave him the information requisite to make again his calculation relative to gravity. As he approached its completion his agitation became so great that he was forced to intrust it to a friend to finish. The result justified his intense feeling: observation and calculation corroborated each other; the crowning glory of Newton's life, the magnificent theory of universal gravitation was complete. (See Gravitation.) His discovery was given to the world under the title *Philosophiæ Naturalis Principia Mathematica* in 1687. This work treats of unresisted motion, of resisted motion, and from them deduces the order of the physical universe. So new and startling an exposition of truth, and one so at variance with preconceived notions, roused vigorous opposition. It was half a century after the publication of Newton's *Principia* before the French mathematicians fully accepted its teachings. In Great Britain the Newtonian philosophy, in spite of its profundity, was early introduced. St. Andrews College adopted it in 1690, Cambridge in 1699, and Oxford in 1704.

For many years Newton's means had been very limited—so much so at times that it is upon the records of the Royal Society of 1674 that the usual dues were not required of him, on account of his inability to pay them. In 1689 he became M. P. for Cambridge. At the expiration of the year Parliament was dissolved. In 1692 an accident, by which he lost the fruit of twenty years of labor, undermined his health and impaired his intellect for a time. The story of this loss—that it was occasioned by a favorite dog which upset a burning candle among his papers and reduced them to ashes—is credited by Biot and pronounced a fiction by Brewster. In 1695 he was appointed warden of the mint, with a salary of from £500 to £600 per annum, and in 1699 he was promoted to the mastership of the mint, with a salary of from £1,200 to £1,500 per annum. The duties of this office he fulfilled with great ability. For twenty years before his death his niece, Mrs. Conduitt, took charge of his establishment in London. His health became greatly impaired, and in 1725 he went to Kensington to live, and the duties of his office were performed by Mr. Conduitt. On Feb. 28 he presided for the last time at a meeting of the Royal Society; the fatigue produced an accession of his disorder, and he died Mar. 20, 1727, and was buried with great pomp in Westminster Abbey. Two controversies which embittered Newton's life have not been mentioned—the one with Leibnitz in 1676 in regard to the authorship of the binomial theorem and the infinitesimal method, where both were independent discoverers; and another with Flamsteed, the first astronomer-royal, in his later years. The following is a list of his works, with the dates of their publication; (1) *Principia* (1687); (2) *Optics* (1704); (3) *Arithmetica Universalis* (1707); (4) *Analysis per Equationes Numero Terminorum Infinitas* (1711); (5) *Methodus Differentialis;* (6) *De Mundi Systemata* (1728); (7) *The Chronology of Ancient Kingdoms Amended* (1728); (8) *Table of Assays;* (9) *Optical Lectures* (1728); (10) *Observations on the Prophecies of Daniel and the Apocalypse of St. John* (1733); (11) *A Method of Fluxions and Analysis of Infinite Series* (1736); (12) *A Historical Account of Two Notable Corruptions of Scripture* (1754). The principal works of Newton have been collected and reprinted by Dr. Horsley under the title of *Newtoni opera quæ exstant omnia* (5 vols., 1779–85). There is also an English translation of the *Principia* which was reprinted in the U. S., but can now be found only at the antiquarian book-stores. His various communications to the Royal Society are to be found in vols. vii.–xi. of its *Transactions*.

S. B. Herrick.

Newton, John: clergyman and author; b. in London, England, July 24, 1725; was the son of a sea-captain, with whom he made several voyages to the Mediterranean; was pressed into the navy as a seaman in 1744; became a midshipman; exchanged into a vessel engaged in the slave-trade

at Madeira; resided some time near Sierra Leone in the employ of a slave-dealer; returned to England in 1747, and for four years thenceforward commanded a Liverpool slave-ship, feeling, as he subsequently said, no scruples as to the nature of his occupation; obtained the surveyorship of the port of Liverpool (then a small place) in 1755; taught himself Latin, Greek, and Hebrew; was deeply affected by the religious movement directed by Wesley and Whitefield; took orders in the Church of England in 1764; became soon afterward curate of Olney, Buckinghamshire, where he formed a close intimacy with the poet Cowper; published a *Narrative* of his early life and remarkable religious experience, and with Cowper wrote the *Olney Hymns*, many of which have passed into popular use in public worship; became in 1779 rector of St. Mary Woolnoth, London; was a leader of the Calvinistic or evangelical party in the Church of England, and author of numerous religious treatises, which at the time enjoyed great popularity, and were collected as his *Works* (6 vols., 1816). D. in London, Dec. 31, 1807. See his *Life*, by Rev. Richard Cecil (London, 1808).

Newton, Gen. John: soldier and engineer; b. at Norfolk, Va., Aug. 24, 1823; graduated at West Point, and was appointed second lieutenant of engineers July, 1842; with the exception of some three years at West Point as assistant Professor of Engineering and while chief engineer of the Utah expedition of 1858, he was engaged in the construction of fortifications on the Atlantic and Gulf coasts, surveys and improvements of rivers and harbors, until the outbreak of civil war in 1861, when, after serving as chief engineer of the department of Pennsylvania and of the Shenandoah, he was, in Sept., 1861, appointed a brigadier-general of volunteers, and commanded a brigade in the defenses of Washington, at the same time performing the duties of an engineer in the construction of those works, until the spring of 1862. With the Army of the Potomac he led his command in the expedition to West Point, at Gaines's Mill, and at Glendale, Va., at South Mountain and Antietam, Md., and at Fredericksburg, Dec., 1862, where he commanded a division; promoted to be major-general Mar., 1863, he commanded the third division of the Sixth Corps in the storming of Marye Heights May 3, 1863. He served with great distinction at Gettysburg, where, after the death of Reynolds, he succeeded to the command of the First Corps July 2, 1863, which he led during the rest of the battle and commanded until the reorganization of the army Mar., 1864, when he was transferred to the West, where he led a division of the Fourth Corps in all the battles of the campaign which resulted in the capture of Atlanta, Sept., 1864; commanded various districts in Florida from Oct., 1864, to Jan., 1866. He was breveted lieutenant-colonel for bravery at Antietam, colonel at Gettysburg, brigadier-general for Peachtree Creek, and major-general for services in the field during the war. When he resumed duty with his corps, in which he had risen to be lieutenant-colonel, he was charged with important engineering duties—in removing the obstructions at Hell Gate and other points on the East river, the proposed enlargement of the Harlem river, the improvement of the Hudson from Troy to New York and of the channel between New Jersey and Staten Island, of many other rivers and harbors, and served upon numerous boards upon civil and military works. He was promoted to be colonel June 30, 1879, and appointed chief of engineers, with the rank of brigadier-general, Mar. 6, 1884. He was retired from active service in the army in Aug., 1886, at his own request. He was commissioner of public works in New York city Aug., 1886, to Nov., 1888, and became president of the Panama Railroad Company in Apr., 1888. D. in New York, May 1, 1895. Revised by James Mercur.

Newton, Richard Heber, D. D.: clergyman; b. in Philadelphia, Oct. 31, 1840; educated at the University of Pennsylvania and at the Philadelphia Divinity School; was ordained deacon in the Episcopal Church in 1862; became his father's assistant in St. Paul's church, and afterward in the Church of the Epiphany, Philadelphia; accepted the charge of Trinity church, Sharon Springs, New York, in 1863, but returned to Philadelphia, and became the rector of St. Paul's church in that city in 1866. In 1869 he was called to the Memorial (afterward All Souls') church, New York, where he became very popular as a preacher, and has built up a strong parish. A Broad Churchman of advanced views, he incurred the suspicion of heterodoxy on account of his alleged rationalism, but he defended himself with ability and continued in his pastorate. His works are *The Morals of Trade* (1876); *Studies of Jesus* (1880); *Womanhood* (1880); *Right and Wrong Uses of the Bible* (1883); *The Book of the Beginnings* (1884); *Philistinism* (1885); *Social Studies* (1886); *Church and Creed* (1891); and many articles in the leading magazines.

Newton's Rings: See Thin Plates, Colors of.

Newton Theological Institution: an institution for the training of young men for the Baptist ministry; at Newton Center, Mass. It was the first Baptist theological seminary of high grade in America, and was founded in 1825. It has a fine location, 7 miles from Boston, with four buildings; the library has 23,000 volumes; the funds of the institution amount to $400,000. The number of students in 1900 was seventy-four. President, Nathan E. Wood, D. D.

Newtown: town: Fairfield co., Conn. (for location of county, see map of Connecticut, ref. 11–E); on the Housatonic river, and the N. Y., N. H. and Hart. and the N. Y. and N. E. railways; 9 miles E. of Danbury, 19 miles N. by W. of Bridgeport. It has manufactories of flour, cider, lumber, carriages and wagons, combs, and buttons, and contains a public library (founded 1876), a savings-bank, and a weekly newspaper. Pop. (1880) 4,013; (1890) 3,539; (1900) 3,276; borough, 254.

Newtown: borough (founded in 1687, incorporated in 1838, formerly the county-seat); Bucks co., Pa. (for location of county, see map of Pennsylvania, ref. 5–J); on the Phila., Newtown and N. Y. Railroad; 14 miles S. E. of Doylestown, the county-seat. It was laid out by William Penn; contains six churches, a public school with high-school department, a Friends school, a national bank with capital of $100,000, and a weekly newspaper; and has a planing-mill, carriage-factory, iron-foundry, and machine-shops, artesian water, and electric lights. Pop. (1880) 1,001; (1890) 1,213; (1900) 1,463. Editor of "Enterprise."

New Ulm: city (founded in 1854, destroyed in a raid and massacre by the Indians in 1862, nearly destroyed by a cyclone in 1881); capital of Brown co., Minn. (for location of county, see map of Minnesota, ref. 10–D); on the Minnesota river, and the Chi. and N. W. Railway; 34 miles W. N. W. of Mankato, 100 miles S. W. of St. Paul. It contains 5 churches, 4 public and 2 parochial schools, Turner hall and gymnasium, Turnverein Library (founded 1864), St. Alexander's Hospital, a State bank with capital of $50,000, a private bank, and 5 weekly newspapers; and has 4 flour-mills, with daily capacity 2,400 barrels, 3 breweries with annual capacity of 30,000 barrels, foundry, creameries, and vinegar-works. Pop. (1880) 2,471; (1880) 3,741; (1900) 5,403. Editor of "Review."

New Westminster: city (formerly capital of British Columbia); British Columbia, Canada (for location, see map of Canada, ref. 8–D); on the Frazer river, 10 miles from its mouth, and on the Canada Pac. and the Great North. railways: 75 miles N. E. of Victoria, the present provincial capital. It is in an agricultural region, and contains the former provincial government buildings, a lunatic asylum, a penitentiary, the Bank of British Columbia and a branch of the Bank of Montreal, and a daily newspaper with weekly edition. The city has valuable facilities for general commerce, but since it ceased to be the provincial capital its principal industry has been the shipment of fish, lumber, grain, and furs. The climate is mild, the mean annual temperature is 47°, and rain is frequent and abundant. Pop. (1881) 1,500; (1891) 6,641. M. W. H.

New Whatcom: See Whatcom.

New Year's Day: The custom of keeping the first day of the year as a day of festivity is a widely prevalent one, but the day on which the year begins varies much in different countries. In the Roman Catholic Church, since the establishment of the Gregorian year (or new style) it falls upon the festival of the Circumcision, a holiday of obligation, which is also the feast-day of several saints, of whom St. Sylvester is the most widely honored. In the other churches it has no specially religious character.

New York [named from *York*, in England, in honor of the Duke of York]: one of the U. S. of North America (North Atlantic group); an original State of the Union; the first in wealth and population; popularly known as the "Empire State."

Area and Location.—It lies between lat. 40° 29′ 40″ and 45° 0′ 42″ N., and lon. 71° 51′ and 79° 45′ 54′ W. The At-

lantic Ocean bounds the State in part on the S. and E., while Long Island Sound is the boundary N. of the island, which gives the name. The rest of the southern boundary is formed by New Jersey and Pennsylvania, and of the eastern boundary by Connecticut, Massachusetts and Vermont, with Lake Champlain setting off the last-named State. On the W. the State is bounded by a point of New Jersey near the ocean, by Pennsylvania near Lake Erie, by the eastern waters of that lake, by the Niagara river adjoining Canada, and by Lake Ontario. Lake Ontario, the St. Lawrence river, and Canada constitute the northern boundary. The outline of the State roughly resembles that of a shoe, with a pointed heel projecting into the ocean, a stub toe touching Lake Erie, and the ankle terminating on Canada. The area is 47,620 sq. miles, and the extreme measurements are 311⅔ miles from N. to S., and 412 miles from W. to E., including Long Island.

Seal of New York.

Physical Features.—Besides the navigable waters which form so large a part of its boundaries, and the East river, a strait of the sea separating Manhattan Island and Westchester County from Long Island, the State has facilities for navigation in Lakes George, Schroon, and Saranac in the N. E., in Otsego, Oneida, Cazenovia, Onondaga, and Skaneateles in the central region, and in Owasco, Cayuga, Seneca, Canandaigua farther W., and in Chautauqua Lake in the extreme W., while hundreds of smaller lakes are used for pleasure-boats. The Hudson river, near the eastern border, is navigable for 151 miles from the ocean, and is the chief feature in the river system, which is notable from the fact that the waters run to all points of the compass. The Mohawk flows 135 miles from the W. into the Hudson, carrying many branches, such as the East and West Canada creeks from the N. and the Schoharie from the S. Into the Oswego river, which has several affluents, the lakes from Oneida to Canandaigua discharge, and through that river into Lake Ontario, and thus into the St. Lawrence. The Genesee, rising in Pennsylvania, crosses New York, and falls into Lake Ontario. In the southern central region, the Chenango, the Tioga, and the Chemung empty into the Susquehanna, which seeks the ocean through the Chesapeake, while farther E. various streams contribute to the Delaware, finally emptying into Delaware Bay. In the N. E. the Chazy and the Saranac flow into Lake Champlain, while the St. Regis, the Raquette, and the Oswegatchie, with others, are affluents of the St. Lawrence. In the western counties, Cattaraugus creek runs into Lake Erie, while the Alleghany river, entering New York from Pennsylvania, returns to carry its waters into the Ohio, and thus into the Mississippi and the Gulf of Mexico. From this watershed the interior lakes and the larger rivers generally, except the Mohawk, cross the lines of latitude.

The trend of the interior waters of New York is determined mainly by its mountains and its hills. These belong to the Appalachian system. On the E. the Green and Hoosac Mountains wall the Hudson, while on the W. the Helderbergs, the Catskills, and the Shawangunk Mountains shut in that river, and turn the affluents of the Delaware. Several ranges in the northeastern counties, of which the Adirondack is the most prominent, are the highest in the State. Mt. Marcy or Tahawas, in that range, is 5,379 feet high, and Dix peak 4,916 feet. The Chateaugay Range, extending from Lake Champlain to the Mohawk in Herkimer County, is dominated by Mt. Seward, 4,384 feet high. The Mohawk valley furnishes the single pathway from E. to W. between the hills and mountains.

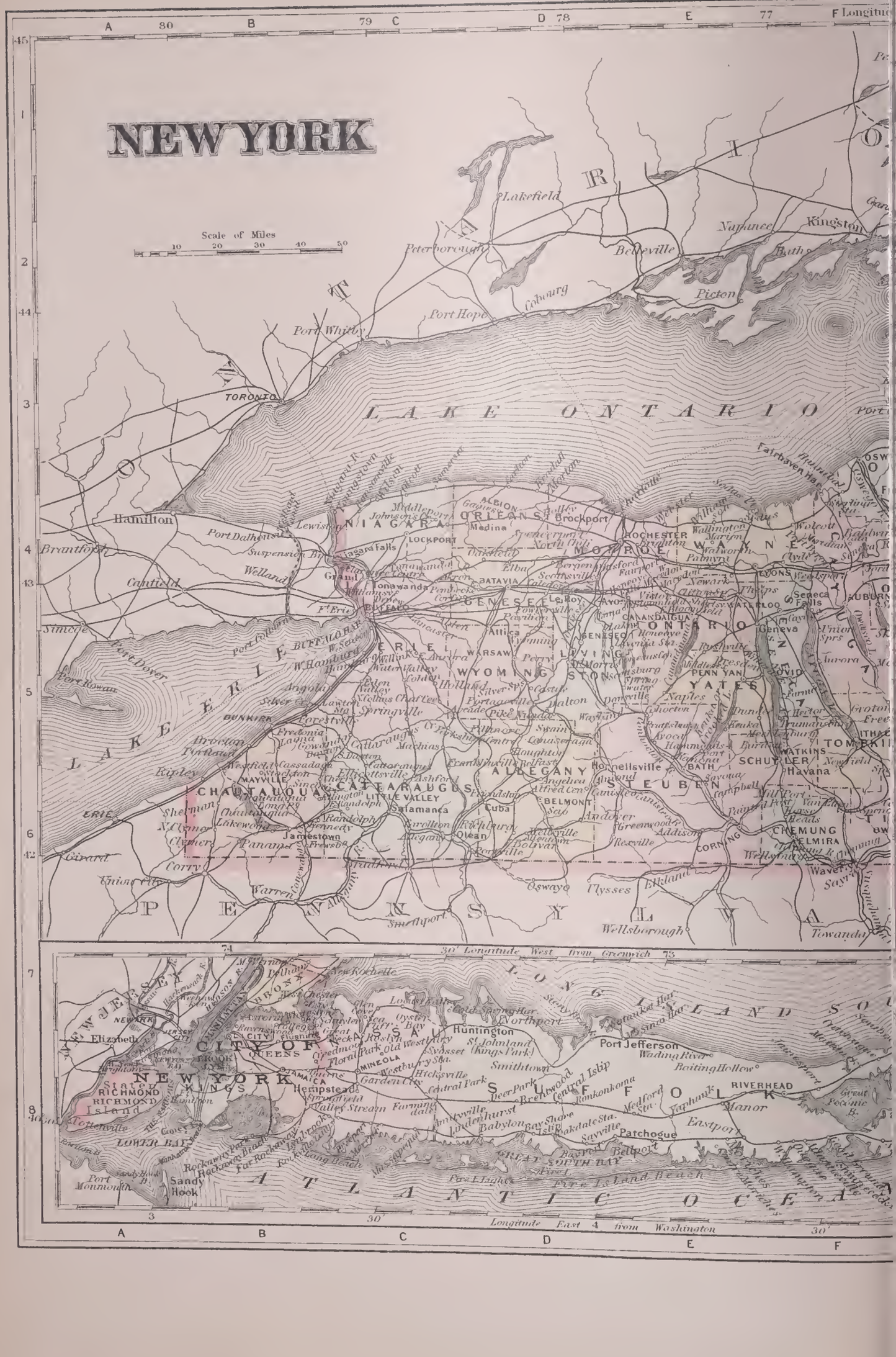
Waters from such hills and mountains make falls which are grand and picturesque, like Niagara, on the river between Lake Erie and Lake Ontario; Trenton, on the West Canada creek; the High Falls of the Genesee, at Portage; the Taghanic and others, near Ithaca; and very many on streams in various counties. Power for industrial uses is developed, as by the Niagara, at Little Falls and Cohoes on the Mohawk, at Fulton and elsewhere on the Oswego, at Rochester on the Genesee, at Waterloo and Seneca Falls on the Seneca, at Watertown on the Black river, in the northeastern region in many places, and at a number of other points.

Islands are abundant. Manhattan Island is occupied by the busy part of New York city. Long Island and Staten Island are the largest of groups in the waters adjacent to the ocean. Lake George is beautified by many islands varying in size. In the St. Lawrence the Thousand Islands are only a part of 1,500 lying between New York and Canada.

The groups in the St. Lawrence and Coney Island, on the southern shore of Long Island, are popular summer resorts. Saratoga, near the upper Hudson, Richfield and Sharon, in the central counties, are noted watering-places, while Chautauqua Lake has given name to a system of educational meetings. An increasing number of points in the Adirondack region attract visitors, and some of them are commended as winter sanitaria for pulmonary patients.

Geology.—This is described by Prof. Grove K. Gilbert, of the U. S. Geological Survey, as follows: The formations of the State represent nearly all parts of geologic time. Beginning with the older, an Archæan area is approximately coincident with the Adirondack Mountains, and a smaller body at the S. is the principal constituent of the Highlands of the Hudson. The rocks are chiefly gneisses and granites, and by their hardness and ability to resist decay have partially escaped the great erosion to which the country has been subjected. Against and about these ancient masses lie Palæozoic strata, constituting four-fifths of the rocky foundation of the State. Along the eastern border the Palæozoic rocks are plicated, crushed, and metamorphosed, so that a belt of schists and slates runs from Lake Champlain to New York city. For a short distance W. of this belt and S. of the Adirondacks the strata are disturbed by folds and faults, but without metamorphism, and they extend thence westward in gently undulating sheets to the limits of the State. The older Palæozoic rocks join the Adirondacks on the N., E., S., and S. W. in regular order. In the central and western parts of the State belts of outcrop trend from E. to W., and the rocks dip southward at an average of 25 feet per mile. In general these rocks have little influence upon the topography, producing only occasional ridges on the general plain; but near their eastern margin are massive sandstones which have resisted the eroding agents, preserving an upland tract known as the Catskill Mountains. The Palæozoic formations represent the Cambrian, Silurian, and Devonian periods. Beginning with the lowest they are as follows: (*Cambrian*) Georgia slate, Potsdam sandstone; (*Silurian*) Calciferous sandrock, Trenton limestone, Utica shale and Hudson slate, Medina group, Clinton group, Niagara group, Salina group, Waterlime group, Helderberg limestone; (*Devonian*) Oriskany sandstone, Corniferous and Onondaga limestones, Hamilton group, Portage group, Chemung group, and Catskill group.

Of periods later than the Palæozoic, the Jura-Trias is represented by the Newark sandstones and shales, which occupy a portion of Rockland County S. of the Highlands; the Cretaceous, by a few outcrops on Long Island; and the Pleistocene, by glacial drift and lacustrine and estuarine clays of wide extent. The ice-sheet of the Pleistocene covered the entire State, and produced many of the details of its topography. By its grinding action it gave smooth forms to all hills composed of soft rocks, and it deepened a number of valleys in the great Devonian shale formations in the central and western parts of the State. Cayuga and Seneca Lakes, and a number of smaller lakes lying approximately parallel to them, occupy some of these deepened valleys. The glacial drift lies in an irregular sheet over most of the surface, being in places so thin as hardly to be noticed, and elsewhere several hundred feet in thickness. The greater number of the wells of the State penetrate only this formation, and it constitutes most of the soils. About the shores of Lake Erie, Lake Ontario, and Lake Champlain, and in the St. Lawrence valley are clay deposits overlying the drift, and there is a similar deposit in the valley of the Hudson. These are sediments from great bodies of standing water which covered certain valleys while the ice was melting away. In the Erie and Ontario basins they are limited by a series of terraces and beach ridges marking the coast-lines of the lakes by which they were deposited. One of these old beaches, running from Lewiston to Sodus, has a height above Lake Ontario of from 125 to 200 feet.



NEW YORK
Scale of Miles
10 20 30 40 50
LAKE ONTARIO
LAKE ERIE
ONTARIO
PENNSYLVANIA
TORONTO
Hamilton
Brantford
Kingston
Belleville
Peterborough
Lakefield
Cobourg
Port Hope
Port Whitby
Napanee
Picton
NIAGARA
ORLEANS
MONROE
WAYNE
GENESEE
ERIE
WYOMING
LIVINGSTON
ONTARIO
YATES
SCHUYLER
STEUBEN
ALLEGANY
CATTARAUGUS
CHAUTAUQUA
CHEMUNG
BUFFALO
ROCHESTER
LOCKPORT
BATAVIA
DUNKIRK
Niagara Falls
Lewiston
Tonawanda
Brockport
Medina
Albion
Canandaigua
Geneva
Penn Yan
Bath
Corning
ELMIRA
Hornellsville
Jamestown
Salamanca
Olean
Mayville
Little Valley
Belmont
Watkins
Havana
Seneca Falls
Lyons
Auburn
Waterloo
Erie
Corry
Warren
Bradford
Wellsborough
Towanda
Waverly
Sayre
Elkland
Oswayo
Ulysses
Smethport
NEW JERSEY
NEW YORK
CITY OF NEW YORK
BRONX
QUEENS
KINGS
RICHMOND
Staten Island
NEWARK
Elizabeth
Sandy Hook
Port Monmouth
LOWER BAY
Hempstead
Jamaica
Mineola
Huntington
Northport
Port Jefferson
Smithtown
Babylon
Patchogue
Riverhead
Islip
Sayville
GREAT SOUTH BAY
Fire Island Beach
LONG ISLAND SOUND
NASSAU
SUFFOLK
ATLANTIC OCEAN
Longitude West from Greenwich
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A B C D E F
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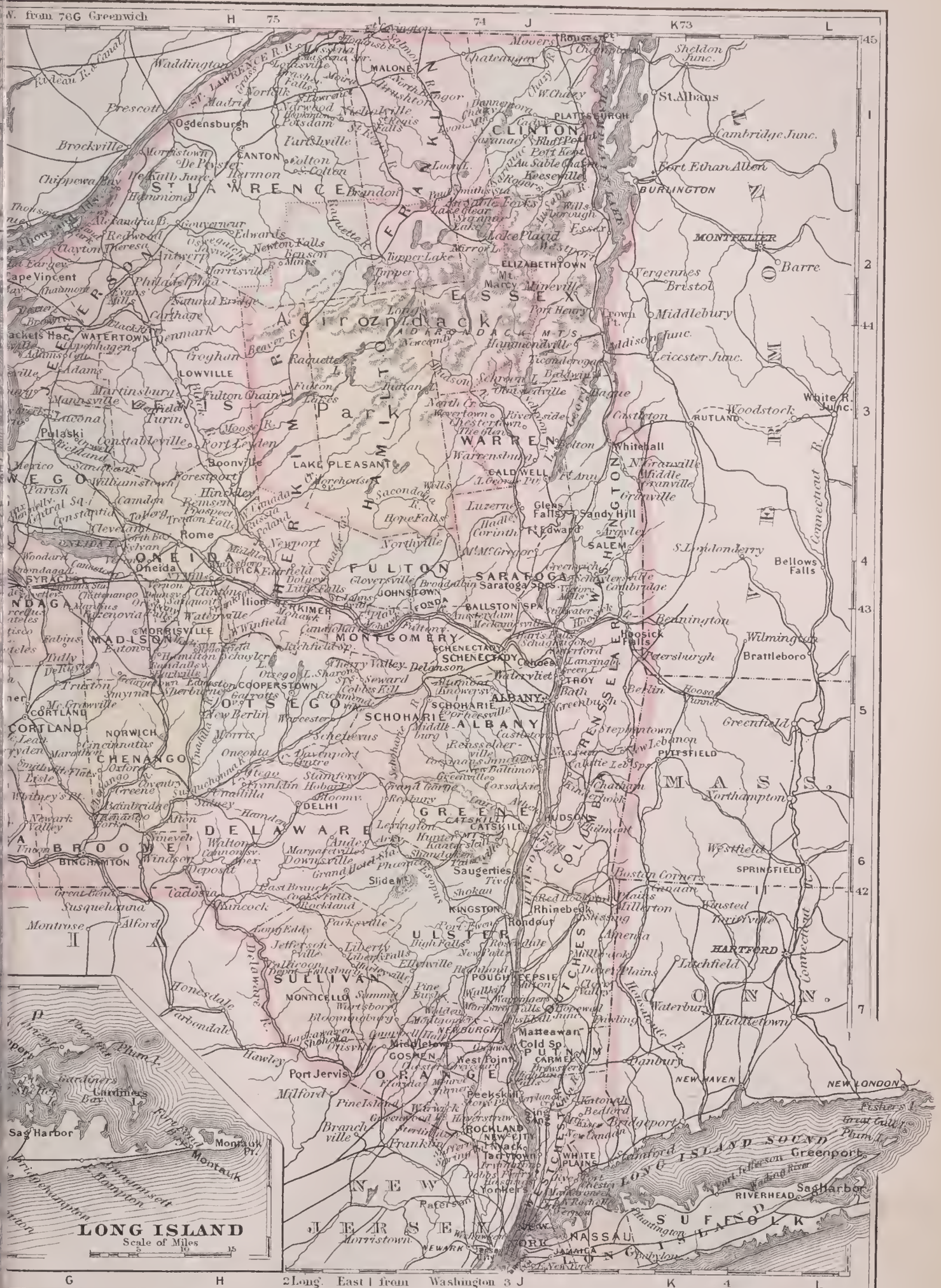
W. from 76G Greenwich
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ST. LAWRENCE
FRANKLIN
CLINTON
ESSEX
JEFFERSON
LEWIS
HAMILTON
HERKIMER
WARREN
OSWEGO
ONEIDA
MADISON
ONONDAGA
FULTON
SARATOGA
WASHINGTON
MONTGOMERY
SCHENECTADY
OTSEGO
SCHOHARIE
ALBANY
RENSSELAER
CHENANGO
CORTLAND
BROOME
DELAWARE
GREENE
COLUMBIA
ULSTER
SULLIVAN
DUTCHESS
ORANGE
PUTNAM
ROCKLAND
WESTCHESTER
NEW YORK
NASSAU
SUFFOLK
LONG ISLAND
LONG ISLAND SOUND
Adirondack Park
ADIRONDACK MTS.
VERMONT
MASS.
CONN.
NEW JERSEY
PA.
Ogdensburgh
Waddington
Prescott
Brockville
Morristown
De Peyster
Canton
De Kalb Junc.
Hermon
Colton
S. Colton
Potsdam
Parishville
Norfolk
Madrid
Louisville
Massena
Malone
Brandon
Chippewa Bay
Hammond
Alexandria B.
Thousand Isles
Redwood
Theresa
Clayton
Gouverneur
Edwards
Newton Falls
Benson Mines
Antwerp
Harrisville
Cape Vincent
Chaumont
Philadelphia
Evans Mills
Natural Bridge
Carthage
Watertown
Sackets Har.
Copenhagen
Denmark
Adams
Croghan
Lowville
Martinsburg
Mannsville
Lacona
Pulaski
Constableville
Port Leyden
Boonville
Mexico
Sand Bank
Parish
Williamstown
Camden
Central Sq.
Constantia
Cleveland
Forestport
Hinckley
Remsen
Trenton Falls
Rome
Oneida
Syracuse
Utica
Vernon
Clinton
Ilion
Herkimer
Little Falls
Dolgeville
Newport
Morrisville
Cazenovia
Fabius
Tully
Eaton
Hamilton
Cortland
Truxton
Norwich
Oxford
Greene
Bainbridge
Afton
Binghamton
Windsor
Deposit
Great Bend
Susquehanna
Montrose
Alford
Cooperstown
Richfield Sp.
Cherry Valley
Oneonta
Unadilla
Sidney
Walton
Delhi
Stamford
Hobart
Margaretville
Andes
Downsville
Hancock
Cadosia
Long Eddy
Liberty
Monticello
Ellenville
Port Jervis
Middletown
Goshen
Newburgh
West Point
Cold Sp.
Matteawan
Poughkeepsie
Kingston
Rondout
Rhinebeck
Saugerties
Catskill
Hudson
Tivoli
Chatham
Slide Mt.
Hunter
Coxsackie
Albany
Troy
Cohoes
Schenectady
Amsterdam
Johnstown
Gloversville
Fonda
Ballston Spa
Saratoga Sps.
Glens Falls
Sandy Hill
Ft. Edward
Lake George
Caldwell
Warrensburg
Whitehall
Granville
Salem
Cambridge
Hoosick Falls
Bennington
Pittsfield
North Adams
Greenfield
Northampton
Springfield
Westfield
Hartford
Litchfield
Waterbury
Middletown
New Haven
New London
Bridgeport
Danbury
Stamford
Peekskill
Sing Sing
Tarrytown
Nyack
Yonkers
White Plains
Paterson
Newark
Jersey City
Morristown
Brooklyn
Jamaica
Huntington
Riverhead
Greenport
Sag Harbor
Fishers I.
Plum I.
Lake Pleasant
Long Lake
Tupper Lake
Saranac Lake
Lake Placid
Elizabethtown
Mt. Marcy
Mineville
Port Henry
Crown Pt.
Ticonderoga
Schroon L.
Plattsburgh
Rouses Pt.
Champlain
Keeseville
Au Sable Chasm
Burlington
St. Albans
Montpelier
Barre
Vergennes
Bristol
Middlebury
Rutland
Castleton
Woodstock
White R. Junc.
Bellows Falls
Brattleboro
Wilmington
Hoosac Tunnel
LONG ISLAND
Scale of Miles
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Gardiners Bay
Gardiners I.
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Soil and Productions.—About one-half of the area of the State is adapted to cultivation, and the products include nearly all those of the temperate zone. The estimated value of the farm products is placed by the census of 1890 at $161,593,009, giving New York second rank among the States, surpassed only by that of Illinois by $23,166,004. In the number of farms, New York with 226,223 is exceeded only by Illinois, Missouri, Ohio, and Texas. In production of wool New York ranks seventh among the States. On June 1, 1890, there were 1,440,230 milch cows, a larger number than in any other State except Iowa, which had 58,188 more. New York was by far the first among the States in production of milk, with 663,917,240 gal., as also in butter with 98,241,813 lb., and cheese with 4,324,028 lb. Butter is made in considerable part in creameries receiving milk from a number of farms, while cheese comes mainly from factories. The first rank belongs to the State in buckwheat. Out of 39,171,270 lb. of hops produced in the census year in all the States, 20,063,029 lb. were raised on 36,670 acres in New York. The dairy prospers chiefly in the central counties and on the lower Hudson. Hops are produced in Oneida, Lewis, Madison, Otsego, and Schoharie Counties. Onondaga and Wayne Counties and the Chemung valley cultivate some tobacco, while broom corn is a favorite crop in the lower Mohawk valley. Grain is raised in the western and southwestern counties. Attention is given in Northern New York to peas, beans, and potatoes. On Long Island and in less degree near all the cities market-gardens thrive. In the central and western parts apples, plums, pears, and cherries are abundant in favorable years, and in the S. and W. peaches are raised, while grapes are cultivated along the Hudson and the interior lakes to the W., whence wines of acceptable brands are sent to market. For the calendar year 1900 the principal agricultural products are thus stated:

CROPS.	Acreage.	Yield.	Value.
Corn	538,626	17,236,032 bush.	$8,100,935
Wheat	367,015	6,496,166 "	5,002,048
Oats	1,596,379	44,538,974 "	14,252,472
Rye	211,203	3,189,165 "	1,785,932
Barley	170,542	3,751,924 "	1,913,481
Buckwheat	211,203	3,189,165 "	1,785,932
Tobacco (1896)	3,259	3,389,360 lb.	271,149
Potatoes	339,276	27,484,356 bush.	12,366,610
Hay	4,138,261	3,351,991 tons	47,095,474
Totals	7,575,764	.....	$92,574,033

The farm animals, Jan. 1, 1900, number as follows:

ANIMALS.	Number.	Value.
Horses	590,771	$37,251,355
Mules	3,714	257,903
Milch cows	1,487,416	52,357,043
Oxen and other cattle	572,299	15,707,884
Sheep	846,165	3,448,122
Totals	3,500,365	$109,022,307

The following summaries are from the U. S. census reports of 1880 and 1890:

FARMS, ETC.	1880.	1890.	Per cent.*
Total number of farms	241,058	226,223	6·2
Total acres in farms	23,780,754	21,961,562	7·6
Value of farms, including buildings and fences	$1,056,176,741	$968,127,286	8·3

* Decrease.

Flora and Fauna.—The maple has been proposed as the State tree because it is so common. Sugar is made from maple sap in the northern counties and to some extent elsewhere. Ten species of oak are found, while a like number of the pine family is reported. The elm beautifies the landscape in most of the pastoral counties. The hickory, beech, birch, ash, hemlock, spruce, cedar, poplar, willow, whitewood, chestnut, basswood, butternut, sycamore, locust, ailantus, black walnut, yew, and sumac may be enumerated. Of flowering plants 1,550 varieties are noted, and 54 species of ferns.

The State includes portions of three faunal regions, the Canadian, Alleghanian, and Carolinian. The Canadian is restricted to the northern and more elevated parts, mainly to the Adirondacks and Catskills. The Alleghanian includes nearly all the more level parts, while the Carolinian occupies barely the lower Hudson valley and a small area just eastward of Lake Erie. The number of indigenous land mammals is about 55; about 350 kinds of birds, not including stragglers, visit the State during their migrations, or spend the greater part of the year in it. Only a little more than one-third of these rear their young within the State. So far as known not a single species of bird or mammal is peculiar to this State. Many southern forms reach the southern border, extending a short distance up the Hudson. Others from the northward come to the mountains and to the higher districts of the Adirondacks and the Catskills. Most of these range outside of the State in all directions. Settlement and the removal of the forests have extirpated many of the larger mammals, such as the elk, which was known in most parts of the State, and the moose and the caribou, which were formerly found in the Adirondacks. The wolf and the beaver have also been practically exterminated, while the panther, wild cat, and black bear are restricted to the least settled mountainous regions. The larger waterfowl, the eagles, and the larger birds of prey, the herons, and the other wading birds, have become rare, while at least two species formerly common on Long Island, the heath-hen and pied duck, have become extinct. The wild turkey has shared the same fate, while only a few pairs represent the wild pigeons formerly present in hundred thousands.

Climate.—The climate of the State is temperate, with marked changes of heat and cold and variations of moisture. Four stations show the following record:

LOCALITY.	TEMPERATURE.		Annual rainfall.	DAYS.			
	Max.	Min.		Clear.	Fair.	Cloudy.	With rain.
New York	95°	6°	52·30 in.	82	150	132	144
Albany	98	−4	44·89 in.	59	162	144	175
Oswego	93	zero.	40·86 in.	74	97	194	167
Rochester	95	6	43·09 in	56	116	193	208

Divisions.—The State is divided into sixty-one counties, as follows:

COUNTIES AND COUNTY-TOWNS, WITH POPULATION.

COUNTIES.	*Ref.	Pop. 1890.	Pop. 1900.	COUNTY-TOWNS.	Pop. 1900.
Albany	5-J	164,555	165,571	Albany	94,151
				Belmont	1,190
Allegany	6-D	43,240	41,501	Binghamton	39,647
Broome	6-G	62,973	69,149	Little Valley	1,085
Cattaraugus	6-C	60,866	65,643	Auburn	30,345
Cayuga	4-F	65,302	66,234	Mayville	943
Chautauqua	6-B	75,202	88,314	Elmira	35,672
Chemung	6-F	48,265	54,063	Norwich	5,766
Chenango	5-G	37,776	36,568	Plattsburg	8,434
Clinton	1-J	46,437	47,430	Hudson	9,528
Columbia	6-K	46,172	43,211	Cortland	9,014
Cortland	5-G	28,657	27,576	Delhi	2,078
Delaware	6-H	45,496	46,413	Poughkeepsie	24,029
Dutchess	7-J	77,879	81,670	Buffalo	352,387
Erie	5-C	322,981	433,686	Elizabethtown	491
Essex	2-J	33,052	30,707	Malone	5,935
Franklin	1-I	38,110	42,853	Johnstown	10,130
Fulton	4-I	37,650	42,842	Batavia	9,180
Genesee	4-D	33,265	34,561	Catskill	5,484
Greene	6-J	31,598	31,478	Lake Pleasant	469
Hamilton	3-I	4,762	4,947	Herkimer	5,555
Herkimer	4-H	45,608	51,049	Watertown	21,696
Jefferson	2-G	68,806	76,748	Brooklyn	1,166,582
Kings	8-B	838,547	1,166,582	Lowville	2,352
Lewis	3-H	29,806	27,427	Geneseo	2,400
Livingston	5-D	37,801	37,059	Morrisville	624
Madison	4-G	42,892	40,545	Rochester	162,608
Monroe	4-D	189,586	217,854	Fonda	1,145
Montgomery	4-I	45,699	47,488	Mineola	.....
Nassau†	8-C	.....	55,448	New York	2,050,600
New York	8-J	1,515,301	2,050,600	Lockport	16,581
Niagara	4-C	62,491	74,961	Utica	56,383
Oneida	4-H	122,922	132,800	Syracuse	108,374
Onondaga	4-F	146,247	168,735	Canandaigua	6,151
Ontario	5-E	48,453	49,605	Goshen	2,826
Orange	7-J	97,859	103,859	Newburg	24,943
Orleans	4-D	30,803	30,164	Albion	4,477
Oswego	3-G	71,883	70,881	Oswego	22,199
Otsego	5-H	50,861	48,939	Cooperstown	2,368
Putnam	7-J	14,849	13,787	Carmel	2,598
Queens	8-C	128,059	152,999	L. I. City	.....
Rensselaer	5-J	124,511	121,697	Troy	60,651
Richmond	8-A	51,693	67,021	Richmond	67,021
Rockland	8-J	35,162	38,298	New City	.....
St. Lawrence	1-H	85,048	89,083	Canton	2,757
Saratoga	4-J	57,663	61,089	Ballston Spa	3,923
Schenectady	4-J	29,797	46,852	Schenectady	31,682
Schoharie	5-I	29,164	26,854	Schoharie	1,006
Schuyler	5-F	16,711	15,811	Watkins	308
Seneca	5-F	28,227	28,114	Ovid	624
				Waterloo	3,601
Steuben	6-E	81,473	82,822	Bath	4,994
				Corning	11,061
Suffolk	8-K	62,491	77,582	Riverhead	4,503
Sullivan	7-I	31,031	32,306	Monticello	1,160
Tioga	6-F	29,935	27,951	Owego	5,039

* Reference for location of counties, see map of New York.
† Organized from part of Queens in 1899.

COUNTIES AND COUNTY-TOWNS—CONTINUED.

COUNTIES.	*Ref.	Pop. 1890.	Pop. 1900.	COUNTY-TOWNS.	Pop. 1900.
Tompkins	5-F	32,923	33,830	Ithaca	13,136
Ulster	7-J	87,062	88,422	Kingston	24,535
Warren	3-J	27,866	29,943	Lake George	.....
Washington	4-K	45,690	45,624	Argyle	264
Wayne	4-E	49,729	48,660	Lyons	4,300
Westchester	8-J	146,772	183,375	White Plains	7,899
Wyoming	5-D	31,193	30,413	Warsaw	3,048
Yates	5-E	21,001	20,318	Penn Yan	4,650
Totals	.....	5,997,853	7,268,012		

* Reference for location of counties, see map of New York.

Cities.—The following table comprises all the cities of the State, and gives their population according to the U. S. census of 1890 and that of 1900:

CITIES.	1890.	1900.	CITIES.	1890.	1900.
Albany	94,923	94,151	Mt. Vernon	10,830	20,346
Amsterdam	17,336	20,929	Newburg	23,087	24,943
Auburn	25,858	30,345	New Rochelle	9,057	14,720
Binghamton	35,005	39,647	New York	3,437,202	1,515,301
Buffalo	255,664	352,387	Niagara Falls	.....	19,457
Cohoes	22,509	23,910	N. Tonawanda	4,793	9,069
Corning	8,550	11,061	Ogdensburg	11,662	12,633
Cortland	8,590	9,014	Olean	7,358	9,462
Dunkirk	9,416	11,616	Oswego	21,842	22,199
Elmira	30,893	35,672	Poughkeepsie	22,206	24,029
Geneva	7,557	10,433	Rensselaer	7,301	7,466
Gloversville	13,864	18,349	Rochester	133,896	162,608
Hornellsville	10,996	11,918	Rome	14,991	15,343
Hudson	9,970	9,528	Schenectady	19,902	31,682
Ithaca	11,079	13,136	Syracuse	88,143	108,374
Jamestown	16,038	22,892	Troy	60,956	60,651
Johnstown	7,768	10,130	Utica	44,007	56,383
Kingston	21,261	24,535	Watertown	14,725	21,696
Little Falls	8,783	10,381	Watervliet	12,967	14,321
Lockport	16,038	16,581	Yonkers	32,033	47,931
Middletown	11,977	14,522			

Government.—The Legislature consists (1901) of a Senate of 50 members chosen for three years, and an Assembly of 150 members elected annually. Senators are chosen by districts formed on the basis of population without dividing counties, while Assembly districts are also based on population, save that each county has at least one member, except Fulton and Hamilton. The Governor is elected for two years; he has the power to pardon, may remove certain officers, and has the right of veto extending to separate items of appropriation bills, but the veto may be overridden by two-thirds of the members elected to each house. The Lieutenant-Governor is president of the Senate, and his term of office corresponds with that of the Governor, whose place he fills in case of disability. The secretary of State, comptroller, attorney-general, treasurer, and State engineer and surveyor are elected for two years. The Governor, with the advice and consent of the Senate, appoints the superintendents of public works, of banking, of insurance, and of State prisons. Many commissions and State boards are appointed in the same manner. The court of appeals, consisting of a chief judge and six associate judges, has appellate jurisdiction only in questions of law. The Supreme Court, composed of judges elected for fourteen years in eight districts, has general jurisdiction in both law and equity; and from it the Governor designates, for terms of five years, seven justices to constitute an appellate division for the hearing of appeals from the Supreme Court. The courts of oyer and terminer no longer exist, and the courts of sessions are abolished, except in New York County, the county courts taking the criminal jurisdiction of the courts of sessions. There is a surrogate's court in each county. In the counties supervisors representing towns and wards exercise general powers, partly legislative and partly relative to auditing accounts, control of county buildings, and care of the poor. The cities are governed under special charters from the Legislature varying in their provisions. In the towns, which all elect their own officers, the highways and bridges and immediate local concerns are directed by the town board, while justices of the peace pronounce upon minor civil and criminal cases subject to appeal.

Population and Races.—Since 1820 New York has had the first place among the States in population. Its elements have from an early day been much diversified. In 1890 the foreign born numbered 1,571,050, while in the whole U. S. the number was 9,249,547. Of the native whites in the State there were of foreign parentage 1,837,453. Of the total population, 2,976,893 were males and 3,020,960 females. The colored persons were 72,901, and Indians on the reservations in 1892, 5,064. The foreign born consisted of 498,602 Germans, 483,375 Irish, 144,060 English, 93,193 Canadians, 64,141 Italians, 58,466 Russians, 35,332 Scotch, 33,145 Austrians, 28,430 Swedes, 22,718 Poles, 20,443 French, 15,598 Hungarians, 11,557 Swiss, 9,129 Bohemians, 8,602 Norwegians, 8,366 Dutch, 8,108 Welsh, 6,238 Danes, 3,135 Chinese, and nearly all other countries had representatives.

Industries and Business Interests.—These surpass those of any other State of the Union in variety and magnitude. First in agriculture, its rank in manufactures is also at the head. While the total products of the U. S., according to the census of 1890, were in value $9,370,107,624, those of New York were $1,711,577,671, or $380,054,570 more than those of Pennsylvania, the second in order. The capital invested in New York was $1,130,161,195 in 65,840 establishments reported, employing an average of 850,084 persons, whose wages were $466,846,642, an amount greater by $161,290,413 than in Pennsylvania. Hardly any industry permissible in the temperate zone is unrepresented. The cities made the following exhibit:

CITIES.	Industries.	Establishments.	Capital.	Persons employed.	Wages paid.	Cost of materials.	Miscellaneous expenses.	Value of product.
Albany	123	1,294	$16,441,365	14,670	$7,817,564	$11,362,017	$1,767,707	$24,430,396
Auburn	53	209	10,832,611	6,001	2,472,574	3,519,477	1,309,790	9,064,093
Binghamton	93	702	9,022,851	10,077	4,306,862	7,583,413	826,468	14,932,001
Brooklyn	229	10,561	125,849,052	103,683	61,975,102	137,325,749	14,824,466	248,750,184
Buffalo	176	3,559	67,867,154	49,998	24,617,408	51,162,770	7,179,615	96,448,654
Cohoes	49	210	10,999,637	8,711	3,085,484	5,330,033	753,257	10,326,460
Elmira	84	521	5,792,959	4,566	2,212,144	4,025,057	485,452	7,719,243
Kingston	44	122	2,374,507	1,648	728,118	1,242,395	228,402	2,848,222
Newburg	49	211	4,107,523	3,186	1,525,738	1,948,501	384,853	4,422,451
New York	292	25,399	420,238,602	351,757	228,537,295	357,086,305	60,223,425	763,833,923
Rochester	158	1,889	45,631,677	32,429	16,501,405	37,915,353	5,674,753	73,164,696
Syracuse	127	1,175	17,207,955	15,417	7,477,373	12,112,349	2,358,337	25,540,304
Troy	103	837	22,382,018	25,092	9,502,580	13,061,278	2,838,611	29,064,935
Utica	72	473	12,257,855	11,416	3,535,130	6,582,234	869,440	12,205,572
Yonkers	71	645	11,503,074	12,913	6,826,431	11,622,634	849,379	23,024,028

Some of the leading manufactures may be tabulated as follows:

CLASSIFICATION.	Establishments.	Capital.	Persons employed.	Wages paid.	Cost of materials.	Miscellaneous expenses.	Value of product.
Combined textiles	566	$70,918,577	59,544	$21,182,030	$46,086,670	$4,553,355	$82,535,242
Cotton goods	42	13,290,745	8,401	2,563,730	5,554,993	733,663	9,777,295
Woolen goods	339	46,461,914	37,992	13,033,901	30,390,598	2,662,282	53,340,151
Silk goods	185	11,165,918	13,151	5,584,399	10,141,079	1,157,410	19,417,796
Dyeing and finishing	49	4,963,095	2,839	1,481,723	1,449,344	372,710	3,636,051
Clothing	2,357	75,697,050	70,593	37,164,217	56,033,725		118,087,027
Liquors, malt	158	53,090,639	8,961	7,206,778	18,322,817		43,064,193
Foundry and machine-shop products	777	52,619,671	29,370	20,111,787	19,461,282		53,546,060
Boots and shoes	140	8,370,287	9,670	4,250,326	7,545,587		13,911,377
Tobacco	391	6,543,914	6,162	2,389,344	3,296,521		8,396,213

During the fiscal year ending June 30, 1893, the collections of internal revenue were: From the manufacture of

distilled spirits, $4,841,338; tobacco, $5,527,033; fermented liquors, $9,311,661; oleomargarine, $1,656; and penalties, $10,433—total, $19,686,276.

Mineral Resources.—The most important mineral products are clay, cement rock, building-stone, salt, and iron ore. All the clays proper are of Pleistocene age, the most important for economic uses being the lacustrine and estuarine clays of the Erie, Ontario, Champlain, and Hudson valleys, but numerous smaller deposits are locally used for brick-making. Shales of the Salina, Hamilton, and Chemung formations are also ground up for this purpose. As the greater clay deposits are readily exploited and practically inexhaustible, the magnitude of the industries in various districts depends chiefly on the demand of neighboring cities, and the Hudson river industries, supplying New York city, are the most important. The annual output of bricks is estimated at about 1,500,000,000, valued at $8,500,000. Roofing tile, drain tile, etc., are also manufactured. Half the hydraulic cement of the U. S. is produced in New York, the productive formation being the Waterlime group. The yield in 1899 was 5,161,553 barrels, valued at $3,522,079, and the greater part of this was obtained from Ulster County. Erie, Onondaga, and Schoharie Counties furnished smaller amounts. In the production of building-stone New York ranks fourth in the U. S. The limestone quarried in 1899 was valued at $1,545,699; marble, at $338,816; sandstone, at $1,218,053; granite, at $306,711; slate, at $76,675. Limestone is obtained chiefly from the Trenton, Niagara, and the Onondaga formations. These are so widely distributed in the central, western, and northern parts of the State that they afford lime-rock and building-stone for local use at very many points. Along the eastern base of the Adirondacks certain beds of the Trenton limestone are of such texture as to take a high polish, and are extensively quarried and marketed under the name of marble. Crystalline marbles are also found in abundance among the metamorphic rocks in St. Lawrence, Columbia, and Westchester Counties. The Potsdam, Medina, and Catskill sandstones and various thinner beds of the Hamilton and Chemung groups are widely distributed, and, like the limestones, are quarried at many points for local use. Sandstone is also shipped to a distance from various quarries of the Potsdam N. of the Adirondack Mountains and of the Medina in Monroe, Orleans, and Niagara Counties. A special grade of sandstone, known as "bluestone," is obtained from the various layers of the Hamilton, Chemung, and Catskill formations in Albany, Greene, Ulster, and Schoharie Counties, and is carried to New York and other cities, where its principal use is as flagging. Granite is derived from crystalline rocks in Westchester County and in the Highlands, and there is an important quarry on one of the Thousand Islands. Slate, quarried in Washington County, is derived from the Hudson River formation. In the production of salt, New York is exceeded only by Michigan. The yield in 1898 was 6,791,798 barrels, valued at $2,369,323. This was derived directly or indirectly from the Salina group, a part being mined and the rest obtained from brines. The Onondaga district, near Syracuse, was for many years one of the most productive in the country, but the Warsaw district, of Wyoming, Genesee, and Livingston Counties, which had rapidly developed, overtook the older district in 1887, and in 1893 doubled its output. In the production of iron ore the State ranks eighth in the U. S., the output of its mines in 1899 being 443,790 long tons, valued at $1,241,981. Magnetite is obtained in great amount along the eastern flank of the Adirondacks, and in less amount on the northern and western flanks, and in the Highlands. Limonite is associated with Lower Palæozoic rocks along the eastern border of the State. Hematite is obtained from metamorphic rocks in Jefferson County, and also from the Clinton formation running E. and W. across Wayne, Cayuga, Oswego, and Oneida Counties. Siderite is found near the city of Hudson, associated with the Hudson slate.

Commerce.—The commerce of New York is in large part that of the nation, as its chief port serves not only for the State, but also for much of the continent. There are twelve customs districts, reporting as follows:

CUSTOMS DISTRICTS AND PORTS.	EXPORTS. For the year ending June 30.		IMPORTS. For the year ending June 30.	
	1899.	1900.	1899.	1900.
Albany	.....	.....	$120,554	$258,525
Buffalo Creek	$8,010,354	$14,488,028	3,675,047	4,134,917
Cape Vincent	196,151	140,131	202,062	244,339
Champlain	6,834,278	7,604,427	2,788,747	4,221,467
Dunkirk	.....	.....	7,938	27,744
Genesee	1,005,709	1,203,552	622,622	747,792
New York	459,444,217	518,834,471	465,559,650	537,237,282
Niagara	6,978,367	9,718,135	1,773,809	2,824,010
Oswegatchie	3,710,651	4,508,342	8,731,505	13,647,069
Oswego	1,820,230	1,898,428	500,556	617,843
Syracuse	.....	.....	160,198	156,354
Sag Harbor	.....	900	.....	.....
Totals	$487,999,957	$558,396,424	$484,142,688	$564,117,342

The following table shows the tonnage movement in the foreign trade with the U. S. in the fiscal year 1899–1900:

CUSTOMS DISTRICTS AND PORTS.	ENTRANCES.				CLEARANCES.				Total vessels.	Total tonnage.
	Sailing.	Tonnage.	Steam.	Tonnage.	Sailing.	Tonnage.	Steam.	Tonnage.		
Buffalo Creek	851	187,027	359	152,124	806	171,729	332	107,954	2,348	618,834
Cape Vincent	186	4,668	945	298,300	195	4,771	916	297,532	2,242	605,271
Champlain	1,285	127,664	55	3,082	1,431	141,555	43	2,492	2,814	274,793
Dunkirk	1	452	1	33	1	452	1	33	4	970
Genesee	512	167,206	461	323,710	512	167,206	461	323,710	1,946	981,832
New York	1,072	591,963	3,161	7,584,798	1,068	628,244	2,950	7,215,285	8,251	16,020,290
Niagara	48	15,211	435	227,537	37	10,418	424	224,525	944	477,691
Oswegatchie	395	116,504	1,263	107,556	181	42,379	1,191	101,968	3,030	368,407
Oswego	813	172,179	444	89,026	949	226,639	440	84,635	2,646	572,479
Sag Harbor	8	2,301	.....	.....	1	399	.....	.....	9	2,700
Totals	5,171	1,385,175	7,124	8,786,166	5,181	1,393,792	6,758	8,358,134	24,234	19,923,267

Wealth.—Of the total wealth of the U. S., placed by the census of 1890 at $65,037,091,197, New York possessed $8,576,701,991. Of the real estate with improvements amounting to $39,544,544,333, the share of New York was $5,817,704,667. Of the machinery of mills and their product on hand, stated at $3,058,593,441, New York held $594,476,039. Of railways and equipments, including street-railways, amounting in the U. S. to $8,685,407,323, those in this State were valued at $534,671,937.

In 1900 the total assessed value of real estate was $5,947,110,126, and of personal property $735,586,303. The tax-rate in 1900 was $1.96 per $1,000, and for the fiscal year beginning Oct. 1, 1901, $1.25, the lowest since 1855.

Banking.—On Sept. 5, 1900, there were 336 national banks, with a combined capital of $97,218,210, surplus and profits of $97,720,013.29, and deposits of $560,820,176.80. The State banks on May 31, 1900, numbered 200, with a combined capital of $28,870,700, surplus and profits of $28,403,064, and deposits of $251,059,315. There were also on June 30, 1900, 15 private banks with combined capital of $495,000, surplus and profits of $246,793, and deposits of $2,365,619; 59 loan and trust companies, with combined capital of $48,250,000, surplus and profits of $89,825,970, and deposits of $640,837,146; and 128 mutual savings-banks with $922,081,596 in savings deposits from 2,036,016 depositors, and a surplus fund of $115,381,633. These interests aggregated 738 banking institutions, with a total capital of $174,833,910, surplus and undivided profits of $331,577,473, and deposits of $2,377,163,853.

Insurance.—The annual report of the State commissioners for 1900 showed 253 fire, marine, life, and casualty companies doing business, with assets of $1,943,004,411, and liabilities, except capital stock, of $1,515,309,737, and capital stock of $105,122,017. These companies reported a surplus of $353,326,119, and risks in force $32,925,249,575. There are 55 fraternal beneficiary societies which show receipts of $33,074,648, and disbursements of about $31,000,000. Fifty-three nonfraternal associations show receipts of $11,382,831, payments for claims $7,956,803, and for expenses $3,398,026. The work of the department is constantly on the increase, and unusual efforts are necessary in order to protect the rights of the policy-holders and members of beneficiary associations.

Means of Communication.—The development of the railways of the State is shown in the following summary as reported on Dec. 31 in the several years: (1850) 1,361 miles; (1860) 2,682; (1870) 3,928; (1880) 5,991; (1890) 7,745·85; (1899) 8,114·98. The report of the board of railway commissioners to the Legislature in Jan., 1894, showed that the gross earnings from operations of roads in the State in the fiscal year ending June 30, 1893, were $234,354,615; gross expenses, $157,128,964; net earnings, $77,225,650. The board also reported 47 street-railways in operation by the overhead trolley system and 3 by the cable system, and elevated railways in operation in the boroughs of Manhattan and Brooklyn.

The canal mileage has been greatly reduced by the abandonment of a number of such waterways as had ceased to be profitable. In 1900 the principal canals wholly in the State were the Erie, extending from Albany to Buffalo, built in 1817–62; the Champlain, from Whitehall to Waterford, built in 1817–37; the Oswego, from Syracuse to Oswego, built in 1825–62; the Cayuga and Seneca, from Montezuma to Cayuga and Seneca lakes, built in 1825; and the Black River, from Rome to Carthage, built in 1836–41. The amount of freight carried by these canals annually is about: Erie, 3,235,726 tons; Champlain, 848,965; Oswego, 92,634; Cayuga and Seneca, 38,761; and the Black River, 115,877—total tonnage, 4,331,963. The principal canal, partly within and partly without the State, was the Delaware and Hudson, extending from Honesdale, Pa., to Rondout, N. Y., built in 1826–28.

Churches.—The census of 1890 gave the following statistics concerning the religious bodies having a membership of 2,000 and upward:

DENOMINATIONS.	Organizations.	Churches and halls.	Members.	Value of church property.
Roman Catholic	959	967	1,153,130	$25,769,478
Methodist Episcopal	2,123	2,136	242,492	16,944,350
Presb. Church in the U. S. of A.	784	943	154,083	21,293,992
Baptists, Regular	875	924	129,711	12,938,913
Protestant Episcopal	731	860	127,218	30,707,213
Reformed Church in America	302	260	52,228	7,445,280
Congregational	301	326	45,686	5,175,262
Lutheran, General Council	113	117	39,430	1,915,510
Jews, Orthodox	152	152	29,064	1,919,500
Lutheran Synod. Conference	67	65	22,642	1,055,455
German Evang. Synod of N. A.	50	50	17,409	681,570
Jews, Reformed	27	27	16,743	2,395,700
Lutheran, General Synod	95	100	15,611	1,224,700
United Presb. of N. A.	65	66	9,719	707,400
Free-will Baptist	134	134	8,636	529,050
Universalist	168	154	8,526	1,798,250
Christian Connection	120	120	7,520	257,850
African Meth. Epis. Zion	47	47	6,668	371,400
Spiritualists	34	33	6,351	33,250
Evangelical Association	86	85	6,222	401,850
Methodist Protestant	90	93	4,759	293,000
Unitarian	18	23	4,470	1,117,500
Disciples of Christ	41	40	4,316	363,650
Wesleyan Methodist	114	112	3,913	135,950
Free Methodist	142	143	3,751	243,950
Friends, Orthodox	50	51	3,644	203,900
Reformed Church in the U. S.	13	13	3,432	204,200
Friends, Hicksite	45	46	3,331	561,850
Seventh-day Baptist	28	27	3,274	71,025
African Methodist Episcopal	34	35	3,124	231,500
Ref. Presb. in the U. S. A., Synod	18	19	2,328	459,500
Lutheran, Buffalo Synod	12	12	2,268	48,010
Independent congregations	26	27	4,232	722,400

Schools.—The regents of the University of the State of New York have supervision of education; they are elected by the Legislature on joint ballot. Charters of academies, colleges, and universities, libraries and museums proceed from them. A university convocation is held annually under the auspices of this body, and examinations in various studies are conducted by its authority, while plans for "university extension" are promoted by it. The State library and State museum are under its care. Twenty-two colleges for men, 8 for women, and 6 for both sexes, with 7 law schools, 15 of medicine, 3 of pharmacy, 3 of dentistry, 1 of the eye and ear, 2 veterinary, 11 of theology, 3 of pedagogy, and 9 other professional and technical schools are regarded as members of this university. (See COLLEGES.) The superintendent of public instruction, elected by the Legislature, is the head of the common-school system. Superintendents in cities and commissioners over groups of towns have more immediate oversight. In 1899 there were 11,913 public-school buildings. The sum of $7,579,067 was expended for houses and sites, furniture and repairs.

There were 1,569,653 children of school-age in the State, of whom 1,200,574 attended public schools at least part of the time, and 163,946 private schools. There were 31,768 teachers employed at an average annual salary of $604.78. The value of school property was $81,768,493, and the total expenditure for school purposes $33,421,491.37. There were 104 incorporated academies and 565 high schools with academic departments, with 3,888 teachers and 76,470 pupils. The total property of secondary schools was $28,412,184, and the expenditure by such schools in 1900 was $6,036,374. Institutes to the number of 110 were held during the year for teachers, of whom over 15,000 attended. Normal schools were maintained at Albany, Brockport, Buffalo, Cortland, Fredonia, Geneseo, Jamaica, New Paltz, Oneonta, Oswego, Plattsburg, and Potsdam, with a total of 6,000 pupils, property valued at $1,915,235, and expenditures for the year of $355,535. The American Museum of Natural History in New York furnishes instruction to the normal schools and teachers' institutes, and to teachers of common schools in cities near by, making reports on that branch of its work to the superintendent of public instruction.

Libraries.—In 1892 there were reported 511 libraries of 1,000 volumes and upward each, which contained 4,036,530 bound volumes and 379,544 pamphlets. The libraries were classified as follows: General, 99; school, 226; college, 27; college society, 4; legal, 21; theological, 10; medical, 14; Government, 1; public institution, 19; State, 1; Y. M. C. A., 20; social, 31; scientific, 12; historical, 5; garrison, 3; mercantile, 3; and miscellaneous, 4.

Newspapers and Periodicals.—In 1901 there were 1,936 newspapers and periodicals, of which 185 were daily, 6 tri-weekly, 43 semi-weekly, 1,048 weekly, 8 bi-weekly, 47 semi-monthly, 554 monthly, 15 bi-monthly, and 40 quarterly publications.

Post-offices.—The total number of post-offices on Jan. 1, 1901, was 3,695, of which 357 were presidential (20 first-class, 100 second-class, 237 third-class) and 3,338 fourth-class. There were 2,384 money-order offices, and 423 money-order stations.

Charitable, Reformatory, and Penal Institutions.—The board of charities exercises visitorial powers over State hospitals, county poorhouses, and asylums, and over 241 incorporated and 157 licensed asylums, which in 1893 contained 18,879 inmates. The State asylums have also local boards of managers. The State institutions for the insane are located at Utica, Poughkeepsie, Middletown, Buffalo, Willard, Binghamton, Ogdensburg, and Rochester. The aggregate cost of the buildings was $8,509,271. A State institution for feeble-minded children is maintained at Syracuse, and one for feeble-minded women at Newark. At Rome there is a State custodial asylum. Educational institutions for the blind are located at New York and Batavia, and for the deaf and dumb at New York, Fordham, Malone, Albany, Rochester, and Buffalo. There are reformatories at Elmira, Rochester, Canaan Four Corners, and Randall's Island, and for women at Hudson and Albion. For soldiers and sailors there is a home at Bath. The State paupers committed to the several public institutions in 1893 numbered 1,406. The total expenditures for charitable, correctional, and reformatory purposes in 1893 were for an average of 80,543 beneficiaries $20,407,982; in 1880, for 47,701 beneficiaries, they were $8,482,648. The ratio of beneficiaries to population was in 1880 1 to 107; in 1892, 1 to 85. A superintendent of State prisons has charge of institutions at Auburn, Clinton, and Sing Sing, containing in 1892 an average of 3,753 inmates and in 1900 3,376. The expenditures for the year 1900 were $460,528.02. The earnings of convicts engaged in several industries left a deficiency of $477,266.97. There are separate buildings at Auburn for women convicts, and a hospital at Matteawan for insane criminals.

History.—When in 1664 the English seized the colony of New Netherland, they called it New York, in honor of the Duke of York. The discovery of the coast belongs to Giovanni da Verrazano, a Florentine navigator, who at the close of Apr., 1524, anchored near what is now Sandy Hook, and entered the bay and the "very great river." French adventurers, Raulin Seculart and Jean Alphonse, about 1545 visited the same waters, and perhaps built works on Castleton Island below Albany, of which the ruins, it is claimed, still remain. The English title was at first based on the discovery of the North American coast by John Cabot, June 24, 1497, duly recorded on maps by his son Sebastian, but not otherwise. Jacques Cartier, under commission from Francis I. of France, on a second voyage in 1535 ascended the St. Lawrence to Montreal, and heard stories of the country to the S. and W. Actual entry in force by Europeans into the

territory now New York was first made from the N. by Samuel de Champlain, a favorite of the French king Henry IV., sent out to establish New France. In an expedition against the Iroquois he sailed down the lake that bears his name and attacked a party of Indians at Ticonderoga, Essex County. He was afterward repulsed in an attack on a village near Fenner, Madison County. While Champlain was engaged in conflicts with the Iroquois in the north, the Half Moon, a Dutch vessel commanded by Hendrick Hudson, an Englishman in the service of the Dutch East India Company, seeking a western passage to China, anchored Sept. 3, 1609, in the lower bay, and eight days later "went into the river," now the Hudson. On the 19th the Half Moon anchored at the point where Albany now stands. Dutch merchants commissioned a ship in the summer of 1610 for trade to New Netherland, and in 1612 other vessels arrived for a similar purpose. A few huts were built on the southern point of Manhattan Island, the beginnings of New Amsterdam. Even earlier Hendrik Christiaensen had erected a strong house on the west bank of the Hudson just below Albany and called it Fort Nassau. This became a center of traffic with the Indians, but it was so damaged by a freshet as to be abandoned in 1617. A new trading-house was set up at the mouth of the Tawasentha, near Albany, by a company of Amsterdam merchants; there an alliance was formed by this Dutch company on the one side and the Iroquois and other redmen on the other, and this treaty, renewed in 1645, was maintained during the entire period of the Dutch occupation. The Iroquois were thus arrayed against the French in Canada, and an impress given to the history of the colony. In 1621 the Dutch West India Company succeeded the earlier traders. The first colony came out by the New Netherland under the auspices of this company in 1623, and consisted in large part of Walloons, persons of French blood resident in Holland. Eight men were left on Manhattan Island, and another party made its home on the west shore of Long Island. The ship sailed up the Hudson, and most of the newcomers landed at Fort Orange, set out the year before, and eighteen families started the town which has grown into the city of Albany. Other vessels followed, and in 1625 the population had become 200. The next year the government was made more formal, with Peter Minuit as director-general, assisted by a council of five. The settlers engaged largely in the fur-trade, but tried to cultivate tobacco, and soon raised wheat for export.

During the administration of Kieft as director-general (1638–47) and of Peter Stuyvesant (1647–64) the colony was disturbed by Indian wars, by quarrels with the Dutch West India Company over the finances, and, when war broke out between England and Holland, by the aggressions of the English. Finally, in 1664, Col. Nicolls, the personal representative of the Duke of York, appeared in the bay with an English fleet and forced the Dutch to surrender Manhattan Island. He set up a government and summoned two delegates from each town to consider a code, "the Duke's Laws," which was accepted perforce. The Dutch temporarily reconquered the island in 1673, but this conquest was not known to the states-general when the Treaty of Westminster was signed, providing for the restoration by England and Holland of all lands captured during the war. Oct. 15, 1674, orders reached Colve, the director-general, to give up New Netherland, and so the Dutch rule, in the main prudent and beneficent, ceased to exist over what thenceforth was to be New York.

The transfer of the province from the Dutch took place Nov. 9, 1674. With Maj. Edmund Andros, the new governor of the territories of the Duke of York in America, was associated a council of ten appointed by him. "All persons of what religion soever" were to be treated alike, while special guarantees were accorded to the Dutch inhabitants, and efforts were put forth to hold the Iroquois in friendship by a board of commissioners. In response to urgent appeals the duke consented to an assembly of delegates from the freeholders, which met Oct. 17, 1683, and a Charter of Liberties was enacted, certain duties on imports were voted, and courts were established. Jurisdiction to Lake Ontario and the St. Lawrence was asserted by Gov. Dongan, while, to meet complaints of raids by the Iroquois E. and W. and S., a conference was held in Albany with the redmen at which, with the governor of New York, were present representatives of Massachusetts and Virginia, and July 30, 1684, an important treaty was negotiated. When James II., after whom the colony was named, ascended the throne he repudiated the Charter of Liberties, and objected to the powers claimed "for the people met in general assembly." New York was restive under King James's consolidation of the northern colonies as the Dominion of New England. The settlers took kindly to the accession of William and Mary, but Nicholson, the lieutenant-governor, scouted at it, and when Gov. Andros was placed under arrest in Boston deemed it "most safe to forbear acting without definite instructions." His weakness gave opportunity for a revolt under the leadership of Jacob Leisler, a captain of militia, who organized a government in the absence of Gov. Nicholson, and declared in favor of the new sovereigns, but was afterward convicted and hanged for refusal to recognize the military representative of Gov. Sloughter. See LEISLER, JACOB.

Before the Declaration of Independence forty-four different persons served as the executive head of the province, counting the Dutch directors. With most of the governors the assembly had differences over the revenue, and some of them, notably Fletcher and Cornbury, and later Clarke and the first George Clinton, rest under allegations of corrupt use of public moneys. For the purpose of increasing the production of naval stores 2,584 immigrants were brought from the Palatinate in 1711, most of them settling on the banks of the Hudson. Eleven years later a hundred families from the same country found homes on the Mohawk, and in 1738 eighty-three Scotch families were brought over to defend Lake George. To provide funds for expeditions against Canada paper money was first issued. The settlers reached out for trade with their neighbors N. of the St. Lawrence and the lakes, and to extend it a trading-post was set up at Oswego in 1722. Relations with the Iroquois required frequent attention, the governors were inclined to arbitrary acts, freedom of religion was matter of discussion, efforts were put forth to promote education, while so urgent was the pressure for popular rights that in 1729 the Lords of Trade were notified that "most of the previous and open steps which a dependent province can take to make themselves independent at their pleasure are taken by the assembly of New York." That assembly was, in fact, asserting its control over the finances and struggling for the independence of the courts. Negro slaves had been imported, and belief in a plot by some of them led, in 1741, in New York city, to cruel persecutions and a most unreasoning panic.

The French and Indian war (1755–63) fell with especial severity on New York. With their Indian allies the French struck swiftly as far as the Mohawk, but in a sharp fight at Fort Edward near Lake George were repulsed by Gen. William Johnson. Hostilities raged on the upper Hudson, along the Mohawk westward to Oswego, then again on the shores of Lake Champlain. Disasters were the frequent lot of this province, and a defeat on Lake George in July, 1758, opened the door to Montcalm, but it was closed by the capture of Fort Frontenac in August, and the next year Fort Niagara surrendered to Gen. William Johnson, and the French were driven back from Ticonderoga and Crown Point. New York contributed its full share to the splendid victory on the Plains of Abraham in 1759. In the next few years the colony manifested much discontent with British rule. It led in the union of the colonies Oct. 18, 1764, by clothing a committee of correspondence with power to correspond with its neighbors on the oppressive acts of Parliament and "on the impending dangers which threaten the colonies of being taxed by laws to be passed in Great Britain." In the colonial congress held in New York Oct. 7, 1765, the members of this committee took active part, and petitions for redress of grievances were presented to the king. The Stamp Act provoked violent protests, the patriotic association known as the Sons of Liberty was organized, and at last on Jan. 18, 1770, a collision occurred in New York city resulting in bloodshed. This irregular fighting was the real beginning of the Revolutionary war. Yet this province, more engaged in commerce than any other, for a while abandoned the sacrifice involved in total non-importation and restricted itself to the exclusion of tea. On that line it was positive and bold, and "the Mohawks" were organized in Oct., 1773, for aggressive action; but the vessels expected were kept back by a storm and did not arrive until four months after the historic tea-party in Boston harbor; on their arrival "the Mohawks" repeated in New York the exploit planned for the earlier date.

Its situation and topography joined with political events to cast upon this province the brunt of the war of the Revolution, and an account of the important military events that took place within its boundaries will be found in the article

United States (*q. v.*). From the seizure of Ticonderoga, May 10, 1775, and of Crown Point, immediately afterward, armies marched and countermarched on its soil. Its chief city could not be successfully defended even by Washington, and from the autumn of 1776 until Nov. 25, 1783, was in the hands of the British. In 1777 a constitution was adopted by the colony. The vast western domain which New York claimed by royal grant, by purchase from the redmen, and afterward by the British treaty, it voted Apr. 19, 1780, to transfer to the Union to become the Northwest Territory.

Parties divided on the powers of the confederacy, and afterward on the project of the national Constitution; the ratification of that instrument was in doubt until the convention actually voted, when the majority, 30 to 27, was secured through recommendation of amendments which in due time became part of the nation's fundamental law.

The population of the entire State in 1783 was 233,896, fifth in rank in the Union. Many Tories had emigrated, and the disposition was strong to drive out those who remained, but this prejudice was gradually dissipated. Settlers came in rapidly after the peace. Industries, trade, education, the amenities of life, developed with equal step. The Legislature, which had met in Kingston, Poughkeepsie, and New York successively, in 1790 chose Albany as its home. A brilliant galaxy of political leaders directed affairs these early days—Alexander Hamilton, George Clinton, Philip Schuyler, Aaron Burr, Rufus King, John Jay, the Livingstons, De Witt Clinton. Several of them fostered aspirations for the presidency of the U. S., but internal rivalries repelled the prize. These, however, did not prevent united action in the second war with Great Britain. The embargo act of 1807 struck severely the commerce of the chief city, and stirred up opposition; but when that was repealed, and Great Britain repudiated the project of a treaty to recall the orders in council while the impressment of seamen continued, the war spirit ran high. Great sacrifices were undergone, and in 1812 the tide of conflict rolled heavily upon the State. On its soil preparations were hurried forward for the invasion of Canada, and collisions of arms were frequent on Lake Ontario, the St. Lawrence, and Lake Champlain. Ogdensburg was captured by the British, but they were beaten at Sackett's Harbor, and both sides claimed the victory at Chrysler's Farm. Fort Niagara was taken, and Black Rock and Buffalo burned by the British, who in turn, July 5, 1814, suffered defeat by Gen. Winfield Scott at Chippewa, and July 25 at Lundy's Lane. An invasion by way of the Saranac and Lake Champlain was gallantly repulsed in September of the same year. A levy *en masse* of the militia of Herkimer, Oneida, Lewis, and Jefferson Counties was made for the defense of the northern frontier, while New York exhibited equal activity against expected attack. The treaty of peace was welcomed by the people who had suffered so much from the war. Initial steps had been taken for the construction of waterways, and the question soon entered into party politics, with De Witt Clinton as their leading advocate and Gov. Tompkins obstructing, in part out of rivalry toward Clinton. The canal policy triumphed, and gave vast impetus to population and business, to which also later the railway system contributed in large degree. Out of the patroon system (see Patroons) and the concentration of lands in few hands agrarian riots sprang up in 1839 and 1845, and on a smaller scale in 1866. In the civil war (1861–65) New York bore its full share, in spite of resistance to the draft in the chief city and threats elsewhere. The State was credited by the War Department with 448,850 men sent into the field and 18,197 who paid commutation.

The first constitution of New York was in force forty-four years; that framed in 1821 for twenty-five years; that of 1846 with some amendments down to the adoption of the new constitution of 1894. Proposals for radical changes have often been rejected. A convention was held in 1867 and submitted a revised constitution, which, with the exception of the articles referring to the judiciary, was rejected by the people. Several amendments proposed by the Legislature, and in 1874 by a commission, were adopted by popular vote. A convention met at Albany in 1894 for a general revision. Most of the thirty-four amendments submitted by them were adopted by the people. Among others a secret ballot was provided for; the use of balloting-machines was permitted; local and municipal elections in the six largest cities were separated from State and national elections, the former occurring in odd-numbered years and the latter in even-numbered years; etc.

GOVERNORS OF THE COLONY AND THE STATE.

Directors-General—Dutch.	
Adrian Joris	1623–24
Cornelis Jacobzen May	1624–25
William Verhulst	1625–26
Peter Minuit	1626–33
Wouter van Twiller	1633–38
William Kieft	1638–47
Petrus Stuyvesant	1647–64
Colonial Governors—English.	
Richard Nicolls	1664–68
Francis Lovelace	1668–73
Directors-General—Dutch.	
Cornelis Evertse, Jr.	1673
Anthony Colve	1673–74
Colonial Governors—English.	
Edmond Andros	1674–83
Anthony Brockholles*	1677–83
Thomas Dongan	1683–88
Francis Nicholson (acting)	1688–89
Jacob Leisler	1689–91
Henry Sloughter	1691
Richard Ingoldsby*	1691–92
Benjamin Fletcher	1692–98
Earl of Bellamont	1698–1700
John Nanfan (acting)	1699–1701
William Smith†, Abraham de Peyster†, Peter Schuyler†	1701–02
Lord Cornbury	1702–08
Lord Lovelace	1708–09
Peter Schuyler‡	1709
Richard Ingoldsby (act.)	1709–10
Gerardus Beekman‡	1710
Robert Hunter	1710–19
Peter Schuyler‡	1719–20
William Burnet	1720–28
John Montgomerie	1728–31
Rip van Dam‡	1731–32
William Cosby	1732–36
George Clarke (acting)	1736–43
George Clinton	1743–53
Danvers Osborne	1753–55
James de Lancey (acting)	1755
Charles Hardy	1755–57
James de Lancey (acting)	1757–60
Cadwallader Colden‡	1760–61
Robert Monckton	1761
Cadwallader Colden (act.)	1761–62
Robert Monckton	1762
Cadwallader Colden (act.)	1763–65
Henry Moore	1765–69
Cadwallader Colden (act.)	1769–70
Earl of Dunmore	1770–71
William Tryon	1771–74
Cadwallader Colden	1774–75
Peter van Brugh Livingston	1775
William Tryon	1775–80
James Robertson§	1780–83
Andrew Elliott (acting)§	1783
Governors of the State.	
George Clinton	1777–95
John Jay	1795–1801
George Clinton	1801–04
Morgan Lewis	1804–07
Daniel D. Tompkins	1807–17
John Tayler (acting)	1817
De Witt Clinton	1817–23
Joseph C. Yates	1823–25
De Witt Clinton	1825–28
Nathaniel Pitcher (acting)	1828–29
Martin Van Buren	1829
Enos T. Throop	1829–33
William L. Marcy	1833–39
William H. Seward	1839–43
William C. Bouck	1843–45
Silas Wright	1845–47
John Young	1847–49
Hamilton Fish	1849–51
Washington Hunt	1851–53
Horatio Seymour	1853–55
Myron H. Clark	1855–57
John A. King	1857–59
Edwin D. Morgan	1859–63
Horatio Seymour	1863–65
Reuben E. Fenton	1865–69
John T. Hoffman	1869–73
John Adams Dix	1873–75
Samuel J. Tilden	1875–77
Lucius Robinson	1877–80
Alonzo B. Cornell	1880–83
Grover Cleveland	1883–85
David B. Hill (acting)	1885–86
David B. Hill	1886–92
Roswell P. Flower	1892–95
Levi P. Morton	1895–96
Frank S. Black	1897–99
Theodore Roosevelt	1899–1901
Benjamin B. Odell	1901–

* Commanders-in-chief. † Councilors. ‡ Presidents.
§ During the Revolution; not recognized by the patriots.

Authorities.—Of the early French writers editions have been published in Quebec, notably *Journals of Samuel de Champlain* (6 vols.); *Les Mœurs des Sauvages Américains*, by the Jesuit Father Lafitau; *Rélations des Jesuites*. Consult also Charlevoix's *New France*, translated by J. G. Shea, 6 vols.; *Five Nations*, by Cadwallader Colden; *League of the Iroquois*, by Lewis H. Morgan. J. R. Brodhead's *History* covers the period from 1609 to 1691. The State has published *Documentary History*, 4 vols.; *Documents relating to the Colony*, 11 vols.; *Geology and Natural History*, 24 vols.; *Addresses at Centennial Celebrations*, 2 vols. See also J. D. Hammond's *Political History*, 2 vols.; *Life* of Joseph Brant, of Red Jacket, of Sir William Johnson, by William L. Stone; *New York*, by Ellis H. Roberts, 2 vols., in American Commonwealth Series. Histories of many of the towns, cities, and counties are separately published. Ellis H. Roberts and George J. Hagar.

New York (the *Nieuw Amsterdam* of the original Dutch settlers): the chief city of the U. S. in population, commerce, manufactures, and finance. It lies in (reckoned from its city-hall) lat. 40° 42·7′ N., lon. 74° 00·1′ W. from Greenwich; at the junction of the Hudson, at this point often locally called the North river, and the narrow strait forming the southwest extension of Long Island Sound and known as the East river. The city includes Manhattan Island and some of the adjacent mainland N. of it, Governors, Bedloe, and Ellis islands in the bay at the S. (these three the property of the U. S. Government), and Blackwells, Wards, Randalls, and a few minor islands in the East river or Sound, Staten Island, and that part of Long Island comprised in the former cities of Brooklyn and Long Island city, and the former towns of Newtown, Flushing, and Jamaica, and part of Hempstead. (See Brooklyn, Long Island, and Staten Island.)

Area and Plan.—Manhattan Island is 13½ miles long, and varies in width from a few hundred yards at each end to 2¼ miles at Fourteenth Street, the area being about 22 sq. miles, or 14,080 acres. The mainland portion of the city covers some 12,000 acres, and the small islands 400 acres more. The total land area of the greater city is 317·77 sq.

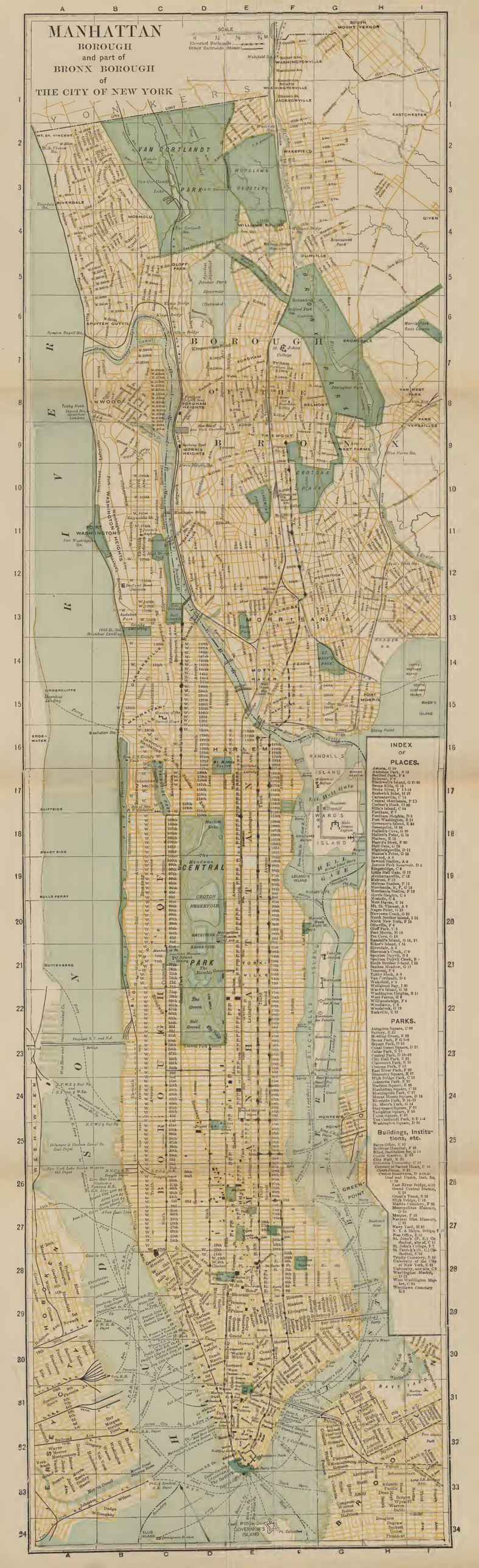
MAP OF THE CITY OF NEW YORK (GREATER NEW YORK) and Vicinity.

The geographical features of this Map are produced from data furnished by the U. S. Geological Survey. The boundaries and the division of the City into Boroughs are according to the Charter of the City of New York, 1897.

KILOMETERS 0 ½ 1 2 3 4 5 6

SCALE 3 MILES TO ONE INCH. 0 ½ 1 2 3 4 5 6

11.97



MANHATTAN
BOROUGH
and part of
BRONX BOROUGH
of
THE CITY OF NEW YORK

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Bedford Park, F 6
Belmont, F 8
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Bronx River, F 1-12
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Carmansville, C 14
Central Morrisania, F 10
Corlear's Hook, H 30
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Governor's Island, E 34
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Hallett's Point, G 19
Harlem, E 16
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Crotona Park, F 10
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Jeannette Park, E 32
Madison Square, E 26
Manhattan Square, C 21
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Court-House, E 31
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Grant's Tomb, B 15
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Trinity Cemetery, B 13
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University, new site, C 9
Washington Market, D 31
West Washington Market, C 28
Woodlawn Cemetery, E 3

miles; its extreme length is 32 miles, and its greatest width 16 miles. Numerous villages and towns have been absorbed by New York in its growth, the names of some of which are still applied to the corresponding parts of the city. Among these, on Manhattan Island, are Greenwich and Chelsea, on the Hudson river in the lower central portion of the city; Yorkville, on the east side at Eightieth Street, and Harlem, also on the east side, further north; and Bloomingdale, Manhattanville, Carmansville, Fort Washington, or Washington Heights, and Inwood, on the west side, extending in a line along the Hudson river from the central part to the northern end of the island. The surface of the land is generally rolling, and in some places hilly, the highest point on Manhattan Island, at Washington Heights, being 238 feet above tide-level.

The substructure of the island consists of crystalline rocks of the Archæan period, flanked, and in some places deeply covered, with drift deposits of the Glacial era. The outcropping rocks are chiefly gneiss, mica-schist, and hornblende, and are part of a great belt extending from northern New England to North Carolina. Much of the city is built directly upon this foundation. In some quarters, however, the drift is too deep to be excavated, and the buildings rest either upon it or upon massive wooden piles driven into it. S. and E. of the city-hall there is a vast bed of beach sand, upon which some of the largest buildings in the city rest, and these, together with those that rest upon piles, are as stable and probably as secure as those bedded upon solid rock.

Street Plan.—The oldest part of the city, at the southern end of Manhattan Island, is irregular in plan, the streets being at unequal intervals, not always parallel or at right angles, and generally narrow. From Fourteenth Street northward to 155th Street on the west side most of the thoroughfares are laid out with mathematical precision, broad, straight avenues running on parallel lines N. and S., and cross streets at right angles to them running E. and W. N. of 155th Street, and indeed for some distance S. of it along the Hudson river, the streets are somewhat irregular, as are also those in the mainland part of the city, where they follow the lines of country lanes and village roads.

Broadway is the principal thoroughfare of the business region, a wide avenue extending lengthwise through the southern and central part of Manhattan Island. From Bowling Green to Tenth Street the cross streets abut upon it, or cross it, chiefly at right angles and at irregular intervals. At Tenth Street it deflects to the westward, and from that point to Fifty-ninth Street the streets cross it at slightly oblique angles and at uniform intervals. N. of Fifty-ninth Street its extension, formerly known as the Boulevard, pursues a somewhat winding course.

Fifth Avenue is a sort of "median line," dividing the cross streets, from Ninth to 140th into E. and W., the house-numbering of each half beginning at Fifth Avenue and running toward the rivers. Below Fifty-second Street the avenue is largely devoted to business establishments of the highest class, clubs, hotels, etc.; above that point it is one of the most fashionable residence streets of the city. Other choice residence districts are found on Madison, Park, West End, and St. Nicholas Avenues, Riverside Drive, Murray Hill, and Fifty-seventh, Seventy-second, and various other cross streets.

Wall Street and adjacent portions of New, Broad, Nassau, and William Streets are the seat of the financial interests of the city. The wholesale dry-goods trade is chiefly centered on Broadway and the streets immediately W. of it, from Leonard to Houston, while the fashionable retail shopping trade occupies Broadway from Tenth to Forty-second Streets, and portions of Fifth and Sixth Avenues and Fourteenth and Twenty-third Streets.

Parks.—The most important of New York's pleasure-grounds is Central Park, in the very heart of the city. It is bounded by Fifth and Eighth Avenues and Fifty-ninth and 110th Streets, and is more than 2½ miles long and half a mile wide. Its area is 840 acres, and it contains 9 miles of carriage roads, 6 miles of bridle roads, and 30 miles of footpaths. About half the area is devoted to woodland, more than 500,000 trees, shrubs, and vines having been planted, besides a considerable natural growth of timber. The park is entered through a score of gates, and fifty ornamental bridges and arches carry the roads and paths over other roads or over the lakes. Conspicuous among the features of the park are the Belvedere, a castellated observatory on the highest point of ground; the Mall, a broad promenade, lined with six rows of large elms, among which stand many statues of famous men; the Terrace and Bethesda Fountain, fine pieces of stone-work and bronze at the northern end of the Mall; the lakes, six picturesque bodies of water, covering 43¼ acres; the menagerie, a small collection of live animals, birds, etc., in the arsenal building; the reservoirs of the Croton water system, 143 acres in extent; the Metropolitan Museum of Art; and the Obelisk, or Cleopatra's Needle, a monument which was made probably about 1500 B. C., and was given to the city of New York in 1877 by the Khedive of Egypt. Central Park was first planned in 1857; the original landscape design was made by E. L. Viele and then modified by Frederick Law Olmsted and Calvert Vaux, and the architectural designs by Calvert Vaux and J. Wray Mould. It ranks by common consent among the most beautiful pleasure-grounds of the world.

Numerous smaller parks and squares are scattered about the city, such as the Battery, at the southern end of Manhattan Island; Bowling Green, at the lower end of Broadway; City-hall Park, now largely occupied by public buildings; Washington Square, with its imposing Memorial Arch at the foot of Fifth Avenue; and Union Square and Madison Square, around which are clustered many of the great hotels and business houses. Morningside Park is a long, narrow pleasure-ground on the steep eastern face of the high ridge W. of Eighth Avenue, between 110th and 123d Streets, and Riverside Park is a similar strip, twice as long, on the western slope of the same ridge, running down to the Hudson river. In the mainland part of the city are four large pleasure-grounds partially laid out and connected by broad parkways. These are Van Cortlandt Park, 1,069 acres; Crotona Park, 135 acres; Bronx Park, 653 acres; and Pelham Bay Park, 1,700 acres. The total park area of the city, exclusive of parkways, is nearly 5,000 acres. The Botanical Garden (250 acres) and the Zoölogical Garden (261 acres) are in Bronx Park. For the former a fine museum has been erected, and in it Columbia University has deposited the fine herbarium of the late Prof. Torrey, valued at $175,000, and its botanical library. Other valuable collections have been secured, and the grounds are being rapidly improved. In the Zoölogical Garden many dens and a great flying cage are completed, and the collection of animals is constantly growing.

Harbor.—The landlocked harbor of New York comprises the lower bay, the upper bay, the East river, and the southern part of the North or Hudson river, and may be entered from the Atlantic Ocean either from the N. E., by way of Long Island Sound, or from the E. and S. by way of the channels at Sandy Hook. The latter is the more frequented course for ocean-going vessels. The lower bay, which includes also Raritan, Sandy Hook, and Gravesend Bays, affords 88 sq. miles of anchorage. It is entered by two channels near Sandy Hook, over a bar about 18 miles S. of the city, the depth of water on the bar being 32 feet at high tide. In this bay are two small islands of artificial construction, named Swinburne and Hoffman islands, and occupied by the hospitals, etc., of the quarantine station. The northern point of Sandy Hook, called Fort Hancock, is elaborately fortified for harbor defense. From the lower bay entrance is had to the upper bay through a picturesque strait called the Narrows, 8 miles from the city. This strait is scarcely a mile wide; on the eastern shore is Fort Hamilton; on the western, Fort Tompkins—an earthwork with batteries at the top of the bluff, overlooking Fort Wadsworth, which is situated at the water's edge and gives name to the whole garrison. A narrow and winding channel known as Staten Island Sound, Arthur Kill, and Kill von Kull, also connects the two bays, but is used only by vessels of light draught. The upper bay, or harbor proper, has 14 sq. miles of anchorage, and contains Governors island, used as a national military station, Ellis island, where all immigrants are landed, and Bedloe island, crowned with Bartholdi's colossal statue of *Liberty Enlightening the World*, a gift from the French people. The North river averages a mile in width, is deep enough for the largest ships, and affords 16 miles of available water-front, of which more than one-third is occupied with docks and piers. The East river is less than half as wide as the North, but is as deep, and the city has several miles of wharfs on it. The northeastern entrance to the harbor, from Long Island Sound, leads through HELL GATE (*q. v.*) into the East river. At Throgs Neck is Fort Schuyler, an inclosed pentagonal casemated masonry work with exterior batteries, and there

are also extensive fortifications on Willetts Point and Davids Island. The harbor is yearly visited by about 16,000 seagoing craft, under steam or sail. The port of entry, or customs district, of New York, comprises New York, Brooklyn, Jersey City, Hoboken, Long Island City, and the minor adjacent cities and towns on the North river, East river, and New York Bay.

Climate.—The climate of New York, which is materially affected by the proximity of the ocean, is on the whole temperate and salubrious, although at times subject to sudden changes of temperature and other conditions. Thousands of visitors from the West and South spend much of every summer in New York for health and pleasure. The average temperature (Fahrenheit scale) and rainfall, by months, from 1870 to 1894 have been as follows:

MONTHS.	Temperature.	Rainfall.
January	30·5°	3·98 inches.
February	31·5	3·92 "
March	36·7	4·04 "
April	48·0	3·40 "
May	59·2	3·22 "
June	69·0	3·16 "
July	73·6	4·25 "
August	72·3	4·71 "
September	65·2	3·65 "
October	55·2	3·38 "
November	43·5	3·78 "
December	33·9	3·27 "
Average annual rainfall	....	44·76 inches.

Architecture.—In no city is a more bewildering variety of architecture to be observed than in New York. The varying tastes of a hundred years of rapid and startling changes are there to be seen. Many streets are lined with monotonous façades of brownstone high-stoop houses of the fashion of a generation ago. A few show still older rows of brick with marble trimmings and quaint wrought ironwork. Mansard roofs are not uncommon, nor are high, steep, tiled roofs of Dutch and German pattern.

Business buildings are perhaps most varied of all. Granite, marble, brownstone, brick, terra-cotta, iron, and other materials are used. Such streets as Broadway, Wall Street, and lower Fifth Avenue present a constantly changing panorama, with no two buildings alike and scarcely any two even resembling each other. Structures of ten and twelve stories are seen on every hand, while those of fifteen and twenty and even more are rapidly increasing in number. Among the more attractive buildings in the central part of the city may be mentioned Madison Square Garden. This structure contains a theater, a concert-hall, a small assembly-room, together with restaurants and dressing-rooms, and an amphitheater capable of holding 17,000 spectators. The exterior of this building is of an ornate Renaissance style, and is adorned by the highest tower in New York, closely copied from the tower of the Giralda at Seville.

The newer hotels and apartment houses are highly decorative in design, and several of the large clubs have showy edifices. The building of the American Fine Arts Society, in West Fifty-seventh Street, is a reproduction of the house of Francis I. in Paris. Of the churches, Trinity, at the head of Wall Street, is pure English Gothic, as is also Trinity chapel belonging to the same parish. The Church of All Souls, on Fourth Avenue, is a massive building of an Italian Byzantine character, of red brick and cream-colored stone in stripes, and has an elaborate porch. St. Thomas's, on Fifth Avenue at the corner of Fifty-third Street, is of English Gothic. Its high tower is crowned by a lantern somewhat in the character of that at Boston, in Lincolnshire. The Judson Memorial church, fronting on Washington Square, is an interesting Italian design, with a square campanile. On Fifth Avenue there are two synagogues remarkable for their architecture—the Temple Emanu-El at Forty-fourth Street, and the Temple Beth-El at Seventy-sixth Street. St. Patrick's Cathedral (Roman Catholic), at Fifth Avenue and Fiftieth Street, is of the Decorated Gothic style of the thirteenth century. Its twin spires are 330 feet high.

Public Buildings.—The city-hall, standing in a park bounded by Broadway, Park Row, and Centre and Chambers Streets, is a small building of beautiful design, dating from 1803–12. It is built of white marble, excepting the rear wall at the N., which is of brownstone painted white, the builders having supposed the city would not extend N. of it, and that therefore the brownstone wall would seldom be seen. The style of architecture is a late revived Classic. Among the many precious relics preserved there are the chair in which Washington sat at his first inauguration as President and the desk on which he wrote his first message to the Congress.

Directly in front of the city-hall, occupying the southern corner of the park, is the U. S. post-office or Federal Building, a huge and ponderous edifice of gray granite in a mixed revived Classic style, with domes modeled somewhat after those of the Louvre. Its ground plan is an irregular quadrangle, the north side measuring 279 feet, the south 144, and the east and west 262½ feet each, and it is five stories high. It was completed in 1875 at a cost of nearly $7,000,000.

The county court-house stands in the park at the rear of the city-hall. It is of white marble, in Corinthian style, with a wing in Romanesque, measuring 150 by 250 feet. The erection of it was begun in 1861, and it has been occupied since 1867, but never has been fully completed. In its construction and furnishing the city was swindled out of vast sums by the notorious "Tweed ring." The most notable of the more recent buildings is that of the Appellate Division of the Supreme Court of New York in Madison Square. It is built of white marble in an ornate Corinthian style, and is elaborately decorated with statuary; the interior decorations are of great beauty.

The criminal courts building is an imposing edifice of brick, terra-cotta, and granite, in Italian Renaissance style, on the block bounded by Centre, Elm, White, and Franklin Streets, first occupied in 1894. On the next block, to the S., connected with the criminal courts by a bridge over Franklin Street, is the city prison, best known as the Tombs, formerly a low, massive structure of granite in pure Egyptian design, now being replaced and entirely remodeled. At Wall, Nassau, and Pine Streets is the U. S. sub-treasury, modeled after the Parthenon. The U. S. barge office, at the Battery, and the Jefferson Market court-house and prison, at Sixth and Greenwich Avenues, are handsome edifices.

Churches.—Places of worship in 1900 numbered more than 1,260, including 114 Baptist, 49 Congregational, 110 Jewish, 97 Lutheran, 173 Methodist Episcopal, 116 Presbyterian, 182 Protestant Episcopal, 78 Reformed, 225 Roman Catholic, and 124 miscellaneous.

Education.—The system of public education in New York comprises the College of the City of New York, an institution of regular collegiate rank for boys; the Normal College for girls, and a complete system of primary, grammar, high, and evening schools (maintaining nearly 500 separate schools), 1 nautical school (on school-ship St. Mary's), and 48 corporate schools (industrial, reformatory, etc.), under direction of the board of education. There is also a kindergarten system. The attendance of all children between the ages of eight and fourteen years is compulsory, unless they are otherwise under instruction, and 12 truant agents are constantly employed in looking up delinquents. The daily attendance of scholars is about 443,000. There are 11,000 teachers on salaries of from $600 to $3,000 a year, and the yearly cost of the entire department is $18,927,819.

Institutions of higher learning are numerous. Besides the colleges of the public-school system, there are Columbia University, the University of the City of New York, St. John's College at Fordham, the College of St. Francis Xavier on West Sixteenth Street, Barnard College, Union Theological Seminary, the General Theological Seminary of the Protestant Episcopal Church, the College of Dentistry, the College of Pharmacy, the College of Economics, five colleges of medicine, and many others for general or special instruction. Schools of art, law, music, architecture, design, mechanics, business training, and industrial trades abound. The Cooper Institute, founded and endowed by Peter Cooper, gives free instruction in many useful and practical branches of learning, and the Ship-building Academy, similarly established by W. H. Webb, affords thorough tuition in ship-building and general seamanship. In the trade schools, founded by Col. Richard T. Auchmuty, at First Avenue and Sixty-seventh Street, instruction is given in carpentering, bricklaying, painting, blacksmithing, plumbing, and kindred practical vocations. The National Academy of Design, the Society of American Artists, the Art Students' League, and the schools connected with the Metropolitan Museum of Art are among the foremost seats of art study and teaching.

The Society Library, founded in 1740 and maintained by the annual dues of its members, is the oldest in the city. It has nearly 100,000 volumes for circulation and reference, and a good reading-room. The Astor Library, on Lafayette Place, opened in 1854, founded by John Jacob Astor, and

liberally enlarged and endowed by other members of his family, has more than 250,000 well-selected volumes. Their use is free, but they can not be taken from the building. The Lenox Library, on Fifth Avenue, facing Central Park, was opened in 1877, and was the gift of James Lenox to the city. Its collections of books, manuscripts, pictures, etc., are extensive and of great value, but partake more of the character of a museum than a practical working library. In 1895 it was decided to consolidate the Astor and Lenox Libraries and the Tilden trust fund into one great public library. Dr. John S. Billings was chosen director of the new institution. The central building is to stand on the site of the old distributing reservoir, extending from Fortieth to Forty-second Streets on Fifth Avenue, and will be 366 feet long and 246 feet wide. The main room will contain shelf room for 1¼ million volumes. Early in 1901 the New York Free Circulating Library was consolidated with this institution. The libraries now (1901) contain 536,381 volumes and 177,646 pamphlets in the reference departments and 155,777 volumes in the circulating department. The Free Circulating Library, at 49 Bond Street, has a number of branches throughout the city, and loans about 500,000 volumes yearly. The Mercantile Library, in Clinton Hall, on Astor Place, founded in 1820, is the chief circulating library. It has about 260,000 volumes, which are loaned out to subscribing members, who pay a small annual fee. It has also a particularly well-stocked reading-room of papers, magazines, etc. The Cooper Institute contains a large free library and reading-room, and the New York Historical Society many literary and artistic treasures. There are about fifty other public libraries, mostly free, including collections of law, medical, and other special works.

The principal museums of New York are the Metropolitan Museum of Art in Central Park and the American Museum of Natural History in Manhattan Square, adjoining Central Park. The former, a private corporation under State and municipal patronage, was founded in 1869. Its collections are free to the public, except on two days of each week, and comprise an array, unrivaled in America, of paintings, statuary, bronzes, glass and metal ware, pottery, Cypriote, Etruscan, Egyptian, and other antiquities, musical instruments, laces, tapestries, etc. The Museum of Natural History was founded at about the same time, on the same plan, and is similarly conducted. It contains magnificent collections of mounted specimens of mammalia, birds, fishes, reptiles, and insects; the Jesup collections of over 500 specimens of American woods and 1,500 of building-stones; the Edwards entomological collection of 350,000 specimens; the Tiffany collection of gems; ethnological and archæological collections; and a fine library.

Publications.—Being the business capital of the U. S., the port receiving the bulk of foreign mails, and the point upon which the land and submarine telegraph systems converge, New York is the chief news center, and its newspaper press therefore has surpassing influence and importance. Among its best-known morning journals are the *Herald*, *Sun*, *Tribune*, *Times*, *World*, *Press*, *Journal*, and *Telegraph*. Among papers in foreign languages are the *Courrier des États-Unis* (French); *Staats Zeitung*, *New Yorker Zeitung*, and *New Yorker Volkszeitung* (German); *Il Progreso Italo-Americano* and *L'Eco d'Italia* (Italian); *Las Novedades* (Spanish); and *Hlas Lidu* and *New Yorske Listy* (Bohemian). Evening papers are *The Evening Post*, *Commercial Advertiser*, *Mail and Express*, *Evening Telegram*, *Daily News*, *Evening Sun*, *Evening World*, and *Evening Journal*. There are other daily papers devoted to commercial, financial, legal, and other special topics.

The weekly press numbers hundreds of journals, in many languages, conspicuous among which are the weekly editions of the great daily papers. *Harper's Weekly*, *Leslie's Weekly*, and *Collier's Weekly* make a feature of illustrations. *Puck*, *Judge*, *Life*, *Truth*, and others are humorous and satirical. *The Outlook*, *Churchman*, *Independent*, *Observer*, *Examiner*, *Evangelist*, *American Hebrew*, *Christian Advocate*, *Freeman's Journal*, and others are representative religious journals of high literary quality. There are also scores of trade, technical, educational, juvenile, fashion, scientific, and other periodicals, including some in Greek, Arabic, Armenian, Hebrew, and Chinese. Among monthly publications, such magazines as *Harper's*, *Scribner's*, *The Century*, and others have a worldwide reputation.

In equal degree New York is the center and chief seat of the book-publishing and general printing trades. The names of Harper, Scribner, Appleton, Putnam, and Randolph have long been household words among readers of English the world over, while many younger firms have risen to almost equal eminence with those older houses. The book-importing trade is also principally conducted in New York, and most of the leading London publishers have branch houses or agents there.

Benevolent Institutions.—The charities of New York are founded and conducted on a scale commensurate with the requirements of its teeming population. The Municipal Department of Charities and Correction, at Third Avenue and Eleventh Street, maintains extensive hospitals, asylums for the insane, almshouses, etc., on Blackwells, Wards, and Randalls islands, besides doing a vast relief work for the general poor. The institutions and societies founded by private beneficence are numbered by hundreds. Each religious society, trade, and profession has one, and there is one for every class of sufferers and unfortunates.

Bellevue Hospital, at the foot of East Twenty-sixth Street, is a large and admirable institution, maintained by the city at a cost of over $100,000 a year. It has connected with it a dispensary for the relief of outdoor poor, a medical college of high rank, a training-school for male nurses founded by D. O. Mills, a similar school for female nurses, and various other important adjuncts. The Charity Hospital is on Blackwells island. The Cancer, Mount Sinai, New York, Presbyterian, St. Luke's, Roosevelt, and Women's hospitals are among the best-known private institutions. Beside these there are perhaps fifty more hospitals and as many dispensaries.

Places of Entertainment.—The size and vast business activities of New York make it the resort of myriads of visitors, for whose entertainment a great number of hotels have been erected. Among the best known of these are the Astor House, Brevoort, Broadway Central, Fifth Avenue, Grand Union, Hoffman House, Holland House, Imperial, Majestic, Manhattan, Marie Antoinette, Murray Hill, Netherland, Park Avenue, Plaza, Savoy, Victoria, and Waldorf-Astoria.

There are more than 40 theaters, opera-houses, and music-halls. The Metropolitan Opera-house, at Broadway and Fortieth Street, ranks among the largest in the world. Leading theaters are the American, the Broadway, the Criterion, Daly's, the Empire, the Garden, the Knickerbocker, the Lyceum, the Republic, Wallack's, etc.

Clubs and club-life form an important feature of New York. There are hundreds of such organizations, including a score or more of the first rank. Among these may be named the Aldine, Authors, Century, Colonial, Democratic, Grolier, Knickerbocker, Lotos, Manhattan, Metropolitan, New York, Republican, St. Nicholas, Union, Union League, University, etc. There are also athletic, yachting, press, jockey, and other clubs devoted to special objects. Some of the great social clubs have 1,500 or more members each, and houses fairly palatial in size and equipment.

Government.—The executive head of the city government is the mayor, who is elected by popular vote for a term of four years, and is removable from office for cause only by the Governor of the State. He appoints the heads of most of the executive departments. During his absence or disability the president of the council is acting mayor, with full powers after ten days. The legislative powers of the city are exercised by the council of 29 members and board of aldermen of 61 members, constituting the municipal council. The county officers elected are county clerk, sheriff, register, etc. For courts, see NEW YORK CITY in the Appendix.

The magnitude of the yearly operations in some of the executive departments is indicated by the following statistics of the old city for 1893: Buildings, 2,275 new structures, valued at $54,859,318. Charities and corrections, expenditures, $2,225,000. Fire, 4,132 fires, expenditures $2,223,000, 76 companies, 85 engines, 1,073 men. Police, 3,654 men, about 90,000 arrests, expenditures $5,300,000. Public works, expenditures $3,000,000. Street-cleaning, about 1,890,000 loads of dirt, garbage, ashes, snow, etc., removed, and 62,650 miles of streets cleaned. In 1900 the health department reported 70,872 deaths, 81,721 births, and 32,330 marriages. The death-rate was 20·57 per 1,000.

Post-office.—New York not only has an enormous mail of its own, but it is the port of entry and departure for the bulk of the country's foreign mails. In the main post-office more than 3,000 men are employed, and there are 32 branch offices. During the year ending June 30, 1900, there were delivered through lock-boxes and by carriers 684,768,464 pieces of ordinary mail matter. The aggregate business of

the money-order department amounted to $135,000,000. The total receipts of the office were $9,869,458.35, and the net revenue nearly $6,000,000.

Markets.—The largest public market is Washington, on the block bounded by Washington, West, Vesey, and Fulton Streets, in which almost every imaginable commodity for food is sold. Fulton Market, at Fulton, Beekman, South, and Front Streets, is a large establishment, and is the chief fish-market of the city. There are a dozen more scattered about the city, all under municipal control.

Water and Light.—The water-supply of New York is drawn chiefly from great reservoirs in the basin of the Croton river, in the upper part of Westchester County, about 40 miles N. of the city. Two underground conduits (see AQUEDUCTS) bring the water to four huge reservoirs in Central Park, with a capacity of nearly 1,250,000,000 gal. Thence it is distributed throughout the city by means of some 400 miles of underground iron pipes. The carrying capacity of the two aqueducts is 400,000,000 gal. a day. The first is 8 feet in diameter, and enters Manhattan Island by way of High Bridge over Harlem river; it was completed in 1842. The second is 12 feet in diameter, and was completed in 1890 at a cost of over $25,000,000.

The streets and buildings of the city have a dual system of lighting—by gas and by electricity. There are about 25,000 street gas-lamps. Electric lights are less numerous, being confined to the principal streets and avenues, and some of the parks.

Finances.—The city debt in 1880 was $142,447,400; in 1890, $148,124,216. On Jan. 1, 1901, the total bonded debt of the greater city was $392,013,499.39; the net bonded debt $279,725,370.38. The assessed valuation of real estate in 1900 was $3,168,547,700; of personal property, $535,556,493; of franchises (law of 1900), $219,679,351. Appropriations for support of the city government, etc., in 1901 were $98,096,413.43, of which more than $90,000,000 was raised by taxation.

Immigration.—The vast majority of aliens coming to the U. S. are landed at New York. From 1855 to 1889 they were received at Castle Garden, at the Battery, under State supervision. Since 1889 they have been under charge of the Federal Government, and are received on Ellis island, in the bay. The following table shows the number of passengers landed from 1881 to 1892 inclusive, and the number of trips made by the ships:

YEAR.	Cabin.	Steerage.	Trips.
1881	51,229	441,604	937
1882	57,947	455,450	1,021
1883	58,596	388,267	972
1884	59,503	320,807	943
1885	55,160	281,170	843
1886	68,742	300,918	906
1887	78,792	371,619	885
1888	86,302	383,595	899
1889	96,686	315,227	891
1890	111,830	371,593	914
1891	105,025	445,290	964
1892	120,991	358,486	957
Totals	950,803	4,374,026	11,132

The total number of aliens arrived during the fiscal year ending June 30, 1900, was 341,712.

Manufactures.—New York was in 1890 the seat of 25,403 manufactories, in about 300 different branches of industry; the direct capital investment in these was $426,118,273; the number of employees of all kinds 354,291, receiving in wages $230,102,167; the cost of materials used $366,422,722, and the value of products $777,222,721. Among the leading industries were the following:

INDUSTRIES.	No. of establishments.	Capital.	Employees.	Value of products.
Boots and shoes	2,796	$4,151,127	9,514	$13,088,672
Clothing	6,303	49,940,324	80,944	138,338,580
Coffee and spice	35	1,274,571	670	17,037,019
Electric apparatus, light and power	58	21,690,647	3,042	5,540,910
Foundries	343	15,036,597	10,381	19,543,794
Gas	6	57,605,812	2,633	12,672,963
Malt liquors	52	28,653,206	3,344	23,926,955
Millinery	389	4,539,206	7,657	12,873,387
Musical instruments	131	8,597,015	5,958	12,828,541
Printing and publishing	1,166	35,469,979	22,311	54,488,179
Silk	146	7,771,030	9,460	13,579,462
Tobacco	1,295	16,392,842	22,096	35,560,025

Commerce.—About 50 per cent. of the total foreign trade of the U. S. passes through the port of New York. The imports at New York for the fiscal year ending June 30, 1900, exclusive of gold and silver coin and bullion, were $537,237,282; and the exports, $518,834,471—total, $1,056,071,753. The total of the U. S. for the same year was $2,244,424,266.

Exchanges.—The chief exchanges are the Stock Exchange, now erecting a fine building on Broad Street; the Consolidated, also dealing in stocks; the Produce, whose great building on Whitehall Street is a conspicuous landmark of the city; the Cotton, the Coffee, the Real Estate, and the Coal and Iron. The Stock Exchange, in 1893, was the scene of these transactions: Government bonds, $1,914,200; State and railway bonds, $355,181,650; shares of stocks, $80,013,902. At the Produce Exchange dealings covered 5,612,250 barrels of flour, 1,052,008,000 bush. of wheat, 177,428,000 bush. of corn, and 80,520,000 bush. of oats.

Banks.—New York contains 44 national banks with a capital of $62,800,000, and 40 State banks with a capital of $5,322,700. Most of the former and some of the latter form a Clearing-house Association, through which a daily exchange of checks and bills and payment of balances are effected. The Clearing-house began operations on Oct. 11, 1853, and in the first forty years of its existence, to Oct. 11, 1893, its exchanges aggregated $1,021,018,593,454, and balances $45,981,837,600—a grand total of $1,067,000,431,054. The figures for the year ending Oct. 1, 1900, were: Exchanges, $51,964,588,572; balances, $2,730,441,810—total, $54,695,030,382.

There are also twenty-six savings-banks with savings deposits (1901) of about $493,000,000.

Insurance.—Both fire and life insurance have their American headquarters in New York, and the buildings erected by some of the companies are among the most notable in the city. Such are the buildings of the Equitable, Manhattan, Mutual Reserve, Home, and New York Life Insurance companies on Broadway, of the Mutual Life on Nassau Street, and of the Metropolitan Life on Madison Square. In 1893 there were invested in New York assets of domestic and foreign fire-insurance companies amounting to about $240,000,000. Even more imposing are the figures reported by the thirty-one life-insurance companies doing business in New York, their assets aggregating in 1893 more than $905,000,000, of which more than half belonged to New York companies.

Travel and Transportation.—Local transportation facilities include five lines of elevated steam-railways, and numerous surface street-railways, on which cars are propelled by horse-power and electricity. A uniform rate of five cents fare prevails. The number of passengers carried in 1900 was 1,074,537,848, of whom about 235,000,000 were on the elevated railways in Manhattan and Brooklyn. The East river bridge connects New York with Brooklyn (for description, see BROOKLYN), and other bridges are under construction. The ferries on the North and East rivers and the bay convey scores of thousands daily from and to the suburbs. Harlem river, which separates Manhattan Island from the mainland, is crossed by a number of bridges, among them the lofty and graceful Washington bridge. (See BRIDGES.) General domestic travel is facilitated by the centering at New York of a dozen important trunk railways and numerous subsidiary lines, several important steamboat lines on Long Island Sound and the Hudson river, and a vast coasting trade between New York and Eastern and Southern ports. Foreign transportation is represented by nearly all the transatlantic steamship lines. Most of the railways have their termini in Jersey City, Hoboken, Brooklyn, and Long Island City, whence passengers and freight are transferred to New York by ferry. Two important lines, with their connections, enter the city directly, and have their termini in the Grand Central station, at Fourth Avenue and Forty-second Street. This is a great structure of brick, iron, and glass, with waiting-rooms, ticket-offices, etc., for each of the railways. The principal train-shed is nearly 700 feet long and 240 feet wide, roofed with a single arched span of iron and glass 110 feet high, and will hold at one time 150 ordinary passenger cars; there is an additional train-shed half as large adjoining this on the E. About 550 trains arrive and depart daily by a four-track railway on Park Avenue, partly underground and partly elevated.

History.—The original Indian name of New York was Manhattan. The first European visitor was Giovanni Verrazani, who entered New York Bay in 1525, but made no landing. The real discoverer and explorer of those regions was Hendriek Hudson, an English mariner employed by a

Dutch trading company. He explored New York Bay and the great river which bears his name in 1609, in his little ship the Half Moon. Two years later Adrian Block visited Manhattan, made a landing, and established a trading station. In 1614 the States-General of Holland chartered the United New Netherland Company to engage in trade at Manhattan, and a fort and trading-house were built on the southern point of the island and called Fort Amsterdam. A permanent village settlement was effected in 1623 under the name of New Amsterdam. The first white male child born on the island was Jean Vigne, in 1614, and the first white girl, Sarah Rapalje, was born in 1625. Peter Minuit, the first important governor of the new colony, arrived in 1626, and thereafter the growth of the place was rapid. In 1652 the place was incorporated as a city under the name of New Amsterdam, and the next year was inclosed at the N. by a wall of earth and timber 2,340 feet long, on the present site of Wall Street. On Mar. 12, 1664, the whole colony was granted by Charles II. of England to his brother, the Duke of York, and in August was forcibly seized by a British fleet. The place was now named New York, in honor of its new owner. In 1673 a Dutch fleet seized it again and renamed it New Orange, but a year later it was restored to the English. An organized government and code of laws were established in 1691, and on Apr. 9 of that year the first colonial assembly met in the city. In 1725 the first newspaper, *The New York Gazette*, was founded; in 1730 a fortnightly stage service to Philadelphia was established; in 1752 the Royal Exchange was opened at the foot of Broad Street; in 1754 King's, now Columbia, College was chartered; and in 1768 the Chamber of Commerce was organized.

The spirit of resistance to British rule made its appearance in New York at an early date. The Stamp Act Congress was organized in 1765; so was the league known as the Sons of Liberty. The Stamp Act was publicly burned, cargoes of taxed tea were thrown overboard, a liberty pole was erected on the common, now the City-hall Park, and vigorous public demonstrations were made against the British garrison. One of the earliest conflicts of the war occurred in John Street between Sons of Liberty and British troops. In the spring of 1776 the bulk of the American army was massed in New York, and on July 8 the Declaration of Independence was publicly proclaimed and read to the troops. On the same day the equestrian statue of George III., on Bowling Green, was pulled down and transformed into bullets for the use of the patriot army. After the battle of Long Island the American troops were gradually withdrawn from Manhattan Island northward, several skirmishes being fought on Harlem Heights. The city then passed into the hands of the British, who held it under rigid military rule until Nov. 25, 1783, when the last of their garrison evacuated the city, and the American troops took possession. A few weeks later Washington took farewell of his officers at Fraunces's Tavern, at the corner of Broad and Pearl Streets.

New York was soon chosen as the capital of the young republic. In Jan., 1785, Congress removed thither from Philadelphia and met in Federal Hall, at the corner of Wall and Nassau Streets, now the site of the U. S. sub-treasury. In the same building Washington was inaugurated as President on Apr. 30, 1789, and there the first Congress under the Constitution held its meetings. New York remained the national capital for five years.

The free-school system of the city was organized in 1805 on a small scale; in the following year steam navigation was first accomplished on the North river by Robert Fulton; in 1807 the steamer Clermont began regular trips to Albany, and in 1818 the first line of Sound steamers was established; transatlantic steam navigation began in 1819 with the Savannah, built at New York. In the war of 1812 New York sent out twenty-six privateers, with 2,239 sailors. The port was then blockaded by the British until the end of the war, but the city was defended against invasion. On Nov. 11, 1826, the first canal-boat arrived from Buffalo by way of the newly finished Erie Canal. In 1832 the city was ravaged by Asiatic cholera, and in Dec., 1835, a fire in the southern part of the city raged for three days, destroying 600 buildings and more than $20,000,000 worth of property. Water was introduced through the Croton aqueduct in 1842. The electric telegraph was invented by Prof. Morse in the University of the City of New York, and a line completed to Philadelphia in 1845. In 1849 occurred the famous Astor Place riots, due to jealousy between the friends of the actors Forrest and Macready. The first American World's Fair was opened in 1853 in the Crystal Palace, on what is now Bryant Park.

At the outbreak of the Southern secession movement, in 1860, the mayor of New York, Fernando Wood, proposed to make it a free city, on the plan of those of mediæval Germany. Such schemes were quickly dismissed when the war began in Apr., 1861, and New York thenceforth supported the national Government with great zeal. The local militia were hurried to the front, the U. S. Sanitary Commission, the U. S. Christian Commission, the Union Defense Committee, and other patriotic bodies were organized, and 116,382 soldiers were sent from the city to the Union army. In the summer of 1863 the disaffected and criminal classes of the city, especially those of foreign origin, formed mobs to oppose the enforcement of the Draft Act. For several days in July large bands of rioters roamed about the city, burning buildings, murdering citizens, and stealing whatever they could lay their hands upon. The office of the *Tribune* newspaper was set on fire, the Colored Orphan Asylum was burned, and Negroes were murdered by scores in various parts of the city, and it was not until the Seventh Regiment hurried back from Washington that order was fully restored. More than 1,000 men were killed and wounded, and about $2,000,000 worth of property destroyed.

In the speculative days of the war, and the years immediately following it, political corruption became rampant in the municipal government. It reached its climax in 1870 and 1871, when the notorious Tweed ring was exposed and overthrown, after having robbed the city of more than $20,000,000. In 1871 serious riots took place between the Orangemen and Ribbonmen, rival factions of the Irish population. In 1869 occurred the famous "Black Friday," arising from an unsuccessful effort to "corner" gold; and in 1873 there was another disastrous panic on Wall Street. May 24, 1883, witnessed the opening of the Brooklyn bridge. The funeral of Gen. Grant occurred on Aug. 8, 1885, with one of the largest and most impressive funeral processions ever seen in the U. S. Work was begun on Grant's tomb and monument in the presence of enormous crowds on Apr. 27, 1891, and exactly a year later the cornerstone of the edifice was laid. The four hundredth anniversary of the discovery of America was celebrated in New York in Oct., 1892, on a magnificent scale, the city being profusely decorated and thronged by hundreds of thousands of visitors. On one day, Oct. 12, the elevated railways carried 1,075,537 and the Brooklyn bridge cars 223,625 passengers. On Apr. 27 and 28, 1893, occurred further demonstrations in honor of the memory of Columbus, including a naval review of U. S., British, French, German, Spanish, Russian, Italian, Dutch, Brazilian, and Argentine ships of war, and a land parade of soldiers and sailors of all those nationalities.

The community of interests of New York, Brooklyn, and other adjacent cities led in 1890 to the promulgation of a plan for uniting them into a single municipality—a so-called "Greater New York." A State commission to consider the expediency of such consolidation, and to formulate plans for effecting it, was formed, and in Nov., 1894, the question was submitted to popular vote and carried, except in Mount Vernon, Westchester, and Flushing. An act of consolidation was signed by the Governor May 11, 1896, to take effect Jan. 1, 1898, and the commission appointed to draft a charter for the new city presented its report to the Legislature Feb. 22, 1897. See NEW YORK, CITY OF, in the Appendix.

Population.—(1790) 33,131; (1800) 60,489; (1890) 1,515,301; (1900) 3,437,202. From 1790 to the present day New York has continuously ranked as the most populous city in the U. S. In 1890, of the inhabitants of New York, 875,358 were native born, and 639,943 foreign born; 23,601 were colored (of African descent); 747,579 were male, and 767,722 female; of male inhabitants of voting age, 177,729 were native and 269,069 foreign born; there were 312,766 families, housed in 81,828 dwellings; of the foreign-born inhabitants, 190,418 came from Ireland, 210,723 from Germany, 35,907 from England, 27,193 from Austria, 12,222 from Hungary, 48,790 from Russia, 39,951 from Italy, 10,535 from France, 8,099 from Bohemia, 6,759 from Poland, and 2,048 from China.

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W. F. Johnson. Revised by Whitelaw Reid.

New York System: in geology, a division of the Paleozoic rocks in North America, including representatives of the Cambrian, Silurian, and Devonian periods. In the systematic work of the Geological Survey of New York, the most important single contribution ever made to American stratigraphy, it was found impossible to classify the formations in accordance with the categories which had been established by earlier work in Europe; and the geologists not only gave local names to the individual formations of the State, but grouped them under classific terms which were in part novel. The New York System, which was announced in various reports in 1842 and 1843, comprises all the formations of the State from the Potsdam sandstones below to the Chemung group above, both inclusive. It contains twenty-eight formations, grouped in four divisions, in which the Champlain division, as defined by Hall, extends from the Potsdam to the Oneida, the Ontario from the Medina to the Niagara, the Helderberg from the Onondaga to the Corniferous, and the Erie from the Marcellus to the Chemung. The system thus set forth constituted for many years the standard of reference for American rocks of corresponding age, and was of great utility as affording an independent basis for the taxonomy of American formations. It has largely fallen into disuse, first because the progress of stratigraphic study showed that no natural break determined its upper limit, the Appalachian rock series being continuous to the top of the coal-measures; second, because with the progress of paleontologic study it became possible to classify the formations under the categories afforded by the periods of European chronology, and thus give them a more definite place in the general geologic history of the globe. Consult *Geology of New York*, parts i. to iv., 1842–43, and *Bulletin No. 80, United States Geological Survey*. See also Geology and Paleontology.

G. K. Gilbert.

New York, University of the City of: an institution of learning chartered Apr. 18, 1831, and opened in 1832. Until 1883 the corporation was a council of thirty-two members elected by the subscribers to the endowment, together with five representatives of the city government. In 1883 the charter was changed so as to make the council self-perpetuating, one-fourth the members going out each year unless re-elected. The political element was dropped, as also a clause forbidding to any religious denomination a majority of the council. In 1832–35 a building was erected on Washington Square, E., and was replaced 1894–95 by a larger structure intended partly as a source of income and partly for the accommodation of the School of Law, School of Pedagogy, and the graduate department. In 1892 a tract of 20 acres at 200th Street, on the Harlem river, was purchased, on which new buildings for the undergraduate department have been erected. The faculty of arts and science dates from 1832; until 1886 its instruction was to undergraduates only. The college requires a four years' course for the degree of bachelor of arts or of science. A technical school is also supported, which gives the degree of C. E. to its students one year after they have become bachelors of science. In 1886 the Graduate Seminary was founded, which receives candidates for the degrees of master of arts or science and doctor of philosophy. In 1890 the School of Pedagogy (begun provisionally in 1887) was permanently established, giving degrees of Pd. D. and Pd. M. It is the first University School of Pedagogy in America. There are three professors besides numerous lecturers. The faculty of arts and science has 20 professors and over 400 students. It has included many names eminent in literary and scientific effort, as Henry P. Tappan, S. F. B. Morse, Davies, Loomis, Tayler Lewis, and the Drapers. The faculty of medicine, founded 1841, numbered among its earlier members Drs. Valentine Mott, Bedford, Paine, Post, and Draper. Its buildings, after several removals, are upon Twenty-sixth Street, opposite Bellevue Hospital. This faculty has over 20 professors and more than 30 lecturers and assistants; it enrolls about 550 students. Three full winter courses of eight months each are required for the degree of M. D. The faculty of law, founded 1858, comprises 4 professors and 7 lecturers. The course for LL. B. is completed in two years. In 1891 graduate courses were opened leading to the degree of LL. M. There are about 300 students. The chancellors have been Drs. Matthews, Frelinghuysen, Ferris, Crosby, Hall, and MacCracken. The value of the property of the university approaches $2,000,000 in value.

Henry M. MacCracken.

New Zealand: a British colony, in the South Pacific Ocean, S. E. of Australia. The northwest point, Cape Maria van Diemen, is 1,175 miles from Sugar-loaf Point, on the coast of New South Wales, and West Cape is 850 miles from Tasmania. The colony consists of three islands, lying N. E. and S. W., and many islets, between the parallels 33° and 53° S. and the meridians 166° 30′ and 173° W. Of the three principal islands, or New Zealand proper, North island, or New Ulster, has a length of about 515 miles and a breadth of about 250 miles, with an area estimated at 44,467 sq. miles—about that of Pennsylvania. The South island, or New Munster, officially called Middle island, has a length of about 525 miles and a breadth of 180 miles. Its area is estimated at 58,525 miles. The southernmost island is Stewart island, or New Leinster. It is triangular, about 25 miles by 30, and has an area of 665 sq. miles. Attached to the colony are the Chatham, Auckland, Kermadec, Campbell, Antipodes, and Bounty islands. The last three groups are uninhabited. The Chatham islands lie 300 miles E. of New Zealand, and have an area of 375 sq. miles. The Auckland islands lie 180 miles S. of Stewart island, and have an area of 312 sq. miles. The Kermadec islands lie 660 miles N. N. E. of New Zealand, and have an area of 15 sq. miles. The total area of the colony is estimated at 104,471 sq. miles; it is a little larger than Colorado and a little smaller than Italy. The capital is Wellington (*q. v.*).

Physical Configuration.—New Zealand lies on a great submarine plateau which in the N. E. joins that of Polynesia, N. W. that of New Guinea and Queensland, and to the S. that of the Antarctic seas. Between the islands and Tasmania lie the great depths called the Thomson Abyss. The coasts of the colony are more than 4,000 miles in length. There are many natural ports, especially on the northern ends of North and Middle islands, and on the east coast of Stewart island. The harbor of Auckland is especially commodious, and approaching within a mile of its waters, and only 2 or 3 miles of the city, is the greater harbor of Manukau, entering from the opposite coast. On the southwest coast of Middle island is a series of narrow fiords which are too deep to afford anchorage. A mountain range begins E. of the center of North island and extends S. W. to the southern angle of Middle island. On North island it is relatively low, not exceeding 6,000 feet. On Middle island it hugs the west coast from the middle southward, and culminates in Mt. Cook, 13,349 feet high (first ascended in 1882). This range is called the Southern Alps. Many of its mountains reach the altitude of perpetual snow, and have glaciers extending down their sides to about 1,000 feet above sea-level. The best known is the Tasman glacier on the southwestern slopes of Mt. Cook. The fiords of the extreme S. W. are surrounded by snow-capped mountains, and are very picturesque. Near the center of North island and to the S. E. of it are several volcanic cones of considerable height—Ruapela (9,100 feet), Egmont (8,300 feet), both now extinct, and Tongariro (6,500) occasionally active. In the northern half of North island mountains are less frequent and lower. The plains lie mostly in the southwestern quarter of North island, and Mt. Egmont is surrounded by extensive and fertile plains. Four-fifths of Middle island is mountainous, but the mountains are to a great extent open, grassy, and adapted to pastoral pursuits, while the backbone of the Southern Alps is crossed by many low passes. The bolder western versant is rich in minerals. The plains adapted to agriculture lie in the western part of this island. The rivers are usually rapid, short, closed by bars at their mouths, and not adapted to navigation. There are two lake regions in the islands; the first is on the eastern slopes of Middle island. These lakes are in the mountains, are long, slender, and picturesque, and two of them (Te Anau and Wakatipu) are of considerable size. The other is in North island, and its largest lake is Taupo, the largest in the islands, with an area of 250 sq. miles. It lies in the center of the island, and is drained by the Waikato river, one of the most important in the colony. From Lake Taupo in a northeasterly direction to the Bay of Plenty lies the area to which the name of Lake District is given, remarkable for its geysers, hot and sulphurous springs, and natural terraces. The terraces are marble-white or tinted, smooth, apparently artificial, but formed by deposits from the water. With

the warm blue water they form natural baths of great beauty, the curative properties of which are well established. At Whakarewarewa, near Lake Rotorua, in the county of the same name, and about 25 miles from the head of the Bay of Plenty, there is a group of eight geysers, of which one throws a column to the height of 30 or 35 feet. The geysers are varied with boiling springs, steam jets, and mud volcanoes. The geyser phenomena appear to be in decadence. Since their discovery many of the finest geysers have ceased action, and new ones are more seldom formed.

Climate.—The islands of New Zealand stretch through fourteen degrees of latitude, and possess a great variety of climate. In general the climate is mild, agreeable, and healthful, especially that of North island, but they are subject to occasional sudden changes of temperature and weather. The mean annual temperatures are about those of Virginia and Delaware near the coast, but the summers are as cool as those of New Brunswick and Nova Scotia. The mean difference between the temperature of the hottest and that of the coldest months is only 14°, or about that of Cuba. The North island is decidedly warmer than Middle island, the former being bathed by a warm ocean current from the N., while the south and west shores of the latter receive a cool current from the S. W., and each island shelters the other from its own current. Snow very seldom descends to sea-level on North island, and only occasionally on Middle island. The perpetual snow line is about 7,500 feet above sea-level, and is reached by Ruapela on North island and by many mountains on Middle island. Ice occasionally forms in winter in all parts of New Zealand. The annual rainfall averages 40 to 50 inches on Middle island and 30 to 40 inches on North island, and is heaviest on the west coast. At Hokitika, on the west coast of Middle island, in lat. 42° 41′ S., the average annual rainfall is 102 inches. The prevailing winds are westerly, and gales are frequent.

Geology and Mining.—Volcanic action has played an important part in the geologic history of New Zealand, but has long ceased in Middle island and is visibly diminishing in North island. The surface covered still by volcanic rocks is considerable, and these with the non-fossiliferous crystalline and schistose rocks cover about half of the surface. The series of fossiliferous rocks is quite complete. In the upper part of the Cretaceo-Tertiary occurs a calcareous sandstone called "Damaru" stone, which is ornamental and very valuable as a building-stone, as it is easily worked, but hardens in weathering. Saurian remains of great size have been obtained from the Permian beds of Mt. Potts. Gold was discovered in the islands in 1857, but it was not until 1861 that it attracted general attention, and caused a large influx of miners. Placer-mining is to be found chiefly in Middle island, in the Otago, Westland, and Nelson districts. The easily worked placer-fields are probably now exhausted, but there is still much opportunity for hydraulic mining on a large scale. The principal quartz mines are on the northern end of North island, near Auckland, but several auriferous reefs are worked in the gold-fields of Middle island. In 1899, of the 389,558 oz. raised the entire quantity was exported. The value of the total export of gold from the colony to the end of 1899 was £55,966,498. New Zealand stands second of the seven Australasian colonies in the total amount of gold produced, Victoria standing first. Queensland has, however, passed ahead of New Zealand in the annual production. In 1890 the average production of gold per man employed in mining it was, for this colony, nearly £393 in value, far surpassing that for the other colonies. Most of the mining is done on Government land. In the production of coal this colony stands second among the Australasian colonies. Most of the coal-beds are on the west coast of the Middle island, and the chief mines are at Otago, Greymouth, and Westport. The only important coal-measures of the North island are those of Waikato. The total output of coal in New Zealand in 1900 was 975,234 tons, valued at £487,617, and the annual output is increasing. Lignite exists in large quantities, but is used only locally. Oil shales have been found, but the oil has not proved suitable for illuminating purposes, though good for lubrication. The mineral product of the colony next in importance is kauri gum, and this is peculiar to New Zealand. It is a resinous product of the kauri-tree, but is found in the soil where forests of this tree once existed, or at the base of living trees. It is much used as a base for fine varnishes and for other purposes. In 1900 the production of kauri gum was 11,116 tons, valued at £607,919.

Flora.—New Zealand is remarkably rich in forests: one-third of its surface was covered by them in 1830, but this has been reduced to one-fifth. Some of the larger forests disappeared at the rate of 4 per cent. a year, but before the damage was complete the matter was taken up by the Government, and the principles of forest conservation were put in operation. The New Zealand forests are characterized not only by their extent, but by the relatively large ratio of forest species to the entire flora. The most valuable tree is the kauri, which now grows only on the North island and chiefly in the province of Auckland. It reaches 120 to 160 feet in height, 5 to 12 feet in diameter at the butt, and is unrivaled for spars, for which purpose much is exported. There are a score more of useful species of trees. Three-fourths of the species of the flora are endemic, and the number of species common to Australia and New Zealand is small. The North island has a flora in many respects distinct from the rest of the group, having peculiarities which it shares with the isolated islands lying between it and the groups of Melanesia and Polynesia. Among the valuable plants of the flora is the New Zealand flax or hemp, from which a valuable fiber is obtained. It is a liliaceous plant (*Phormium tenax*), and the leaves, from which the fiber is obtained, are from 3 to 9 feet long and 2 to 3 inches broad. The wild plant is chiefly relied on for the supply. The fiber, though nearly as strong as Manilla hemp, is not suitable for ship's cordage, as it does not well stand exposure to alternate wetting and drying.

The *fauna* of New Zealand has several singular features. There are no indigenous land mammals except two species of small bats. There are no snakes; the few lizards are harmless; one species of frog only, and relatively few species of insects are to be found. Among the birds the most remarkable native species are the wingless and hairy species of apteryx or kiwi, of which there are four kinds, and the gigantic wingless moa. The last has been long extinct, but native tradition represents it as formerly hunted as food. Colonization has introduced many species, as the domesticated animals and birds, game birds, small birds, and rabbits. The last have become a serious pest in many districts.

Agriculture.—New Zealand is the best-adapted of the seven Australasian colonies to agriculture, including the pastoral industries, the climate and soil being both favorable for these pursuits throughout the islands. The average yield of crops per acre is generally higher in this than in the other colonies, but the average value per acre is lower. It is estimated that two-thirds of the land is suitable for cultivation or grazing. Of this about one-fifth is under actual cultivation. About one-half of the land in 1893 was still in the possession of the Government. The rural public lands are either sold on favorable terms or leased. In 1900 there were 62,485 holdings, comprising 34,422,653 acres, of which about one-third was leased, and there were (1896) 83,300 persons engaged in agricultural and pastoral pursuits. The wheat produced is generally more than sufficient for home needs, and the average product is from 20 to 25 bush. per acre. Oats are extensively grown and yield 30 bush. per acre, and barley and hay are important crops. Maize is but little grown, likewise tobacco and the vine. Tasmania and New Zealand are the only ones of these colonies producing potatoes for export.

The number of live stock in New Zealand in Apr., 1900, was: Horses, 261,931; horned cattle, 1,210,439; sheep, 19,348,506; swine, 249,751. In 1890 it shipped 896,914 cwt. of fresh and frozen meats, seven or eight times as much as all the other colonies together. The capital employed in the industry of preparing fresh meats for shipment was for that year £1,464,659—more than in any other manufacturing industry. The colony also takes the lead in dairy products, and in amount exported far surpasses all the other colonies. In the number of swine it is similarly pre-eminent, and exports a considerable quantity of pork to the other colonies.

Population.—The aborigines are of a Polynesian race called Maori, are fine looking, though short and rather squat. In 1878 the number returned was 43,595 and in 1891 43,642, of whom 2,119 were half-castes. There are about 20 per cent. more males than females among them. See MAORIS.

Aside from the Maoris, the total population in 1891 was 628,658, of whom 97 per cent. were British subjects and more than one-half were born in New Zealand. The alien population numbered 14,594, of whom 4,444 were Chinese. In 1896 the total population was 743,214, of whom 39,854 were Maoris. In 1899 there were 5,461 marriages, 18,835

births (of which 829 were illegitimate), and 7,680 deaths, giving a surplus of 11,155 births over deaths. The death-rate was 10·24 per 1,000. In the same year there arrived 18,506 immigrants and 16,619 emigrants departed; in the five years 1895–99 inclusive there were nearly 10,000 more emigrants than immigrants. There is no state aid to religion, except in a few cases of endowments obtained at the time of settlement. Over 40 per cent. of the population are adherents of the Church of England, 23 per cent. Presbyterian, 13 per cent. Roman Catholic, and 10 per cent. Methodist.

The chief towns (with population Apr., 1896) are: Wellington (the capital), 41,758 (with suburbs): Auckland (with suburbs), 57,616; Christchurch (with suburbs), 51,330; Dunedin (with suburbs), 47,280; Invercargill, 9,996; Napier, 9,231; Nelson, 6,659; and Oamaru, 5,225.

Commerce.—On Mar. 31, 1900, there were 2,271 miles of railway open to traffic, of which 167 miles were of private ownership, the remainder public. The telegraph system is entirely in the hands of the Government. On Mar. 31, 1900, the colony had 6,910 miles of line, comprising 19,228 miles of wire. The telephone is also in the hands of the Government, and there are 3,160 miles of wire laid, serving 7,150 subscribers. In 1899 the registered vessels of the colony numbered 522, with a combined tonnage of 129,583: 310 were sailing vessels, 212 steamers, In 1899 609 vessels entered and 604 cleared from the ports of the colony. About two-thirds of these vessels were colonial, less than one-third British. Auckland is the most important port, after which come Wellington, Lyttelton, Dunedin, and Bluff Harbor. Nearly all imports are taxed, and on luxuries, such as spirits, wine, and tobacco, the duty is high. The total imports in 1899 were valued at £8,739,633, and the exports at £11,938,335. The chief imports in order of importance were clothing and cloths; iron and steel goods; sugar, paper, books, and stationery; spirits, wine, and beer; and specie. Among the exports the wool equaled in value nearly all the others put together. Next in order was frozen meat, then gold; grain, pulse, and flour; kauri gum; hides, skins, and leather; and butter and cheese. Two-thirds of the imports and exports are with the United Kingdom, but only 5 or 6 per cent. with the U. S. See NEW ZEALAND in the Appendix.

In 1899 there were 5 banks of issue in the colony, of which 2 were wholly New Zealand institutions. The value of the notes of these banks in circulation was £1,195,562. The average deposits in these banks were £14,433,638, and in the private savings-banks £4,192,233.

Administration.—The executive power is in the hands of the governor, appointed by the crown, with a salary of £5,000. He has the power of proroguing Parliament and vetoing legislation. The Parliament, here called the General Assembly, consists of the Legislative Council and the House of Representatives. The members of the first are appointed. Those in office before Sept. 17, 1891, are life members; those subsequently hold for seven years. They number 44 in 1897, and are paid £150 per annum. The members of the House number 74, including 4 Maoris, are elected for three years, and receive £240 per year. Electors may be male or female, must be twenty-one years of age, and have a freehold estate of £25 value. For Maori representation any adult native may vote in the 4 exclusively Maori districts.

Primary education is in public schools, and is compulsory between the ages of seven and thirteen in districts to be decided on by the education department. The University of New Zealand is solely an examining body granting degrees under a royal charter. With it are 3 affiliated colleges, viz., the Otago University, at Dunedin, the Canterbury College, at Christchurch, and the Auckland University College, with a total of 26 instructors and 766 students.

The total revenue in 1899–1900 was £5,386,989, of which over one-quarter came from the railways and less than one-sixth from direct taxation. The amount of expenditure was £5,140,127, excluding the charges of the sinking fund met by debentures. The total expenditures for public works from 1870 to Mar. 31, 1900, was £32,978,626, including discount and charges for raising loans. The net public debt in 1900 was £46,930,077, making £61 17*s.* 3*d.* per head of population. The debt is slowly increasing. The outstanding loans of local governing bodies amounted to £6,963,254 in 1899.

History.—New Zealand was discovered in 1642 by Tasman, who did not land on it. Cook visited the islands several times from 1769 to 1777, circumnavigated them, explored and surveyed their shores in part, and introduced several domesticated animals and plants. The country was little visited, however, because of the bad reputation of the natives. In 1814 Rev. Samuel Marsden established a mission at the Bay of Islands, on the east coast of North island, 80 miles S. E. of North Cape. He was followed by many others, and within a generation the whole population had become nominal Christians. In 1839 the New Zealand Land Company dispatched a preliminary expedition to treat with the natives for the purchase of land. By the treaty of Waitangi in 1840 many of the native chiefs ceded the sovereignty to Great Britain, and in the same year five shiploads of immigrants arrived. Disturbances with the natives occurred from time to time afterward. The most serious was in 1863–64, when the colonial forces had to be supported by several British regiments and ships of war. Final and complete surrender of the natives occurred in 1875. In 1852 a royal act conferred constitutional government on the colony. The colony was divided into 6, afterward 9, provinces, each with its governing council. In 1875 this was abolished and the present system established. Since 1893 women may vote, but are not eligible as Representatives or in the Legislative Council.

REFERENCES.—The official publications of periodical character are numerous and full. Those of Sir James Hector are especially valuable for the geology and climate. See also Hochstetter, *New Zealand, its Physical Geography, Geology, and Natural History* (2 vols., 1868); Griffin, *New Zealand, her Commerce and Resources* (1884); Rusden, *History of New Zealand* (1885); Gudgeon, *History and Doings of the Maoris* (1885); Grey, *Polynesian Mythology and Maori Legends* (1885); Larnach, *Handbook of New Zealand Mines* (1887); Wakefield, *New Zealand after Fifty Years* (1889); Coghlan, *A Statistical Account of the Seven Colonies of Australasia* (1893). MARK W. HARRINGTON.

New Zealand Flax: See FIBER.

Ney, MICHEL: Duke of Elchingen, Prince of Moskva, marshal and peer of France; b. at Saarlouis, Jan. 10, 1769; entered the French army in 1788; was made a brigadier-general in 1797 after the battle of Neuwied, general of division in 1799, after he had greatly distinguished himself by the capture of Mannheim and in Masséna's campaign, and marshal in 1804. He commanded in the Austrian, Prussian, and Spanish campaigns, and distinguished himself at Elchingen, Jena, Eylau, and Friedland. He was ordered to Spain in 1808, and was successful in maintaining French rule over Galicia, but in 1810, while under the command of Masséna, with whom he constantly quarreled, he met with some reverses in Portugal, especially during the retreat from Torres Vedras. His greatest exploits were the battle of Borodino while the grand army crossed the Moskva, his command of the rear guard during the retreat from Moscow, and his exertions in order to organize a new army. After the abdication of Napoleon he submitted to the Bourbons, and was well received by Louis XVIII. When Napoleon returned from Elba, Ney repaired to Paris, assured the king of his fidelity, and received the command of a corps of 4,000 men, with which he marched against the emperor, purposing to capture him and carry him to Paris; but when he saw the enthusiasm with which Napoleon was received everywhere he yielded to the demands of his soldiers and went over to the side of the emperor. In the Waterloo campaign Ney fought the battle of Quatre Bras against the British on the same day that Napoleon defeated the Prussians at Ligny, and at Waterloo he commanded the center with great bravery. After the second restoration he was captured, arraigned for high treason, and placed first before a court martial, which declared itself incompetent, and then before the Chamber of Peers, which by a large majority condemned him to death. He was shot Dec. 7, 1815, in the garden of the Luxembourg, where a monument now stands in his honor. See *Histoire complète du Procès du Maréchal Ney* (2 vols., 1815); Nouval, *Vie du Maréchal Ney* (1833); and Verronais, *Vie militaire de Michel Ney* (1853).

Nez Percé Indians; See SHAHAPTIAN INDIANS.

Ngornu, or **Angornu**: city of Bornu, Central Sudan; on the southwest shores of Lake Chad; 18 miles S. S. E. of Kuka. The great fluctuations of the level of the lake sometimes cause the flooding of the city, and sometimes leave a broad level plain between it and open water. The place is an important trade center, and its importance and population are periodically increased during the markets, when a large traffic is carried on in cotton, amber, metals, corals, and slaves. It is flimsily built, has been moved back farther from the lake shore than its early situation, and is subject to attacks from the predatory tribes which occupy the

islands of the lake. Its population is variously estimated at from 20,000 to 50,000. MARK W. HARRINGTON.

Niagara [from an Iroquois Indian word meaning thunder of water]: a river of North America, forming the boundary between the State of New York and the province of Ontario, Canada, and connecting Lake Erie with Lake Ontario. It is 33 miles long, and has a total fall of 326 feet. It is navigable in its upper course from its issue from Lake Erie to the beginning of the rapids at Niagara Falls, a distance of 16 miles, during which its fall is less than 20 feet; and in its lower course from Lewiston to Lake Ontario, a distance of about 7 miles, during which its fall is only 2 feet. Along its middle course, which contains the celebrated Niagara Falls and is crossed by two suspension bridges, on the Canadian side is the Welland Canal, through which the navigation interrupted by the rapids and falls of the middle course of the river is carried on. In its upper course it forms many islands, and its average depth is 25 feet. In its lower course, from Lewiston to its mouth in Lake Ontario, its depth varies from 100 to 150 feet.

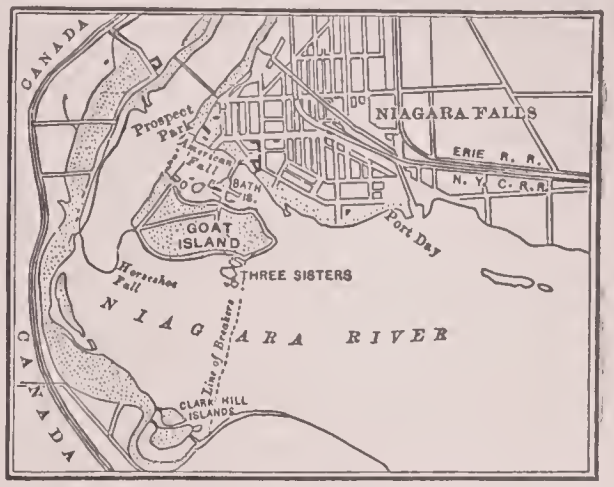
Niagara Falls: cataracts of the Niagara river, discovered by Father Hennepin in 1678, and remarkable for volume of water rather than for height. The general features of the region about the falls looking S. W. are shown in the accompanying cut. Up stream (S.) from the falls the river flows smoothly in a broad channel, little depressed below the general surface of the limestone upland of Western New York. About a mile above the falls the river begins a descent of 50 feet in the upper rapids. At the falls it plunges 160 feet into a narrow gorge about 7 miles long, 200 to 350 feet deep, 800 to 1,500 wide at the top, and generally

Niagara Falls, from the U. S. side.

250 to 500 wide at the water-line. Except for the upper 2 miles, the river pursues a tumultuous course in swift rapids, with a descent of 100 feet, emerging from the gorge at the northern cliffed margin or escarpment of the upland between Lewiston, N. Y., and Queenston, Ontario. The volume of water passing the falls is 280,000 cubic feet per second (U. S. Lake Survey).

The river is divided by Goat island just above the gorge, thus making two falls: the Canadian or Horseshoe fall on the W., the "American" fall on the E. The former has a strongly incurved brink measuring 3,010 feet around the curved crest line, or 1,230 feet across the chord. The face of Goat island, separating the two falls, is 1,310 feet. The American fall, with slight incurvature, measures 1,060 feet from side to side. For 2 miles down the gorge, between the Canadian fall and the lower rapids, the waters flow with relatively smooth surface through a great pool 1,450 feet in greatest width and 189 feet in depth just above the upper suspension bridge, the exceptional depth being attributed to the pounding action of the water beneath the fall. Great blocks or tables of rock sometimes fall from the limestone cliff that incloses the gorge. In 1818 a block fell on the U. S. side; in 1828, 1855, and 1887 blocks fell from the Canadian side, one of these being the formerly well-known Table Rock. In winter-time a great mound of ice forms from the spray beneath the falls, and the walls of the gorge and the trees near the falls are encased in ice.

In order to restore as nearly as possible the natural conditions of the falls, which had been seriously defaced by private owners, and in order to save visitors from annoyance and imposition, which had become extreme, the land on either side of the falls has been converted into public parks. The New York State reservation, containing nearly 107 acres (cost, $1,433,429.50), was opened July 15, 1885; the Queen Victoria Niagara Falls Park on the Canadian side, embracing 154 acres (cost, $436,813.24), was opened May 24,



Niagara Falls reservations.

1888. The gorge is spanned by three bridges, for which see NIAGARA FALLS (the city) and BRIDGES. The finest general views of the falls are to be had from the middle of the upper suspension bridge, and from the high terrace N. of the Horseshoe falls on the Canadian side. An electric railway follows the brink of the gorge from the falls to the escarpment above Queenston. The Cave of the Winds, a hollow behind the falling waters, is entered by many visitors. Engineering enterprise has constructed a tunnel from the bottom of the gorge just below the "American" fall, running back under the city of Niagara Falls for 7,000 feet. See TUNNELS AND TUNNELING.

The geological history of Niagara is of great interest, because of the association of the age of the falls with one of the closing stages of the glacial period. The origin of the limestone upland in which the gorge is cut must be first considered. It consists of relatively resistant strata, 80 to 100 feet thick and dipping gently to the S., of heavy Niagara (Silurian) limestone. The surface of the limestone has been revealed by the gradual stripping off of overlying weaker rocks, and its former northward extension has been much reduced by the erosion of its margin. The retreat of the margin has been accelerated by the undermining of the weaker strata—Niagara, Clinton, and Medina shales and sandstones—beneath it; hence the upland is now terminated by a north-facing bluff or escarpment about 250 feet above the lowland plain that stretches northward from its base, and nearly 40 feet above the present level of Lake Erie.

After the present form of the upland had been essentially produced by the slow weathering of ages, the region was glaciated, the entire surface being buried under a heavy ice-sheet. It is commonly believed that the basin of Lake Erie in weaker rocks S. of the Niagara limestone upland and that of Lake Ontario in weaker rocks N. of the escarpment were in greater part excavated by ice action; but it is difficult to measure the results of this process, and to define how far other processes, such as the warping or obstruction of broad preglacial valleys, may have had to do with forming the basins. Be this as it may, it is known that when the ice-sheet evacuated the region the lakes occupied the basins, much as we now see them; and that wherever the former rivers of the region ran, the post-glacial discharge of Lake Erie took the course of the Niagara river across the plateau and fell over the escarpment on its way to Ontario; thus the cataract was formed at the face of the cliffs. Since then, the strong wearing of the river has caused the recession of the falls at a much more rapid rate than the general retreat of the cliff face under the weak attack of the weather; thus the narrow gorge has been formed, and the falls now stand about 7 miles back from their original position. Their recession continues, and eventually the gorge will be cut back to Lake Erie.

The gorge makes a peculiar bend at the whirlpool, which calls for special explanation. It is believed that at this point the receding falls, which were then working back to the S. W., came upon the drift-filled valley of a small pre-existing stream, which once carried the drainage of a small area of the upland out to the lowland on the N. The further recession of the falls proceeded southward, up the buried valley, from which the drift-filling was rapidly washed out; hence the abrupt angle at the middle of the gorge. The impetus of the river has excavated a basin northwestward from the angle, in line with the old drift-filled valley, but to a greater depth; and here the waters whirl around before escaping into the lower part of the gorge.

The time required for the recession of the falls has been the subject of much study. The falls have been carefully surveyed on four occasions. First in 1842 under James Hall, of the Natural History Survey of New York; in 1875 by the U. S. Lake Survey; in 1886 by R. S. Woodward, of the U. S. Geological Survey; and in 1890 by A. S. Kibbe, of the New York State Engineers. The fall on the U. S. side shows moderate change, its average annual recession in forty-eight years being half a foot. Between 1842 and 1890 the Canadian fall receded 150 to 230 feet along a distance of 900 feet on the western half of its front, and 270 feet at the apex of its curve. This gives an average recession near the middle of from 4 to 6 feet a year; and if this rate had been constant, only about 7,000 years would have been required for the erosion of the gorge.

There is indication, however, that the recession of the falls has not always been at so rapid a rate, and that its age is greater than 7,000 years. The volume of water, the most important factor in determining the rate of retreat, has probably varied greatly, for studies of the shore-lines of the Great Lakes make it clear that their basins have been gently uplifted on the N. since the ice-sheet withdrew, causing changes in their lines of discharge. Before the uplift, it is quite possible, even probable, that Lake Huron drained across the Province of Ontario directly to the lake of that name; in that event, Niagara river must have had but a small fraction of its present volume, and the recession of the falls must have been slow. The great depth of water in the pool below the falls seems to indicate a decided increase in the volume of water about the time that the falls had receded to a point somewhat above the cantilever bridge. The height of the falls has decreased during the retreat, for the limestone cap of the upland descends gently southward, while the rapids below the falls ascend southward; and this loss of height must have had some effect on the rate of recession. It is probable that after the arrival at the drift-filled valley by which the whirlpool is explained there was an increased rate of recession for a time. These and other factors on which the retreat of the falls depends are at present so uncertain that no definite statement can be made as to the time since the river first leaped over the escarpment. The age of the falls is of importance because it gives means of dating a closing stage of the glacial period. It is pretty well ascertained that during the earlier stages of the northward recession of the continental ice-sheet the St. Lawrence valley was obstructed by ice, and the waters of Erie and Ontario were united in a great lake, whose waters ran out to the S. W. by the Wabash river, across Ohio and Indiana to the Ohio river. At a later stage of ice retreat, an outlet was opened eastward down the Mohawk; then the eastern waters fell to a lower level than the edge of the Niagara plateau, separating the two lakes, Ontario occupying the lower basin N. of the escarpment, while Erie lay in the higher basin S. of the escarpment and drained northward over its rim.

An account of the geology of the Niagara gorge is given in the *Natural History of New York*, Geology of the Fourth District, by James Hall (1842); a history of the river, by G. K. Gilbert, is given in the Sixth Annual Report Commiss. New York State reservation at Niagara (1890). An account of the various surveys of the falls with maps and measurements is presented by A. S. Kibbe, in the Seventh Annual Report (1891). A popular account of Niagara is given in *The Niagara Book*, by various authors.

W. M. Davis.

Niagara Falls: city (formed by the consolidation of the villages of Niagara Falls and Suspension Bridge, incorporated in 1892); Niagara co., N. Y. (for location, see map of New York, ref. 4–C); on the Niagara river, and the Erie, the Lehigh Valley, the Mich. Cent., and the N. Y. Cent. and Hudson River railways; 13 miles S. of Lake Ontario, 20 miles N. of Buffalo. The river is here crossed by three remarkable bridges, viz., the upper suspension, built of steel, a foot and carriage bridge, about 300 feet below the falls on the U. S. side, 821 feet span and 260 feet above the water, built to replace one destroyed in the winter of 1889; the cantilever, 910 feet in length, a short distance up stream from the Whirlpool Rapids, built in 1883, the first bridge of its kind constructed in the U. S.; and the railway suspension, 300 feet N. of the cantilever, built of steel, with a carriage-way 28 feet below the track. (See Bridges.) For ages the enormous power of the river was allowed to go to waste, though many projects were conceived to utilize it. The first practical step and triumph of engineering skill was the construction of a hydraulic canal, extending from a point above the falls, through the center of the city to the gorge. From this a 5,000 horse-power was obtained. Since then a great tunnel has been completed at a cost of about $4,000,000, for the purpose of securing a vastly increased water-power for manufacturing purposes. (See Tunnels and Tunneling.) The land and islands surrounding the "American" falls (that is, the falls on the U. S. side) have been appropriated for a State reservation, and the land on the Canadian side of the river now constitutes a similar reservation. From the lands within the New York State reservation the greater part of the scenery for which the locality is famous is visible. (For description of the falls and reservations, see Niagara Falls). The city contains 10 churches, Niagara University (Roman Catholic, organized 1856, chartered 1883), De Veaux College (Protestant Episcopal, chartered 1853), a national bank with capital of $100,000, 3 State banks with combined capital of $200,000, and 2 daily, a semi-weekly, and 2 weekly newspapers. It has numerous hotels and boarding-houses. The industries include the manufacture of paper, pulp, flour, silver-plated ware, paper-coating, and machinery. The assessed valuation of the city in 1893 was $9,704,165, and the total debt in 1894 was $512,000. Pop. of village (1880) 3,320; (1890) 5,502; of city (1900) 19,457.

Editor of "Gazette."

Niagara Falls: another name for Clifton (*q. v.*), a town of Ontario, Canada.

Niagara Group: an American geological formation representing part of the Upper Silurian period; so named by the Geological Survey of New York on account of its typical development along Niagara river. It is exposed throughout the breadth of New York a short distance S. of Lake Ontario, and has a thickness of 300 feet, consisting of shale below and limestone above. At Niagara Falls there are 80 feet of shale overlaid by 85 feet of limestone. In Ohio, Michigan, and other Western States, the shale becomes thin, but the limestone increases to 600 or 800 feet. It occurs also in New Brunswick, Newfoundland, etc., where it is thicker than in New York. The limestone is largely used for building purposes, especially for abutments of bridges, etc. The deposit is marine, and in many places abounds in fossils; some of the earliest land-plants, consisting of the trunks of trees which drifted far from shore, are found in it.

Israel C. Russell.

Niare, Zamouse, or **Bush-cow** [*niare* and *zamouse* are from native names]: a wild ox (*Bubalus pumilus*) found in Western and Western Equatorial Africa. It has no dewlap, has sharp, crooked, and short horns, large and finely fringed ears, and a fierce disposition. It is of a rather small size; it is sometimes trained for the saddle, and may be taught to obey the bit as well as horses; but its pace is only 4 or 5 miles an hour.

F. A. L.

Nias': an island of the Malay Archipelago, a short distance to the W. of Sumatra, near the equator. It is 70 miles long, with an average breadth of 16 miles; is mountainous, and is surrounded with coral reefs, but is fertile, producing rice, sugar, and large quantities of pepper. The inhabitants are estimated at from 200,000 to 250,000. They are closely allied in appearance and language to the Battas, an independent and warlike race in Sumatra. Nias is especially remarkable for the persistency with which the slave-trade has continued there. It is due to intertribal wars. Modigliani's *Un viaggio a Nias* (1890) is an excellent monograph on the island.

Revised by M. W. Harrington.

Nibelungenlied, nee'be-loong-en-leet': the greatest popular epic of the Middle High German period. It was composed by an anonymous poet at the close of the twelfth cen-

tury. The poem is divided into cantos, called adventures, the number of which varies in the different manuscripts. We can further distinguish in the epic two great parts, in the first of which the scene is laid on the Rhine, with Worms as the center, while the chief events of the second part take place on the lower Danube, at the residence of Attila, King of the Huns. The principal hero of the first part is Siegfried, Prince of the Netherlands, who assists Gunther, the King of the Burgundians, in obtaining the hand of Brunhilde, or Brynhild, the powerful Queen of Iceland, and who is rewarded with Kriemhilde, the beautiful sister of Gunther. The envy and jealousy of Brunhilde cause a quarrel between her and Kriemhilde, and finally lead to the murder of Siegfried by Hagen, the faithful vassal of Gunther and deadly enemy of Siegfried. The central figure of the second part is Kriemhilde, who, after the death of Siegfried, thinks of nothing but of avenging herself on the murderers of her husband. For this purpose she marries Attila, and invites Gunther, who had consented to the murder of Siegfried, to visit her with his Burgundians at Attila's residence. Contrary to the advice of Hagen, Gunther and his brothers, Gernot and Gieselher, accept Kriemhilde's invitation. They march to the Danube, and finally arrive at Attila's court, where, after a long and dreadful struggle, all are killed, including Kriemhilde. Only Attila, his friend Dietrich von Bern, and the latter's faithful companion Hildebrand, survive to lament the fearful catastrophe.

The subject-matter of the poem is based upon the German hero-legends which originated in the times of the migration of the tribes, and which formed the favored contents of many single hero-songs previous to their final combination into one great epic. The account in the *Nibelungenlied* of the annihilation of the Burgundians by the Huns has preserved the reminiscence of the historical fact that Attila, in 437, defeated the Burgundians under Gundahari (Gunther), whose capital was Worms. The name of Kriemhilde may also be historical, if the report of Jordanis is correct, according to which (cap. 49) Attila died by the side of a girl named Ildico, which name is the diminutive of Hilde. In Dietrich von Bern we have the famous Theodoric the Great (475–526) of history, who is the most prominent figure in the German hero-legend. Though he reigned long after the death of Attila (453), the legend nevertheless has him appear as a fugitive at Attila's court, thus illustrating the free manner in which the legend treats historical truth.

Concerning Siegfried and his relations to Kriemhilde and Brunhilde there are no historical accounts, unless we accept the views of some recent investigators who see in him the historical Arminius. Owing to the fact that in the *Nibelungenlied* Siegfried and Brunhilde present certain features of character (their extraordinary physical strength, Brunhilde's strange aversion to marriage, etc.) which are seemingly supernatural, a number of scholars hold the view that both are of mythological origin. This opinion derives its main support from the Old Norse version of the Siegfried legend in the *Eddas*, according to which Siegfried and Brunhilde seem to belong to the family of Germanic gods and demigods. Outside of the Norse versions no trace of such divine origin for them has, however, been found in Germanic mythology, and there is, moreover, not the slightest reason offered to explain the strange fact of this old Germanic myth of Siegfried and Brunhilde combining with the historic legend of the Burgundians. All the mythological speculations concerning the divine pre-existence of Siegfried and Brunhilde must therefore be dismissed as more or less clever conjectures. It is far more probable that the Siegfried legend, like the legend of the Burgundians, preserved the reminiscence of the tragic fate of some national hero, who presumably lived before the migration of the tribes, in an age which was accustomed to adorn its heroes with superhuman attributes.

Both legends, that of Siegfried as well as that of the Burgundians, originated among the Franconians, whence they migrated to the North and to other German tribes. We can distinguish two such migrations of the legends to the North, one which probably took place as early as the sixth century and a second one during the thirteenth century, the account of which is embodied in the *Thidreksaga*. Lachmann believed that the *Nibelungenlied* in the form handed down to us was not written by a single poet, but was a conglomeration of old hero-songs. While the existence of such songs must be admitted at least for the beginning of the twelfth century, it is quite obvious that the skillful plan and artistic unity of the poem could not be attained by a mere compiler, but must be ascribed to the conscious work of a single poet. Who this great poet was we do not know, and all the guessing as to his identity and home has proved fruitless.

That the *Nibelungenlied* was a very popular epic can be seen from the number of manuscripts still extant. Among these (ten complete manuscripts and eighteen fragments) the most important are the three which date back to the thirteenth century, and which, since Lachmann, are usually quoted as A, B, C. As to their respective age and authenticity, Lachmann, the editor of MS. A, held that this, the most imperfect of the three, was the original, while Holtzmann, and especially Zarncke, attempted to prove the greater antiquity of MS. C, of which Zarncke made an excellent edition. This difference of opinion was mainly due to opposing views concerning the origin of the poem, and it resulted in a long and bitter fight between the leaders and followers of both schools, known as the famous Nibelungenstreit. The view now held by most scholars is that of Karl Bartsch, who showed in his *Untersuchungen über das Nibelungenlied* that none of the three MSS. represents the original, that the latter is lost, and that MS. B, which was edited by Bartsch, preserved the original more faithfully than the others.

For several centuries the *Nibelungenlied* was entirely forgotten, until Bodmer, in 1757, called attention to it by editing parts of the epic. His efforts created, however, little interest among his contemporaries, Frederick the Great, for instance, treating with contempt all attempts to revive mediæval German literature. A change in the critical estimation and understanding of the poem was brought about by the Romanticists and by the rise of national feeling during the wars with Napoleon I. Then the poem was interpreted and studied at several universities, and in 1815 Zeune published an edition of the epic for the young men who were to carry it with them to the battle-fields. Since then the *Nibelungenlied* has constantly increased in popularity. The greatest philologians of the nineteenth century, like the Grimms, Lachmann, Müllenhoff, Zarncke, Bartsch, and Scherer, devoted themselves to its elucidation, and numerous translations carried the knowledge of it into the widest circles. While in former periods the poem had to suffer from unjust comparisons with Homer, it is now universally considered the greatest national epic of the Germans, in which the wild passions and valorous deeds of a heroic age and the most tender and sacred emotions of the human breast find their artistic expression. For although the characters of the epic appear in the knightly guise of the twelfth century, we can still notice that that the principal heroes really belong to a more primitive period. With marvelous skill the author has depicted his times as well as those of the older heroic age, carefully preserving the epic style despite the lyrical character of the strophe which he employs, and thus creating a work of poetry rich in colors, full of dramatic life and of the deepest ethical sentiments—a picture of the Germanic character and mind in their period of youth.

Bibliography.—The principal editions of the *Nibelungenlied* by Lachmann, Zarncke, and Bartsch have been mentioned above. An excellent list of the most noteworthy literature on the subject is given by Zarncke in the introduction to his edition of the poem. See Hermann Fischer, *Die Forschungen über das Nibelungenlied seit K. Lachmann* (1874); R. von Muth, *Einleitung in das Nibelungenlied* (1877); K. Lachmann, *Ueber die ursprüngliche Gestalt des Ged. von der Nibelungen Noth* (1816); A. Holtzmann, *Untersuchungen über das Nibelungenlied* (1854); F. Zarncke, *Zur Nibelungenfrage* (1854); K. Müllenhoff, *Zur Gesch. der Nibelungen Not* (1855); K. Bartsch, *Untersuchungen über das Nibelungenlied* (1865); W. Willmanns, *Beiträge z. Erkl. u. Gesch. d. Nibelungenlieds* (1877); R. Henning, *Nibelungenstudien* (1883); W. Grimm, *Die deutsche Heldensage* (1889); A. Rassmann, *Die deutsche Heldensage u. ihre Heimath* (1857); R. Heinzel, *Ueber d. Nibelungensage* (1885); W. Müller, *Mythologie d. d. Heldensage* (1886); W. Golther, *Studien zur germ. Sagengeschichte* (1888); Sophus Bugge, *Studien über die Entstehung d. nord. Götter u. Heldensage* (1882); E. Mogk, *Die älteste Wanderung d. d. Heldensage nach d. Norden in Forschungen zur germ. Philologie* (1894); Lichtenberger, *Le poème et la légende des Nibelungen* (1891). The best modern High German version of the *Nibelungenlied* is by K. Simrock (52d ed. 1892).

Julius Goebel.

Nicander of Colophon: Greek didactic poet of the second century B. C. He was the author of a lost epic poem,

Ἑτεροιούμενα, in five books, which suggested Ovid's *Metamorphoses*. We still have a poem, Θηριακά (Remedies against the Bites of Venomous Animals) and Ἀλεξιφάρμακα (Remedies against Poisons), in which the author has sought to enliven the ungrateful theme by digressions and descriptions. There are editions by J. J. G. Schneider (1816) and by O. Schneider (1856). B. L. G.

Nicara'gua: a republic of Central America, between Honduras on the N. W. and Costa Rica on the S., extending from the Caribbean Sea to the Pacific. Area about 40,000 sq. miles. The general outline is nearly an isosceles triangle; one side forms the Caribbean coast, which runs from N. to S. about 300 miles; the Pacific coast trends from S. E. to N. W. and terminates in the Bay of Fonseca, which separates Nicaragua from Salvador. The main mountain axis enters the country from Honduras, passes across it in a southeasterly direction, and terminates at the San Juan river; it is nearly parallel with the Pacific coast and about 90 miles distant from it. Eastward from this range the country falls to low and often swampy lands along the Caribbean coast. Near the Pacific coast, and roughly parallel to it and to the central range, there is an irregular line of volcanic peaks. Nearly all the active and quiescent volcanoes of Nicaragua are in this line, and some of them rise to more than 6,000 feet. Between the volcanoes and the central range is the lake valley, 300 miles long, the most striking natural feature of Nicaragua, and one which has largely determined its history. In it are the two beautiful lakes Managua and Nicaragua, respectively 134 and 110 feet above sea-level in the dry season, and connected by a short river, the Panaloya or Tipitapa; from the southeastern end of Lake Nicaragua the waters are discharged through the San Juan river, 108 miles long, to the Caribbean Sea. Though the outlet is to the Atlantic side, the lake valley is properly on the Pacific slope. The line of volcanic mountains is not continuous; on the contrary, its peaks are scattered, some of them near the coast and some bordering the lakes; indeed, several of them are on islands in Lake Nicaragua. Between these volcanic cones the divide between the lakes and the Pacific is merely a line of low hills, and in some places even these are wanting. Lake Managua is 32 miles long by 16 wide, and deep enough everywhere for the small steamers which ply on it. The Momotombo volcano, on its northern side, is one of the highest peaks in the country (6,255 feet), and the shores everywhere are remarkable for their picturesque beauty. Northwest from the lake the plain of Leon stretches to the Pacific, and is now crossed by a railway. The Tipitapa river, between the two lakes, has little water in the dry season, and is never navigable for large vessels. Lake Nicaragua is 92 miles long by 34 wide, and from 12 to 83 feet deep; its three largest islands, Ometepe, Zapadero, and Solentiname, are simply mountains rising from the water, and the first is a more or less active volcano. At one point the lake is separated from the Pacific by a neck hardly 12 miles wide, and without high hills; here it is proposed to make the Pacific section of an interoceanic ship-canal, on a line 17¼ miles long. See SHIP-CANALS.

The total population of the republic by the census of 1890 was only 360,000; of these, 198,000 were classed as Indians (generally civilized peasantry) and 144,000 as mixed races. Much the greater part of this population is gathered about the lakes and in the space between them and the Pacific. All the northeastern part is very thinly inhabited, mainly by semi-civilized or wild Indians, and portions of it are covered with heavy forests. On the eastern coast is the Mosquito Reserve or MOSQUITIA (*q. v.*), where, as yet, the Nicaraguan Government has only a nominal authority. The eastern and northeastern regions have several good-sized rivers, flowing through fertile valleys; only the low coast lands are unhealthful. The only important industries of Nicaragua are agriculture (especially coffee-growing), grazing, the collection of rubber and dye-woods in the forests, and gold-mining; the annual product of the gold mines (nearly all in the northern districts) does not exceed 23,000 oz. The annual exports now (1894) average in value about $4,000,000, the principal items being coffee, rubber, dye-woods, hides, gold bullion, and fruits (from the Mosquito Coast). Of the total exports, about one-fourth are to the U. S. The imports considerably exceed the exports, about one-fifth coming from the U. S. There are 122 miles of Government railways connecting the lakes with the Pacific coast at Corinto; about 1,600 miles of telegraph lines are also operated by the Government. The common language is Spanish, but some of the Indians still speak their own dialects. The government is a centralized republic; the executive is a president, chosen for four years, and not eligible for re-election for the succeeding term; congress consists of a senate (two senators from each of the twelve departments) and a chamber of deputies (one for every 20,000 inhabitants). All male adult citizens are electors. The Roman Catholic is recognized as the state religion, but other cults are tolerated. The external national debt in 1900 was $1,315,692; the internal debt $3,510,047; total, $4,825,739. The revenue for 1898 was $1,808,331, and the expenses for the same year amounted to $2,175,686. Interest on the debt is regularly paid. The coast of Nicaragua was discovered by Columbus in 1502, and the country was first explored by Gil Gonzalez Davila, who reached the lake region from the Pacific side in 1523; he found a large Indian population. Granada (the original capital) and other towns were founded by Francisco Hernandez de Córdoba in 1524–25. Not long after Nicaragua was made a province of Guatemala, and it continued so until the Central American countries became independent of Spain in 1821. From 1823 to 1839 it was a state of the Central American confederation. During this period, and after it assumed the position of an independent state, there were frequent civil wars, culminating in 1856 in the subjection of the country to the filibuster William Walker, who, however, was expelled in Apr., 1857. With the new constitution of 1858 and the presidency of Tomás Martinez began a period of peace and comparative prosperity, occasionally broken by short wars with some of the other Central American countries. In 1893 there was a civil war, resulting in the election of Gen. José Santos Zelaya. In 1895 Nicaragua united with Honduras and Salvador to form the "Greater Republic of Central America." Since 1857 the capital has been Managua. See NICARAGUA in the Appendix.

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Nicaragua (town): See RIVAS.

Nicaragua, Lake: See NICARAGUA.

Nicaragua Ship-canal: See SHIP-CANALS.

Niccolini, GIOVANNI BATTISTA: poet; b. at S Giuliano, near Pisa, Italy, Oct 31, 1782. He studied first at Florence, then philosophy and jurisprudence at Pisa but later turned to classical literature. In Florence he made the acquaintance of the already famous Ugo Foscolo, who conceived a deep affection for him and greatly influenced his literary ideals. Indeed, he is supposed by some to have made him the Lorenzo of the *Ultime lettre di Jacopo Ortis*. Niccolini's first poetical success was a poem (*La Pietà*) on the plague in Leghorn (1804). In 1807 Élise Bonaparte, then Queen of Etruria, made him professor of history and mythology in Florence, where his lectures made a sensation. After the Restoration he was for a time librarian of the grand ducal palace, but the sneers of the courtiers drove him back to his earlier employment. In the meantime he had begun to write plays. His first piece, *Polissena* (1810), was later crowned by the Accademia della Crusca (1818). This was followed by the less important *Medea*, *Edipo*, *Ino e Temisto*, and by versions of the *Seven against Thebes* and *Agamemnon* of Æschylus. In 1815 his first drama, employing modern material and showing an approach to the romantic manner, *Matilda* (in imitation of the *Douglas* of the English John Home), had but moderate success. In *Nabucco* (printed anonymously in London, 1819) he entered upon the drama of political tendencies, slightly veiling under Assyrian names figures of the Napoleonic era (Nabucco = Napoleon; Mitrane = Pius VII.; Arsace = Carnot). Ceasing now for a time to write plays, he took part vigorously in the struggle for literary reform then raging. In 1827, however, he produced a new drama, *Antonio Foscarini*, intended to show a way of reconciliation between romanticism and classicism, but also full of political intentions. A violent controversy at once followed the representation of this. In *Giovanni da Procida* (1830) he uttered his first unmistakable revolutionary cry, a protest against foreign domination in Italy. *Lodovico Sforza detto il Moro* (1833) was unimportant, as was also *Rosmunda d'Inghilterra* (1837); but *Arnaldo da Brescia*, a dramatic poem (secretly printed at Marseilles, 1843), was a political event of the first importance, by reason of the vehemence of its

criticism of the Guelph ideas then dominant in Italy. His later plays, *Filippo Strozzi*, *Beatrice Cenci* (in imitation of Shelley), and *Mario e i Cimbri* (a national lyric drama), are less interesting. Niccolini was critic as well as poet, and we have from him several interesting treatises: *Del sublime e di Michelangiolo* (1825); *Dell' imitazione nell' arte dramatica* (1828); *Sull' romanzo storico* (1837); and, above all, *Discorso sulla tragedia greca* (1844). He died at Florence, Sept. 20, 1861, leaving in manuscript a *Storia della casa di Hohenstaufen*. The first collected edition of his works was in three volumes (Florence, 1831; 4th ed. 1858). This has now been superseded by Prof. Corrado Gargiolli's complete edition in ten volumes (Milan, 1862, *seq.*). See also Vanucci, *Ricordi della vita e delle opere di Giovanni Battista Niccolini* (2 vols., Florence, 1866). A. R. Marsh.

Niccolo da Pisa, nĕĕ-kō-lō-daa-pee'saă: sculptor and architect; b. at the beginning of the thirteenth century. His style, which is unlike that of the artists of his own epoch, is supposed to have been formed on the study of the antique. The Emperor Frederick II., when in Rome in 1221, secured Niccolo's services, and a little later commissioned him to design and erect the fortifications of the castle at Capua and other places. In 1225 Niccolo was called to Bologna to build the convent and church of the Dominicans. In 1231 he was at Padua erecting the Basilica of St. Anthony; he afterward built the Church of S. Maria Gloriosa dei Frari in Venice. Later he made many designs for the Church of San Giovanni at Siena and some buildings and improvements at Pisa, where he was obliged to lay the foundations of his buildings on piles. He built the Church of St. Michael and several palaces in this manner; also the campanile of the Augustinians. He made designs for San Domenico at Viterbo and for San Lorenzo at Naples. He enlarged and embellished the cathedral at Volterra. At Lucca he sculptured several works, among others a *Deposition* (dated 1237) over a door of the cathedral. He erected the monastery and Church of Ss. Trinità at Florence, which Michelangelo admired so much. His statue of a *Virgin and Child* which he made for San Domenico at Bologna was continually imitated by other sculptors, and he was consulted on every important question in architecture and in engineering. In 1260 he built the famous Baptistery at Pisa, in 1267 sculptured the *arca* or shrine of San Domenico in the church of that saint in Bologna, and in 1268 the pulpit for the Siena cathedral. Charles X. of Anjou sent for him to come to Naples to build the abbey of Tagliacozzo. Niccolo was recognized as the greatest sculptor of the age. D. at Siena in 1278. W. J. Stillman.

Niccolo of Arezzo, called also Niccolo Lamberti and Niccolo di Piero: sculptor and architect; b. at Arezzo in 1350. He studied sculpture with Moccio of Siena, whom he soon surpassed. Two statues for the campanile of Sta. Maria dei Fiori proved his skill, but on account of the plague he left Florence in 1383 and went to Arezzo, where he worked at a bas-relief for the Brotherhood of Sta. Maria della Misericordia. The wall of Borgo San Sepolcro having been demolished by an earthquake, Niccolo was sent to repair it. He was driven from Arezzo by civil war and returned to Florence, where he took part in the work at Or San Michele and Sta. Maria dei Fiori, and was chosen one of the seven sculptors to compete for the gates of the Baptistery. Boniface IX. required him to come to Rome after this to repair the Castel St. Angelo. It is supposed that he afterward went to Milan in the service of the Visconti, and that he was the architect called Niccolo Selli of Arezzo who worked for John Galeazzo at the time the Certosa of Pavia was begun. In 1411 the monument of Pope Alexander V. was intrusted to him at Bologna. This fine work still exists at the Certosa. His work is often mistaken for that of Andrea Pisano. D. in Bologna in 1417.
W. J. Stillman.

Nice, nees, or **Nicæ'a** [Gr. Νίκη, liter., victory, or Νίκαια (sc. πόλις, city), city of victory, liter., femin. of νίκαιος, pertaining to victory; cf. Mod. Turk. name, *Isnik* < Gr. εἰς Νίκαιαν, to Nicæa]: an ancient capital of Bithynia; 44 miles S. E. of Byzantium. According to Strabo, it was founded by Antigonus (d. 301 B. C.) and rebuilt by Lysimachus (d. 281 B. C.), who changed its name from Antigonia to Nicæa, in honor of his first wife. It was rectangular, 16 stadia in circuit, and surrounded by massive walls. Two œcumenical councils were held here: the first (325), consisting of 318 bishops, was the first General Council of the Christian Church, and the most important of the series. It condemned Arius, formulated the Nicene Creed, and determined when Easter should be observed. The second (787), reckoned the seventh œcumenical, of 350 bishops, sanctioned the use of pictures in worship. Nice was captured (1078) by the Seljuk Turks and retaken (1097) by the Greeks and crusaders, who brought their ships 7 miles overland. From 1204 to 1261, while Constantinople was in the hands of the Franks and Venetians, it was the capital of the Byzantine empire. Since 1330 it has been held by the Ottomans. In the solitary church (of the eleventh century) still existing is a rude realistic picture of the first council. See Isnik.
E. A. Grosvenor.

Nice (Ital. *Nizza*): capital of the department of Alpes-Maritimes, France; at the foot of the Alps, on both sides of the mouth of the Paglione; 140 miles E. by N. of Marseilles (see map of France, ref. 8–I). It consists of the old town, the new town, and the port, and the three divisions have very different appearances, but they are all connected with each other and surrounded by beautiful promenades, drives, and public gardens, which, together with the exceedingly mild and salubrious climate, yearly attract thousands of foreigners who spend the winter here. It has spinning and weaving factories, and manufactures of artistic pottery, wax, essences, and perfumeries; flowers and fruits are raised on a large scale, and the preservation of the latter forms a prominent industry. Its trade in oil, wine, hemp, and silk is also very important. In 1388 it acknowledged the supremacy of the house of Savoy, and in 1814 became part of the kingdom of Sardinia, but was in 1860 ceded to France. Pop. (1891) 74,250; (1896) 93,760.

Nice, Councils of: See Nice or Nicæa.

Nicene Creed: See Creed.

Niceph'orus: Byzantine historian and Patriarch of Constantinople; commonly regarded as a saint and called the Confessor; was born in 750. Although a layman, he was against his will appointed patriarch by Nicephorus I. in 806, but was persecuted and finally deposed in 815 by the iconoclast Leo V., the Armenian, who banished him to a monastery in the Princes' islands. There he composed many works, deservedly admired for their accuracy, learning, and finished style. Among them are a *Brief History of Constantinople* from 602 to 770, a *Chronology* from Adam to the time of the author, and various treatises on the iconoclastic controversy. D. in 828. Banduri was preparing a comprehensive edition of Nicephorus's works, but died before it was complete. Some were published by Neri (1849) and others by Petra (1852)
E. A. Grosvenor.

Nicephorus: name of three Byzantine emperors. Nicephorus I. (803–811). A soldier, eventually general-in-chief. He rebelled against Constantine VI., by whom he was defeated. His life was spared, but his eyes were put out. In 803 a popular insurrection broke out against the Empress Irene, the sole sovereign, and raised Nicephorus to the throne. He was ambitious and brave, but perfidious. He fought against his two great contemporaries, Charlemagne and Haroun-al-Rashid, was constantly unsuccessful, and obtained peace by paying tribute to each. Making war against Crum, King of the Bulgarians, he invaded Bulgaria; but his whole army was destroyed in the passes of the Balkans, and Nicephorus was captured and put to death (811). His skull, lined with silver, served as a drinking-cup.—Nicephorus II. See Phocas II.—Nicephorus III., Botoniates (1078–81). An intrepid and able general before his accession, on the throne he was indulgent and pusillanimous. His reign was distracted by insurrections, which he was too feeble to suppress. Finally, attacked by the partisans of Alexius Comnenus and desirous of averting civil war, he resigned his crown and became a monk.
E. A. Grosvenor.

Nich'iren [liter., lotus of the sun]: a Japanese priest; b. 1222 A. D.; founder of the Hokke-shiu or Nichiren-shiu, one of the most popular of Buddhist sects. His fanaticism and bitter quarrels with other sects caused him to be banished to Cape Idzu, whence he returned in 1263 A. D. after a two years' exile. A second banishment and a period passed as a hermit in the mountains of Koshiu marked the close of his career. D. in 1282. The incidents of his life figure largely in Japanese art. The chief temples of the sect are at Ikegami, 6 miles S. of Tokio, and its chief book is the *Hokkekiō*, divided into two sections of fourteen chapters each, the first giving Buddha's life up to his thirtieth year, the second the rest of his teachings. These Buddhists recognize a difficult observance for the clergy and an easy one for

the laity. Their central doctrine teaches that every living plant or being may, by successive transmigration, attain to Buddhaship. Man works out his own salvation by observing the law and by prayer, not by relying on Amida Buddha, as some other sects teach. There are two forms of teaching; one symbolic, the other the pure truth. Shaka (that is, Sakya-muni, or the Buddha), whose emblem is the lotus, is worshiped; and the founders, Nichiren and Kishimojin, are held in reverence. J. M. Dixon.

Nichol, John Pringle, LL. D.: astronomer; b. at Brechin, Scotland, Jan. 13, 1804, the son of a bookseller; taught school in early life; studied for the ministry of the Scottish Church, and was licensed to preach, but soon devoted himself to science; became a successful popular lecturer upon astronomy, in which capacity he visited the U. S., and Professor of Practical Astronomy in the University of Glasgow. Among his works were *Views of the Architecture of the Heavens* (1838); *The Stellar Universe* (1848); *The Planetary System, its Order and Physical Structure* (1851); and *Cyclopædia of the Physical Sciences* (1857). D. at Rothesay, Scotland, Sept. 19, 1859.

Nicholas, Saint: Bishop of Myra, in Lycia, Asia Minor; b. at Patara, in Syria. He is the chief patron saint of Russia; patron of numerous seaports; patron saint of children, especially schoolboys, poor maidens, travelers, merchants, and sailors; one of the most popular saints of the Christian Church. On the day of his birth he stood up in his bath with folded hands mutely thanking God that he saw the light. He would nurse only once on Wednesdays and Fridays. He was while a little boy pointed out as a saint. He became a priest and a monk in the monastery of Holy Sion, near Myra, and rose to be abbot; made a pilgrimage to Palestine, and on his return settled in Myra, which was only 3 miles from Patara, where he was chosen bishop. In 325 he attended the Œcumenical Council of Nice, and boxed the ear of Arius because he was so horrified at Arius's blasphemy. He was a miracle-worker upon a stupendous scale. He quelled storms at sea, foretold the future, multiplied loaves of bread, and even raised the dead. He died on Dec. 6, 326, and was buried at Myra, but his relics were removed to Barri, in the kingdom of Naples, in 1087. The most famous story told about him is to the effect that by the clandestine gift of three purses of gold he portioned off three penniless girls whose bankrupt father had contemplated for them a life of shame. It is this story which occasioned the representation of the saint with three golden balls, placed sometimes upon the book he carries, sometimes at his feet, again in his lap. The stories of his deliverance of sailors and shipwrecked persons made him the patron saint of merchants, and as the early merchants were necessarily money-lenders, the three golden balls of their patron saint were adopted by the merchants' guild. So it came to pass ultimately that the golden balls of St. Nicholas became the symbol of the pawnbroker. The care he showed in the protection of children made him their patron, and led to the fiction that he would give them presents on the eve of his festival (Dec. 6). This idea has been transferred to Christmas eve, and in the famous poem of Clement C. Moore, '*Twas the night before Christmas*, the saintly Bishop of Myra appears in any but a dignified way; yet Santa Claus is a corruption of the Dutch name of St. Nicholas, and the Dutch in New Amsterdam celebrated a San Claus holiday.

Samuel Macauley Jackson.

Nicholas: the name of several popes. Nicholas I. (858–868), a Roman by birth, an imperious and energetic character; asserted the papal authority with great success against the metropolitan in his controversy with Hincmar of Reims, and even against the royal and imperial power, compelling Lothaire, King of Lorraine, who was supported by his brother, the Emperor Louis, to abandon his mistress, Walrada, and reinstate his legitimate wife, Theutberga, in her rights as queen. Less successful was his contest with the Patriarch of Constantinople, Photius, who had usurped the see after the deposition of Ignatius by the emperor. Nicholas excommunicated Photius and demanded the reinstatement of Ignatius, but the emperor, Michael III., supported Photius, who in his turn excommunicated Nicholas, arguing that the highest ecclesiastical authority had been transferred from the see of Rome to that of Constantinople by the transference of the imperial residence.—Nicholas II. (1058–61), who was guided throughout his pontificate by the advice of Hildebrand, afterward Gregory VII., held the famous Easter Council in Rome, 1059, which placed the papal election in the hands of the cardinals, and required the assent of the emperor only in the last instance.—Nicholas III. (1277–80) deprived Charles of Anjou of his vicariate of Tuscany, and forced Rudolph of Hapsburg to cede the Romagna and the exarchate of Ravenna.—Nicholas IV. (1288–92) was an unimportant pontiff, remembered chiefly for his abuse of the absolving power in annulling the treaty by which Charles of Anjou had obtained from Alphonso III. of Aragon his release from prison.—Nicholas V. (1447–55), b. at Pisa in 1398, a peaceable and learned man; reorganized and enlarged the Vatican Library and the University of Rome, and gathered in Rome a great number of the most celebrated scholars of the age, among whom were many Greeks who fled to Western Europe on the downfall of the Eastern empire.—In 1328, Louis of Bavaria raised Peter de Corbario as anti-pope to John XXII., under the name of Nicholas V., but he died shortly after in the papal dungeon, and is not counted in the papal succession.

Nicholas I., Nikolai Paulovitch: Czar of Russia (1825–55); b. at St. Petersburg, July 7, 1796; the third son of the Emperor Paul. Before his accession he traveled, visited England, married in 1817 the eldest daughter of Frederick William III. of Prussia, and lived at St. Petersburg in domestic retirement, occupied by military studies. On the death of Alexander I., the elder brother, Constantine, resigned the crown, and thus Nicholas succeeded to the throne. A formidable military conspiracy, which endangered not only his succession but the very existence of the empire, he put down with admirable courage and presence of mind, but also with a relentless severity which approached cruelty. In his reign wars were carried on in Central Asia, the Caucasus, Turkey, Poland, Hungary, and with the Western powers, but he himself possessed slight military skill. He was a good administrator and a vigorous but intolerant ruler. As a diplomat also he had some talent. For several years after 1849 Russia occupied the first place in the political system of Europe, and her plans with respect to Turkey were rapidly maturing when they received a sudden check from Napoleon III. by the alliance between Great Britain, France, and Turkey, and the ensuing Crimean war. The misfortunes of the Russian arms during this war were a great humiliation to him, and are said to have shortened his life. D. Mar. 2, 1855. See Russia (*History*).

Nicholas II.: Czar of Russia; son of Alexander III.; b. May 18, 1868; received a careful education, in which especial attention was paid to the modern languages and scientific studies; entered the army at the age of eighteen; in 1890–91 traveled extensively in the East, visiting Egypt, India, China, and Japan, and he has also visited most of the countries of Western Europe. On the death of his father, Nov. 1, 1894, Nicholas succeeded to the throne, having previously become affianced to the Princess Alix of Hesse-Darmstadt.

Nicholas de Cusa: See Cusanus.

Nicholasville; town; capital of Jessamine co., Ky. (for location, see map of Kentucky, ref. 3–H); on the Queen and Cresc. Route and the Richmond, Nich., Irvine and Beattyville railways; 12 miles S. of Lexington. It is noted for the thoroughbred horses raised and trained there, has several grain elevators, flour-mills, and hemp-factories, and handles a large quantity of tobacco annually. There are a national bank, a State bank, a private bank, and two weekly newspapers. Pop. (1880) 2,303; (1890) 2,157; (1900) 2,393.

Nicholl, Horace Wadham: See the Appendix.

Nichols, Edward Leamington, Ph. D.: physicist; b. in Leamington, England, Sept. 14, 1854; prepared for college at Peekskill Military Academy; graduated at Cornell University 1875; studied in Leipzig, Berlin, and at Göttingen, where (1879) he took the degree of Ph. D.; was appointed Fellow in Physics at Johns Hopkins University in 1879. He became connected with Edison in electrical work at Menlo Park in 1880; was Professor of Physics and Chemistry in Central University, Richmond, Ky., 1881–83; Professor of Physics and Astronomy in the University of Kansas, Lawrence, 1883–87; in 1887 became Professor of Physics in Cornell University, where he has been largely instrumental in developing the course in electrical engineering. Prof. Nichols is a member and vice-president of the American Institute of Electrical Engineers. He is the author of about fifty papers and memoirs, chiefly upon experimental physics, which have appeared in the *Annalen der Physik und Chimie*, *Philosophical Magazine*, *Electrical World*,

American Journal of Science, *Nature*, and the *Transactions* of the several scientific societies; also of a *Laboratory Manual of Physics and Applied Mechanics* (2 vols., New York, 1894), and of a small volume of lectures entitled *The Galvanometer* (New York, 1894). Since 1893 he has been editor of *The Physical Review*, and associate editor of *Johnson's Universal Cyclopædia*, in charge of physics and its applications. C. H. THURBER.

Nichols, JOHN: author; b. at Islington, a suburb of London, England, Feb. 2, 1745; was apprenticed to the eminent printer William Bowyer; became his partner, successor, and biographer, and was a distinguished benefactor to English letters, not only by the enterprise and liberality displayed in several costly undertakings, but by his careful editorship of numerous works and by his own learned writings. Nichols printed in 1778 for private distribution a brochure of fifty-two pages, *Brief Memoirs of Mr. Bowyer*, which was soon expanded into a quarto volume, *Biographical and Literary Anecdotes of William Bowyer, Printer, F. S. A., and of Many of his Learned Friends* (1782); and the latter work became so popular as to be ultimately recast into the valuable series entitled *Literary Anecdotes of the Eighteenth Century* (9 vols. 8vo, 1812–15). and was followed by *Illustrations of Literary History* (8 vols. 8vo, 1817–58), completed by his son, John Bowyer Nichols. From 1778 until his death Mr. Nichols was the editor and publisher of *The Gentleman's Magazine*. Among his elegant volumes upon English local history were *Bibliotheca Topographica Britannica* (52 Nos., 1780–90); *The Progresses, Processions, Festivities, and Pageants of Queen Elizabeth* (4 vols., 1788–1821) and of *King James I.* (4 vols., 1828); and *The History and Antiquities of the Town and County of Leicester* (7 parts, 8 vols., 1795–1815). D. in London, Nov. 26, 1826.—JOHN GOUGH NICHOLS, son of John Bowyer Nichols, continued the publishing business, edited several genealogical journals and was author of works on antiquarian subjects.
Revised by H. A. BEERS.

Nicholson, JAMES: sailor; b. at Chestertown, Md., in 1737; was engaged in the capture of Havana 1762; took command in 1775 of the Defense, a small Maryland vessel, with which he recaptured several prizes from the British; was appointed, June, 1776, to the command of the Virginia (twenty-six guns), and in Jan., 1777, succeeded Commodore Esek Hopkins as commander-in-chief of the Continental navy, and retained that post throughout the war; was engaged with his crew as volunteers in the battle of Trenton; fought a severe but indecisive engagement with the British ship Wyoming June 2, 1780, and was taken prisoner after a gallant resistance with his vessel, the Trumbull (thirty-eight guns), in Aug., 1781, by the British vessels Iris and General Monk. After the war he became commissioner of loans in New York, where he died Sept. 2, 1804.

Nicholson, JOHN: soldier; b. in Dublin, Ireland, Dec. 11, 1821; entered the military service of the East India Company in 1838; engaged in the disastrous campaign in Afghanistan 1840–42; was for some months a prisoner among the Afghans; took part in the Sikh war of 1845; became assistant resident at Lahore; rendered important services in the Sikh war of 1848, after which he became deputy commissioner of the Punjaub, and acquired such influence over the savage tribes of the frontier that he became the object of a kind of hero-worship among a sect which sprang up called the Nekkul-Seynees, which insisted upon paying him the honors of a prophet despite his energetic refusal, carried to the point of inflicting floggings to cure his misguided worshipers of their delusion. With Sir John Lawrence, Nicholson divides the honor of having saved the Punjaub to British allegiance during the great mutiny of 1857; he raised the famous "movable column," with which he destroyed all the rebel forces between Lahore and Delhi, and was assigned the post of honor in the final assault upon Delhi, in which he was mortally wounded Sept. 14, and died Sept. 23, 1857.

Nicias, nis'i-as (in Gr. **Νικίας**): an Athenian statesman and general from the period of the Peloponnesian war. He was very wealthy, the leader of the aristocratic party after the death of Pericles, and the fierce opponent of Cleon; wary, cautious, and superstitious, but prudent and energetic. His military successes—the capture of Minoa in 427, of Melos in 426, of Sphacteria in 425, of Cythera in 424—enabled him after the death of Cleon to negotiate a peace of fifteen years between Athens and Sparta in 421, which received his name. Neither of the parties, however, fulfilled the conditions, and in 415 Alcibiades induced the Athenians to make an expedition against Sicily. Nicias tried to dissuade the people from the undertaking, but in vain. He then accepted the command—first in connection with Alcibiades, afterward alone—and laid siege to Syracuse. Re-enforcements were sent to the city from Sparta. The Athenian fleet was defeated and destroyed, and when Nicias retreated with his troops to the interior, he was soon compelled to surrender, and he himself was put to death (413). Plutarch has written a very interesting sketch of his life and character.
Revised by J. R. S. STERRETT.

Nickel [Germ., from Swed. *nickel*, shortened from *kopparnickel*, copper-nickel, an ore containing the metal]: a metal allied to cobalt and to iron. Although one of the principal ores of nickel was described by Hiarni in 1694 under the name of kupfer-nickel, signifying false copper, it was not until 1754 that Cronstadt announced the discovery of a "semi-metal" which he proposed to give the name nickel. It was reserved for Bergman, in 1779, to show that it was really a new metal.

Properties.—Pure nickel, or the metal obtained by galvanic deposition from a solution as pure as possible, is a silvery-white metal with a strong luster, not tarnishing on exposure to the air. It can be polished so as to be deceptively like polished silver. It is very ductile, hard, and tenacious. A nickel wire will sustain 1½ times the weight required to break an iron wire of the same size. The specific gravity of nickel varies, according to different observers, between 8·27 and 8·93. Its atomic weight is 58·6; its coefficient of linear expansion 0·0000727; its specific heat 0·11; and its electric conductivity 7·374. Its malleability is diminished by an admixture of carbon or manganese. It is attracted by the magnet, and may be rendered magnetic by the same means as iron, its magnetic power compared with that of iron being given as 35 : 55, or as 8 : 9, or as 2 : 3. Repeated ignition destroys its magnetic property, and it loses this power at a lower temperature than iron. Nickel is very difficult of fusion. Adams succeeded in fusing pure nickel in a sealed porcelain crucible lined with pure alumina and bedded in a Hessian crucible at a heat which fused platinum. Crookes and Rohrig put its melting-point at 1,900°–2,100° C. Nickel is soluble in dilute sulphuric and hydrochloric acids, but slowly and with comparative difficulty. Nitric acid attacks and dissolves it readily, as does aqua regia. Strong nitric acid renders it passive. It combines directly with chlorine, bromine, iodine, fluorine, sulphur, phosphorus, and arsenic, forming soluble compounds.

Occurrence.—In the earlier days of nickel-mining the deposits in Saxony, Cornwall, Sweden, Norway, and Hungary furnished arsenide and sulpho-arsenide ores. Practically the ores utilized now on a large scale are the nickel-bearing pyrrhotites, which occur most extensively in the Sudbury district, Canada, and the silicates, among which garnierite is the principal one, mined in New Caledonia. In the U. S. nickel-mining was prosecuted for the longest period at the Gap mine in Pennsylvania, opened for copper in 1744, but worked for nickel since 1863. A small amount of nickel has also been annually produced as a by-product by the Muir la Motte lead mine in Missouri. Mining has also been conducted on a small scale at Lovelock Station, Nev., and at Riddles, Ore. Since 1885, when the production of nickel in the U. S. was 277,904 lb., it has declined, irregularly, until it was only 49,399 lb. in 1893.

At the New Caledonia mines the nickel ore, associated with cobalt ore and with chrome ore, is found at the contact of serpentine and argillaceous schists. Mining began in 1873, but development was hampered by the difficulty in extracting the nickel from the ores. From 1876 to 1890, the Thio district exported 59,448 tons of ore, carrying 8 to 12 per cent. of metal and 228 tons of nickel matte. In 1890 the product was 22,689 metric tons, in 1891 it rose to 60,921 tons, and in 1892 to 83,114 tons, the ore carrying 7 per cent. of metal. From lack of demand only 36,000 tons was exported to France, the balance going to stock, which rose to 80,000 tons. In 1892 France produced, chiefly from New Caledonia ores, 2,741,776 lb. of nickel; Sweden in the same year made 33,000 lb., Norway 275,000 lb., and Germany 1,494,000 lb.

In the Sudbury district, opened since 1887, the ore, a mixture of pure chalcopyrite and nickeliferous pyrrhotite, occurs in irregular lenticular masses in the Huronian rocks in proximity to dikes of diorite. There are indications that in depth the ore becomes more nickeliferous and less cupriferous.

Thus at the Copper Cliff mine the ore carries 4 per cent. of copper and 4·5 per cent. of nickel at a depth of 400 to 500 feet, while at 700 feet the ore runs on an average 0·5 per cent. of copper and 8 to 10 per cent. of nickel. Generally speaking, the ore in the district runs from 1 to 5 per cent. of nickel and from 1 to 4 per cent. of copper. The total product of nickel by the Sudbury mines, as determined by the Ontario Geological Survey, was 3,992,982 lb. It is shipped in the form of a copper-nickel matte, 12,427,986 lb. of this product having been imported into the U. S. in 1893. The statement has been made by good authority that the Sudbury mines can be worked at a profit when nickel sells as low as 25 cents per pound. The district controls the markets of the world. While formerly the metallurgy of nickel was much complicated by the presence of arsenic, cobalt, etc., the treatment of the New Caledonia and Sudbury ores is much simpler. The first process is to obtain by smelting in blast furnaces a matte, which is a mixture of sulphides of nickel, copper, and iron, a preliminary operation being, when sulphur is in excess in the ore, to roast it in heaps or furnaces. The matte is either roasted in reverberatory furnaces, producing an oxide, which is reduced by carbon, or it is blown in a Bessemer converter. The matte is also smelted with alkaline sulphides in excess.

Uses.—For some time the use of nickel was confined to the purposes of coinage and the making of certain alloys. In Jamaica, Belgium, Switzerland, Germany, Servia, Brazil, Mexico, Venezuela, Chili, and the U. S. small coins have been made with an alloy of nickel with zinc and copper, pure nickel being altogether too hard for this use. The U. S. cent, authorized by the act of Feb. 21, 1857, consists of 88 parts of copper and 12 of nickel.

Nickel is largely used in the preparation of German silver or nickel silver. This may be looked upon as a brass to which one-sixth to one-third of nickel has been added. Tradition tells us that this alloy has been in use in China from a remote period; its use in Europe became common about the middle of the nineteenth century. The white copper, or *packfong*, of the Chinese contains 40·4 parts of copper, 31·6 of nickel, 25·4 of zinc, and 2·6 of iron. German silver should be, approximately, 1 part of nickel, 1 of zinc, and 2 of copper. For casting purposes a little lead is sometimes added. A cheaper kind contains 8 parts of copper, 2 of nickel, and 3·5 of zinc. If the amount of nickel fall below 2 parts in 11–12, the silver produced will be little better than brass; 8 parts of copper, 3 of nickel, and 3·5 of zinc make a beautiful alloy closely resembling silver. The preceding, with 4 parts of nickel, makes a very beautiful compound having a faint shade of blue. The Chinese *tutenag* has 8 parts of copper, 3 of nickel, and 6·5 of zinc. This alloy is fusible, hard, and not easily rolled. The color of good German silver is nearly silver white, its fracture small-grained, specific gravity 8·4 to 8·7. It is as ductile as ordinary brass, but harder and capable of being polished. In making it, the three metals should be granulated and well distributed through the crucible, covered with charcoal, and well stirred while in fusion.

The chief use of nickel is for nickel-plating, or the deposition of nickel upon other metals by means of electricity. For many years the fact was well known that a brilliantly white deposit of metallic nickel could be obtained by the electrolysis of a solution of any one of many nickel salts, but the possibility of electro-plating with nickel was not demonstrated until Dr. Isaac Adams, Jr., solved the problem and created, in fact, a new art. He showed the way of supplying a nickel-plating solution regularly and continuously with the metal regularly and continuously withdrawn from it. The use and value of nickel on account of its hardness, beauty, luster, and the polish which it takes were rapidly recognized as soon as nickel-plated ware became common.

The best practical solution for nickel-plating is a solution of the double sulphate of nickel and ammonia. If properly prepared and used, this solution has the property of giving a deposit with a smooth surface which can be polished with little labor, and it gives a very thick deposit before it acquires a rough or matted surface. The solution should be of a salt as pure and neutral as possible, and kept free from substances which would impair its working properties, chief among which are nitric acid, the alkalies, and lime. Nitric acid and caustic alkali are used for cleaning goods about to be plated, and hence, without scrupulous care, a little nitric acid or alkali will find its way into the plating-vat. Nitric acid in very small quantities ruins the vat, the work coming out black and streaked. The presence of potash or soda is at once manifested by a deposit of green oxide or sub-oxide of nickel upon the article being plated. Copper, zinc, and arsenic are also detrimental, and must be excluded or their bad effects neutralized.

While in electro-plating an anode of pure metal is convenient and useful, in working out the problem of nickel-plating Dr. Adams brought to light the curious fact that a plate of pure metallic nickel—used as an anode—does not satisfy the conditions requisite to successful plating. Such a plate does not dissolve regularly in the solution; or, in other words, it does not furnish from itself as much metal as is deposited upon the objects plating. If a plate of nickel combined with carbon—a carbide of nickel—be employed, the metal will be fed into the solution on one side just as fast as it is deposited out on the other, and thus the great desideratum attained—viz., the possibility of continuous and uniform work. Such cast-nickel plates, or anodes, are now successfully made, and form an article of commerce.

Joseph Wharton, of Philadelphia, early began experimenting to determine whether nickel could not be produced in a pure and malleable condition susceptible of being worked in nearly the same manner as iron, and of being applied in the manufacture of various objects requiring strength of material and a material that can not be easily oxidized. One of his earliest experiments was to take the somewhat spongy mass got by reduction of the oxide of nickel, and, after heating it to full redness, work it under a steam-hammer into a bar. In 1873 Mr. Wharton sent to the Vienna Exhibition a sample of nickel in the form of axles and axle-bearings, and at the exhibition in Philadelphia in 1876 he exhibited a remarkable series of objects made of wrought nickel, such as bars, rods, a cube, a horseshoe magnet, and magnetic needles of forged nickel. Dr. Fleitmann, of Iserlohn, Westphalia, Prussia, has improved and cheapened the operation of refining nickel and toughening it, and has reduced the liability to the presence of blowholes in castings by adding to the molten charge in the pot, when ready to pour, a very small quantity of magnesium. Complete malleability of nickel was obtained at Wharton's works in Camden, N. J., before Fleitmann's invention or process, but this last is more rapid and better than the old method. The metal so treated becomes remarkably tough and malleable, and may be rolled into sheets and drawn into wire. Cast plates can be successfully rolled. The cast plates, such as are made for anodes, after reheating, are rolled down to the desired thickness. It is found that it is a great improvement to the nickel anode plates to roll them down; they dissolve with greater uniformity in the bath. Nickel so treated with magnesium has been rolled into sheets as thin as paper. Dr. Fleitmann has also succeeded in welding sheet nickel upon iron and upon steel plates so as to coat them equally on each face with a layer of nickel. The quantity preferred by weight is $\frac{8}{10}$ iron and $\frac{2}{10}$ nickel, $\frac{1}{10}$ of nickel being placed on each surface. To secure union, the iron or steel must be perfectly flat and clean. A pile is made with outer facings of sheet-iron, to protect the nickel from scaling. When the whole is heated to the proper degree, it is passed through the rolls. The two metals become so firmly united that they may be rolled down, two or three together or separately, to the thinness desired.

The unusual properties displayed by meteoric iron, which is invariably associated with nickel, attracted attention to the alloy, but it was not until 1885 that Marbeau's manufacture of nickel steel in the crucible and its addition to ordinary steel brought out the valuable properties of small additions of nickel to steel. James Riley conducted some experiments at the works of the Steel Company of Scotland, with open-hearth steel, and showed that steel containing 4·7 per cent. of nickel had an elastic limit of 28 tons per square inch, and a breaking strain of 40 tons, whereas similar steel without nickel showed only 16 and 30 tons respectively. The elongation and contraction of area of the steel were not materially impaired. In 1890 the Creusot works in France began experiments with nickel steel for armor plate, and in 1891 successful results were obtained with plates of U. S. manufacture. The amount usually alloyed with armor-plate steel by the Bethlehem works is $3\frac{1}{4}$ per cent. of nickel. Some experiments have been made in the direction of using nickel steel for heavy forgings and for common industrial purposes. For the latter, however, the alloy is still too costly. Nickel has declined steadily in price, and it is believed that the figure reached early in 1894 of 40

to 45 cents per pound does not reflect the ultimate capacity for placing it in the market at a low figure.

Revised by C. KIRCHHOFF.

Nickel-plating: See NICKEL.

Nickerson: city (founded in 1878); Reno co., Kan. (for location of county, see map of Kansas, ref. 7–F); on the Atch., Top. and S. Fé and the Mo. Pac. railways; 11 miles N. W. of Hutchinson, 58 miles N. W. of Wichita. It is in an agricultural and stock-raising region; contains a high school, 2 brick schoolhouses, 2 private banks, and a weekly newspaper; and has large stock-yards, roller flour-mill, railway machine-shops, salt-works, and creamery. Pop. (1880) 597; (1890) 1,662; (1900) 1,038. EDITORS OF "ARGOSY."

Nic'obar Islands: a group of twelve inhabited and seven uninhabited islands in the Indian Ocean, 125 miles N. W. of the northern point of Sumatra; area, 635 sq. miles, with 6,900 inhabitants belonging to the Malayan race, with only a low state of civilization. The islands are very fertile, producing cocoanuts, sugar, rice, tobacco, bamboo, and oranges in abundance. All attempts by the Danes to colonize them failed. Since 1869 they have belonged to Great Britain.

Nicode'mus: a member of the Sanhedrim, mentioned thrice in the Gospel of John—iii. 1–21, as coming to Jesus by night; viii. 45, as demanding that Jesus should be heard before being judged; and xix. 38–42, as assisting Joseph of Arimathea in laying out the body of Christ.

Nicol, ERSKINE: genre-painter; b. at Leith, Scotland, July, 1825. He studied in the Trustees' Academy, Edinburgh; settled in London in 1863; associate of the Royal Academy, London; was awarded a second-class medal at the Paris Exposition of 1867. His painting is robust, and his works are popular on account of their subjects, which include life and manners in Great Britain. *Paying the Rent* is in the collection of Mrs. W. H. Vanderbilt, New York; *Paddy's Mark* is in the Corcoran Gallery, Washington.

W. A. C.

Nicolai, CHRISTOPH FRIEDRICH: critic and editor; b. in Berlin, Mar. 18, 1733; was educated in the schools of Berlin, and became in 1749 apprentice in a bookstore at Frankfort-on-the-Oder, where he privately studied classical and English writers, mathematics, history, and philosophy. In 1752 he returned to Berlin and entered the publishing-house of his father. Through the publication of his *Briefe über den gegenwärtigen Zustand der Wissenschaften* (1756), he made the acquaintance of Lessing, and subsequently of Moses Mendelssohn, with whom he associated in publishing the *Bibliothek der schönen Wissenschaften* (1757–58) and the *Briefe die neueste Litteratur betreffend* (1759–65). In 1765 Nicolai founded the *Allgemeine deutsche Bibliothek*, a periodical which he continued until 1792, and by which he exerted a great influence on German literature. He also published a novel, *Leben und Meinungen des Herrn Magisters Sebaldus Nothanker*, a description of a journey through Germany and Switzerland in twelve volumes, and a number of smaller works. While young and under the stimulating influence of Lessing's genius, Nicolai rendered valuable services to German literature, not only as a publisher of influential journals, but also as a critic. He was among the first in Germany to point to Shakspeare's greatness as a dramatist. In his later years he failed to understand the new era in German literature inaugurated by Herder and Goethe. Thus he attempted to ridicule Goethe's *Werther* by a silly parody called *Freuden des jungen Werther* (1775), and in a similar manner he tried to make fun of Herder's enthusiasm for the *Volkslied* by publishing the *Kleyner feyner Almanach* (1778). His antagonists handled him mercilessly and stamped him as the representative of shallow reasoning and barren rationalism. D. in Berlin, Jan. 8, 1811. See von Göcking, *Nicolais Leben und litterarischer Nachlass* (1820); Foss, *Friedrich Nicolai* in *Archiv f. Litteraturgeschichte* (ii. 375).

JULIUS GOEBEL.

Nicolaïeff, or **Nikolaïev**, nĕĕ-kō-laa'yef: town; chief naval station of Southern Russia and great grain emporium; on the Bug, 20 miles from its mouth, and 80 miles N. E. from Odessa (see map of Russia, ref. 10–C). It is strongly defended and advantageously situated. Pop. (1891) 76,578.

E. A. G.

Nicolas, Sir NICHOLAS HARRIS, F. S. A.: historian and antiquarian; b. at East Looe, Cornwall, England, Mar. 10, 1799; became a lieutenant in the British navy in 1815; studied law; was called to the bar 1825; was joint editor of *The Retrospective Review* 1826 and of the *Excerpta Historica* 1831; made a knight of the Hanoverian Guelphic order 1831, chancellor of the Ionian order of St. Michael and St. George 1832, of which he became grand cross 1840. D. at Cape Curé, near Boulogne, France, Aug. 3, 1848. Among his works are *Synopsis of the Peerage of England* (1825); *History of the Battle of Agincourt* (1827); *The Chronology of History* (1835); *History of the Orders of Knighthood of the British Empire* (4 vols., 1841–42); *Dispatches and Letters of Lord Nelson* (7 vols., 1844); *Memoirs of Sir Christopher Hatton* (1847).

Nicolaus (in Gr. Νικόλαος) **of Damascus**: Greek historian, intimate of Herod the Great, and tutor of the children of Antony and Cleopatra; wrote a *Universal History* in 144 books, important fragments of which have been preserved, together with portions of his biography of Augustus. See Müller, *Fragmenta Historicorum Græcorum*, vol. iii., pp. 343–464.

B. L. G.

Nicolay, JOHN GEORGE: historical writer; b. at Essingen, Rhenish Bavaria, Germany, Feb. 26, 1832; was taken to the U. S. by his father in his childhood; was educated in the common schools of Ohio and Illinois; entered the office of *The Pike County Free Press*, Pittsfield, Ill., in 1848, becoming finally editor and proprietor; sold his newspaper and became clerk in the office of the secretary of State of Illinois at Springfield; made the acquaintance of Abraham Lincoln, who chose him as his secretary upon his nomination as President at Chicago; was private secretary of President Lincoln 1861–65; was U. S. consul in Paris, France, 1865–69; edited for a time *The Chicago Republican*; was marshal of the Supreme Court of the U. S. 1872–87. He is the author of *The Outbreak of Rebellion* (New York, 1881), and joint author with John Hay of *Abraham Lincoln: a History* (10 vols., New York, 1891; supp., 2 vols., 1894).

C. H. THURBER.

Nicole, nĕĕ'kōl', PIERRE: moralist and theologian; b. at Chartres, France, Oct. 19, 1625. He studied at Paris at the Collège d'Harcourt and at the Sorbonne, and was a precocious scholar in the classics and theology. He entered Port Royal as a master of classical studies, and soon became the spokesman of its ideas and its efficient but anonymous defender in its contentions with the Jesuits. He was the stanch and life-long friend of Arnauld, and was associated with him in the composition of the famous *Logique* or *Art de penser* of Port Royal, and of many controversial works. He fled with him to the Netherlands from the renewed religious persecutions in 1679, but his more pacific spirit led him to relinquish theological controversy as a condition of returning to Paris (1683). D. Nov. 16, 1695. He furnished Pascal the materials for some of the *Lettres Provinciales*, supervised the first collected edition, and published (1659), under the pseudonym of *William Wendrock*, a Latin translation of them that rivaled the original in popularity. In his eighteen letters under the title *Les Imaginaires et les Visionnaires* (1667) he expressed the austere puritanism of Port Royal in its condemnation of the drama and fiction generally, and excited Racine to a bitter personal reply. His chief title to enduring fame is his thirteen volumes of *Essais de Morale* and *Lettres*, begun in 1671, which assure him a place in the second rank of moralists. They were regarded by his contemporaries as masterpieces of literary style, but now only the *Essai sur le moyen de conserver la paix avec les hommes* is cited. They are judicious in thought and just in expression, but lack depth.

A. G. CANFIELD.

Nicolini, ERNESTO: See the Appendix.

Nicoll, JAMES CRAIG: See the Appendix.

Nicoll, WILLIAM ROBERTSON, LL. D.: a minister of the Free Church of Scotland; b. in Aberdeen, Oct. 10, 1851; educated at Aberdeen University and the Free Church College of Aberdeen; minister at Dufftown 1874–77, at Kelso 1877–86; since 1884 editor of *The Expositor*; since 1886 editor of *The British Weekly*; since 1891 editor of *The Bookman*; projector and editor of *The Expositor's Bible* (to be completed in about 40 vols.); the *Theological Educator*; *The Foreign Biblical Library*; *The Household Library of Exposition*; *The Clerical Library*; *The Sermon Bible*. He is author of *The Incarnate Saviour* (1881); *The Lamb of God* (1886); *James Macdowell*; *Memoir of Prof. Elmslie* (1890); *The Key of the Grave* (1893); and with C. K. Shorter a new *Life of the Brontës* (1895).

Nicome'dia (in Gr. Νικομήδεια): the capital of ancient Bithynia, at the head of the Sinus Astacenus, founded by Nicomedes I. (278–248 B. C.) in 264 B. C., after the destruction of Astacus (a little to the S. E. of it) by Lysimachus. From 292 to 330 A. D. it was the capital of the Eastern Roman empire, and contained many splendid buildings. It has suffered very severely from earthquakes, as in 358 and 362 A. D. Arrian was born, Hannibal died, and Diocletian abdicated here. Constantine died at his Villa Ancyrona, close by. The modern Turkish town of *Ismid* occupies the old site.

Revised by J. R. S. STERRETT.

Nicopolis [= Lat. = Gr. Νικόπολις, liter., city of victory; νίκη, victory + πόλις, city]: name of ten ancient cities, one in Egypt, four in Asia, and five in Europe, each commemorating a victory. The most important are: (1) in Epirus, built by Augustus after the naval battle of Actium (31 B. C.). Long a splendid city, after many vicissitudes it was destroyed by the Bulgarians (1034). Its extensive ruins are 5 miles N. of Prevesa. A heroic battle was fought here (Oct. 3, 1798) by 760 French, Prevesans, and Suliotes against 7,000 soldiers of Ali Pasha of Yanina. See Bellaire's *Les Îles Ioniennes sous la domination française*. (2) A town in Bulgaria on the Danube (Bulg. *Nicopol*), probably ancient *Nicopolis ad Istrum*, founded by Trajan after the second Dacian war (106). Bayezid I. there won a great battle (1396) over the allied French, Hungarians, and Germans. European historians assert that 60,000 Ottomans were slain. Pop. (1888) 5,156.

E. A. GROSVENOR.

Nicosia, nĕe-kō-see'ăă, or **Lefcosia** (anc. *Tremitus*): capital of Cyprus since 1192; surrounded by high walls raised by the Venetians and still intact; famous for its wines and carpets (see map of Europe, ref. 8–H). When captured by the Ottomans (1570) 20,000 persons were massacred. Pop. 12,515.

E. A. G.

Nicosia: town of Sicily; 40 miles N. W. of Catania (see map of Italy, ref. 9–F). It is picturesque and venerable in appearance with its mediæval cathedral and four churches, but its inhabitants are reputed the most illiterate and uncivilized of the island. Pop. 15,460.

E. A. G.

Nicotine, or **Nicotia**: See TOBACCO.

Nictheroy, nĕek-tā-roi': former capital of the state of Rio de Janeiro, Brazil; on the eastern side of the bay, opposite Rio de Janeiro city (see map of South America, ref. 6–G). The business portion, sometimes called Praia Grande, contains few buildings of interest, but the suburbs of Icarahy, São Domingos, São Lourenço, etc., scattered for a long distance along the shores of the bay and among the hills, contain many charming residences and are favorite holiday resorts. Nictheroy was repeatedly bombarded during the naval rebellion of 1893–94. Pop. over 20,000.

H. H. S.

Nicue'sa, DIEGO, de: a Spanish commander; b. at Baeza, Spain, about 1465. He went to Española in 1502, acquired considerable wealth there, and later was agent for the colonists in Spain. For his subsequent history, see the article DARIEN.

Nicum, JOHN, D. D.: Lutheran clergyman; b. in Würtemberg, Jan. 6, 1851; educated at Muhlenberg College, Allentown, Pa., and the Theological Seminary, Philadelphia; became pastor at Frackville, Pa., 1876, Frankford, Philadelphia, 1878, Syracuse, N. Y., 1880, Rochester, N. Y., 1887. His chief works are *History of the New York Ministerium* (1888), and a translation with additions of Wolf's *The Lutherans in America* (1891). He is a member of the American Society of Church History and a contributor to its printed proceedings, as well as to *The Lutheran Church Review*, *The Independent*, and the various Lutheran Church papers. Dr. Nicum has also been active in securing uniform legislative action for the Lutheran churches in the State of New York.

H. E. JACOBS.

Nidāna, nĕe-daa'na [Sanskr., cause, from √*dā*, to bind]: one of the twelve links of the Buddhist chain of cause and effect which Gautama thought out under the Bo-tree during the third watch of the night in which he became Enlightened. He saw that *Ignorance* (in a previous state of existence, of the Four Noble Truths) was the first cause of life with all its misery and sorrow. From this ignorance comes *Conformations*, or the character-forming qualities derived from former births; from conformations come *Consciousness*; from consciousness *Corporeal Form and Name* (that is, individual being); from this come the *Six Organs of Sense*; from these *Contact*; and from contact with the objects of sense comes *Sensation*; from sensation comes *Desire*, or lust, which in turn brings *Attachment*, or clinging to the object of desire (life); from this clinging to life comes *Continuity of Becoming*. This leads to *Birth* in one of the six GATI (*q. v.*), and with birth come *Sickness*, *Disease*, and *Death*. But if Ignorance, the first cause, be removed by the complete extinction of desire, each link will in turn be removed, rebirth will be avoided, sorrow and suffering will come to an end, and Nirvāna will be attained. See Monier-Williams's *Buddhism* (London and New York, 1889); Oldenberg's *Buddha* (trans. by Hoey, London, 1882); Alabaster's *Wheel of the Law* (London, 1871); and the other works mentioned under the article BUDDHISM.

R. LILLEY.

Niebelungen: See NIBELUNGENLIED.

Niebuhr, nee'boor, BARTHOLD GEORG: historian and statesman; b. at Copenhagen, Denmark, Aug. 27, 1776; studied law and philosophy at Kiel and Göttingen; was appointed private secretary to Count Schimmelmann, Danish Minister of Finance, in 1796, and next year secretary to the royal library in Copenhagen; visited England in 1798, and entered the civil service of the Danish Government in 1799; but his enthusiasm for England and hatred to Napoleon made it very unpleasant for him in Copenhagen, and in 1806 he removed to Berlin, where from this year till 1809 he held various offices in the financial department of the Prussian Government. He soon fell out, first with Stein, then with Hardenberg, and finally resigned. Appointed historiographer to the King of Prussia, he delivered in 1810–11 a course of lectures on the history of Rome at the newly established University of Berlin, and in this sphere his brilliant genius and immense learning at once found their proper application. From 1816 to 1822 he resided in Rome as Prussian ambassador to the papal court, though in reality wholly occupied by scientific studies; and in the latter year he removed to Bonn as professor at the university. Here he developed a great literary activity; founded the *Rheinisches Museum* (1827), superintended the new edition of the *Corpus Scriptorum Historiæ Byzantinæ*, and continued his great work, the *Römische Geschichte*. Under the violent impression which the French Revolution of 1830 made on him, he broke down mentally and physically, and died Jan. 2, 1831. His *Römische Geschichte* (3 vols., 1811–32) is, so far as it goes—namely, to the first Punic war—a complete reconstruction of the history of Rome. The entire narrative of the founding of Rome, and the subsequent regal period, all of which had up to Niebuhr's time been accepted as authentic history, he discarded, after a thorough critical analysis, as purely legendary. Some of his hypotheses have been rejected, such as that of the epical source of the early Roman legends; others have been modified, such as that of the origin of the *plebs*; but the fundamental distinction between history and legend, and the methods employed in distinguishing them, inaugurated a new epoch in the study of history, and his wonderful intuition into the correlation between the various elements of which a social organism is composed, as well as the astonishing power of imagination with which from a few scanty remnants he reconstructed the whole organism, will always bear witness to his eminent genius. Other works are: *Kleine historische und philologische Schriften* (2 vols., 1828); *Lectures on Roman History* (3 vols., 1843); *Lectures on Ancient History* (3 vols., 1851); edition of *Fronto* (1816). See Susanna Winkworth, *Life and Letters of B. G. Niebuhr* (3 vols., London, 1852); F. Eyssenhardt, *Barthold Georg Niebuhr* (Gotha, 1886); Bursian, *Gesch. der class. Philol. in Deutschland*, pp. 647–663.

Revised by ALFRED GUDEMAN.

Niebuhr, KARSTEN: traveler; b. at Lüdingworth, in the Hanoverian district of Hadeln, Mar. 17, 1733; studied mathematics at Göttingen; became lieutenant-engineer in the Danish service in 1760, and in the following year was sent as mathematician to an expedition to Arabia, Persia, and the neighboring countries for the purpose of obtaining information bearing on New Testament history and geography. Though all his companions in the expedition perished Niebuhr continued his travels for several years, and on his return to Denmark applied himself to the preparation of a valuable work on Arabia, *Beschreibung von Arabien* (Copenhagen, 1772). He also published *Reisebeschreibung von Arabien und andern umliegenden Ländern* (1774–78) and *Reisen durch Syrien und Palästina* (1837), and edited the papers of Forskal, the naturalist, who died on the journey—*Descriptiones animalium* (1775) and *Flora Ægyptiaco-Arabica* (1776). D. at Meldorf, Holstein, Apr. 26, 1815.

Niel, nēĕ-el′, Adolphe: marshal of France; b. at Muret, Haute-Garonne, France, Oct. 4, 1802; was educated at the École Polytechnique of Paris and the Military Academy of Metz; distinguished himself in the expedition against Constantine 1836, and was made commander of the engineering corps in Algeria; took part in the expedition against Rome in 1849; conducted the siege of Bomarsund in 1854, and planned the operations which led to the fall of Sebastopol; distinguished himself in the Italian campaign of 1859, was made a marshal of France after the battle of Solferino, and Minister of War in 1867. D. in Paris, Aug. 13, 1869.

Niel'lo-work: ornamental work in which plates of metal are engraved with ornamental figures, the lines of which are then filled with a black alloy and the whole burnished. The art is practiced in Russia, and to a certain extent by the silversmiths of Western Europe and the U. S. Some of the earliest and best niellos are Byzantine; the most celebrated are Italian of the Cinque-cento period, and printing from engraved plates is thought to have originated in niello-work of that time. R. S.

Niemcewicz, nyem-tsev′ich, Julian Ursyn: poet; b. at Skoki, Poland, Feb. 16, 1757; received a military education, but left the service in 1788, and entered into Polish politics as a deputy from Lithuania; fought in 1794 at the side of Kościuszko; was carried, together with him, as a prisoner to St. Petersburg, and later accompanied him to the U. S. He returned to Poland in 1807, and played a conspicuous part in politics there till 1830. Shortly after the fall of Warsaw he went to Paris (1833), where he resided till his death, May 21, 1841. In Polish literature he became very celebrated as the author of elegies, e. g. *Dumania w Ursynowie* and *Moje przemiany*, and of the memorable historical songs *Śpiewy hȳstoriczne* (Warsaw, 1816–18–19). He also wrote dramas, *Powrót posla* (The Messenger's Return), *Kazimierz wielki*, *Samolub*, *Dworek na gościńcu*; and romances, *Dwaj Siecichowie* (1815), *Lejba i Siora* (1821), *Jan z Tęczyna* (3 vols., Warsaw, 1825). Two volumes of his *Memoirs* were published at Posen, 1871. Revised by J. J. Král.

Nie'men: river of Prussia and West Russia. It rises a few miles S. of the city of Minsk, becomes navigable at Grodno, and divides at Winge into the Russ and the Gilge, both of which fall into the Kurisches-Haff. It is 500 miles long, and is of considerable commercial consequence.

Niemeyer, August Hermann: See the Appendix.

Niepce, nēĕ-eps′, Joseph Nicéphore: one of the inventors of photography; b. at Châlons-sur-Saône, France, Mar. 7, 1765; entered the army 1792, and saw active service in Italy; was administrator of the district of Nice 1795–1801. In the latter year he returned to Châlons, and devoted himself to researches in chemistry and lithography. In 1813 he conceived the idea of obtaining sun-pictures, and afterward in conjunction with Daguerre (*q. v.*) he invented several of the earlier processes used in Photography (*q. v.*). D. July 5, 1833. —His nephew, Claude Marie François Niepce de Saint-Victor (1805–70), also a soldier, wrote *Traité Pratique* (1856) on photography, and *Recherches Photographiques* (1855).

Nievo, nēĕ-ā′vō, Ippolito: poet and novelist; b. at Padua, Italy, Nov. 30, 1832. He studied philosophy and history at the university in his native place, but while still a student became ardently interested in the revolutionary movements then going on. He joined Garibaldi as a volunteer, and accompanied him as an officer on his Sicilian expedition. On his return, in Mar., 1861, he was lost in the wreck of the steamer Ercole, near the Gulf of Naples. He had published several stories showing great talents: *Il conte pecorajo*, *Angelo di bontà*, and *Le avventure del Barone di Nicastro.* Still more interesting, however, is his posthumous *Confessioni di un ottuagenario* (2 vols., Florence, 1867)—a kind of historical romance, giving a survey of the history of Italy from 1775 down to 1858, and full of episodes drawn with a most skillful hand. His verses have been published under the title *Poesie di Ippolito Nievo* (Florence, 1883).
A. R. Marsh.

Nièvre, nēĕ′evr′: central department of France; situated along the Loire and its two affluents, the Allier and Nièvre, and the Yonne, an affluent of the Seine. Area, 2,632 sq. miles. It is mountainous, and not very fertile. Wine is extensively produced, but wheat is not raised in sufficient quantity for home consumption. Timber and minerals are abundant. Iron, coal, copper, lead, and silver are mined, and there are marble quarries and manufactures of glass and pottery. Pop. (1896) 333,899. Capital, Nevers.

Niger: the third largest river in Africa, in respect of its length and the size of its basin. It drains an area of about 1,150,000 sq. miles. It is formed by the junction of three little rivers, in about 8° 20′ N. lat. and 10° W. lon., and is known to most of the natives in its upper course as the Joliba and in its middle and lower courses as the Quorra. It is 2,500 miles long, and is notable by two facts: (1) Its delta, which begins 100 miles from the sea, is the largest in Africa, the mouths of its outermost branches being 200 miles apart, the whole including 14,000 sq. miles of low alluvial plain covered with forest and jungle. (2) The Niger is the only river in Africa which affords uninterrupted steam navigation between the sea and the heart of the continent. On this route, however, the Niger is followed only as far as the confluence with its greatest tributary, the Benue, on which light-draught steamers journey as far as Yola in Adamawa. Rising among mountains, the Niger flows sluggishly N. to the edge of the Sahara, and then, describing a great bend, it flows S. E. and S. to the Gulf of Guinea, its course running nearly all the way through an undulating plain. The French have navigated the river in light-draught gunboats from Bammaku, on the upper Niger, to the port of Timbuktu. Ascending from the sea, rock obstructions stop navigation at Rabba. The main channel through the center of the delta is known as the Nun river.
C. C. Adams.

Niger Territories: the region in Northwest Africa governed by the Royal Niger Company under a charter granted by Great Britain in 1886. The company, through their agents, made treaties with about 300 native states and tribes, and the region embraces about 500,000 sq. miles, including the Niger delta, but most of it E. of the Niger, and between the Sahara and the Benue river. Their authority over most of this territory is merely nominal, and they have (1894) apparently no influence whatever over the great states of Sokoto and Bornu. The capital is Asaba, above the Niger delta, where public buildings, including a prison and hospitals, have been erected. The head station of the military force is at Lokoja, at the confluence of the Niger and Benue rivers. Trade is making gradual but encouraging progress, amounting annually to nearly £400,000. A council in London governs the territories. The importation of spirituous liquors is prohibited in nineteen-twentieths of the area.
C. C. Adams.

Night-blindness: See Blindness.

Night-hawk: a name applied in North America to birds of the genus *Chordeiles*, belonging to the family *Caprimulgidæ*, or goatsuckers. They are sometimes confounded with the whip-poor-will, from which they may be readily distinguished by their forked tails and absence of bristles about the mouth. The beak is small, gape of mouth wide, wings very long. The plumage is mottled with black, white, gray, and tawny, and there is a conspicuous white patch on the wing. The common species, *Chordeiles virginianus*, is abundant in Eastern North America, and there are two subspecies, one in Florida and one in the Southwest. The Texan night-hawk (*C. texensis*), found also in the Southwest, is smaller and lighter colored. The eggs are laid upon the bare ground, without a nest. The birds are well known by their sharp cry and the loud booming sound produced at twilight by the rapid rush through the air. Night-hawks devour enormous quantities of insects, over 600 having been found in one bird. F. A. Lucas.

Night-heron: a popular name for several species of herons belonging to the genus *Nycticorax*, distinguished from other herons by stouter bills and shorter legs and necks. The most common species is *Nycticorax nycticorax*, which is found in both Europe and North America, although the American bird is accorded the rank of a sub-species, *N. n. nævius.* It is about 2 feet in length, and when adult of a light ashy color, top of head, scapulars, and interscapulars dark glossy green. There are two long, slender white plumes hanging from the head. This bird, locally known as qua or quawk from its cry, breeds in colonies, nesting in high trees in swampy localities. *Nycticorax violaceus* of the Southern U. S. is a rarer and somewhat handsomer bird.
F. A. Lucas.

Nightingale [O. Eng. *nihtegale*; *niht*, night + *galan*, sing]: *Danlias luscinia*, a small and inconspicuous member of the family *Sylviidæ*, famed for its song, which is heard not only at night, but during the day as well. The nightingale is about the size of a bluebird, and is reddish brown above, grayish white below. It is common throughout a

great part of Europe, ranges east into Persia, and occurs in Northern Africa. It also visits England, particularly the eastern and southern counties, where its song may be heard from the middle of April to the middle of June. The Per-

The nightingale (*Daulias luscinia*).

sian nightingale (*Daulias hafizi*) is said to be the bulbul of the poets, but that name is now generally applied to birds of the genus *Pycnonotus*, members of another family, the *Ixidæ*. The nightingale feeds principally upon worms and insect larvæ. The nightingale of the East Indies is the *Kittacincla macrura*, a bird resembling the true nightingale. It sings by night or in a darkened cage, and its song is regarded as equal to that of the true nightingale. F. A. L.

Nightingale, Augustus F.: See the Appendix.

Nightingale, Florence: b. at Florence, Italy, in May, 1823, of wealthy English parents. Prompted by philanthropic instincts, she early turned her attention to the relief of humanity, and studied systems of nursing and hospital management under the Sisters of Charity in Paris and subsequently at the Kaiserswerth institution on the Rhine. During the Crimean war she was sent by the British war department, at the head of a band of select nurses, for the relief of the sufferings of the sick and wounded at Constantinople, and in this position displayed marvelous energy and ability; and the testimonial of £50,000 subscribed for her by a grateful public she devoted to the founding of a training-school for nurses. Her chief writings are *Notes on Hospitals* (1859); *Notes on Nursing* (1860); *On the Sanitary State of the Army in India* (1863); *Notes on Lying-in Institutions* (1871); *Life or Death in India* (1873), etc. Revised by S. T. Armstrong.

Night-jar: See Goatsucker.

Nightmare [*night* + *mare* < O. Eng. *mara*, incubus, bad dream : O. H. Germ. *mara* > Mod. Germ. *mahr*, ghost, nightmare]: a terrific dream (*ephialtes*, *hypnophobia*, *incubus*, *succubus*) in which there appears to be a disagreeable object, as a person, animal, or goblin, present and often upon the breast of the sleeper, accompanied by the inability to cry out, move, or call for help. Some patients have merely a sense of terror, oppression, and inability to call, without any dream. It is often ascribable to heart disease or asthma, more frequently to obstruction in the circulation caused by the pressure of food or flatulency in the alimentary canal, especially when the sleeper lies upon his back and the weight of the overloaded viscera falls upon the aorta. Many of the symptoms of nightmare may occur to nervous and anxious patients in a half-wakeful state just after going to bed. The careful voluntary suspension of the effort to think (a suspension often difficult to accomplish) will usually prevent these attacks, which seem to be due to the performance of the function of thinking at a time when the supply of blood to the brain is deficient. The ancients believed that devils and witches were present during an attack of nightmare. They affirmed that the evil spirits which placed themselves upon the patient were males, called *incubi*, while female spirits and witches, *succubi*, were thought to lie beneath the sleeping sufferer.

Nightshade Family: the *Solanaceæ*, a group of gamopetalous dicotyledons, numbering 1,500 species, mostly natives of the warm climates. They are nearly all herbs or small shrubs, a few only being trees; their flowers are regular, with a superior two-celled ovary, and numerous ovules. The potato (*Solanum tuberosum*), tomato (*Lycopersicum esculentum*), and tobacco (*Nicotiana tabacum*) are members of this family, as are also the species of *Petunia*, *Datura*, *Cestrum*, *Lycium*, etc., many of which are familiar ornamental plants. Charles E. Bessey.

Nigid'ius Fig'ulus, Publius: Latin grammarian; prætor 58 B. C. As a follower of Pompey banished by Cæsar, he died in exile 45 B. C. Next to Varro the most learned man of his time, he treated not only grammar, but also subjects connected with natural science and religion. See A. Swoboda, *P. Nigidii Figuli operum reliquiæ* (Vienna, 1889). M. W.

Nihilism [from Lat. *nihil*, nothing]: a philosophy of universal negation; a nickname given to the tenets of the extreme section of Russian revolutionists and rebels against the czar's authority, who are erroneously supposed to be partisans of universal destruction, without having any positive constructive element in their programme.

Origin of the Name.—The term Nihilism was invented by the great Russian novelist Ivan Turgenev, and appears for the first time in his novel *Fathers and Children*. It is used as a nickname of the hero Bazaroff, who impersonates an intellectual movement which came into existence during the epoch of the emancipation of the serfs (1861), and which since the appearance of Turgenev's novel has actually been known in Russia under the name of Nihilism.

Primitive and genuine Nihilism was a school of philosophical and ethical individualism which flourished in Russia between 1855 and 1865, and is now entirely extinct. It was the first manifestation of the awakening of the feeling of independence in the masses of educated Russians. It had no political aspects, however, and was by its very nature opposed to political action. It proclaimed man's absolute independence of all claims which the family, society, the state, had upon him. It was a vehement and impassioned protest of the individual man against the subjugation which was imposed upon him by ancient traditions in the name of the family and the community. These early Nihilists did not deny everything, for they believed firmly, fanatically, in science and in the power of the individual mind: but they refused to bow to any other authority, and deprecated all that was based upon emotions, fancy, supposed revelation. Something similar took place in Germany in the so-called *Sturm und Drang* period, and for similar reasons. With all its grotesque exaggerations this early Nihilism was a grand and useful movement in a country where the individual had been crushed and downtrodden for generations. The recognition of the rights of women and of children in modern Russia is due to the struggle of the early Nihilists. They paved the way for the modern militant Nihilism, in which the idea of individual independence has received a broad political and social conception; but this social feeling came from quite a different source.

The Origin of the Modern Political Movement.—Political aspirations manifested themselves with the Russian people at a very early date, almost as soon as Western Europe set them a good example. The Napoleonic wars resulting in the invasion of France and the temporary occupation of her provinces by the Russian and German armies brought a considerable section of the best Russian troops into contact with the French, fresh from their great Revolution. The result was a political fermentation among the officers and even soldiers of the imperial guard which, ten years later (Dec. 14, 1825), brought about the famous Decembrist insurrection, which for a moment imperiled the throne of the Emperor Nicholas. This insurrection, which had for its aim the emancipation of the serfs and the establishment of a free constitution in Russia, and which was led and supported by men of the highest position in the country, opened the long struggle for freedom which has been going on in Russia. The revolt was put down, six of its leaders perished on the scaffold, 125 were sent to the Siberian mines, and all sympathizers and accomplices were treated with extreme severity; but the traditions of this first liberal movement could not be extirpated, and in the next generation there arose in Russia a great writer and patriot, Alexander Hertzen (see Hertzen, Alexander), who, having voluntarily expatriated himself in order better to serve the cause of Russian free-

dom, settled in London and there started his famous *Kólokol* (Alarm Bell), a periodical which had an enormous influence in Russia. Moreover, he founded a free printing-office, which did for Russia what the free presses of Switzerland and the Netherlands did for France in the time of Voltaire and Diderot. The leading points of the programme of Hertzen and the democrats of his time were those of the Decembrists, namely, free constitutional government for the country and the emancipation of the serfs. Owing to better knowledge of the agrarian arrangements and of the aspirations of the peasantry, they laid proper stress upon the agrarian question, advocating the emancipation of the serfs with land endowment, and they had the satisfaction of seeing that their plan, although mutilated, was accepted in principle by the Government in 1861.

Transformation of the Individualistic Nihilism into a Political and Social Movement.—With the majority of the educated classes aspirations for liberty found their satisfaction in the individualistic rebellion described above. The years 1860–64 mark the fullest dominion of this school, which found its prophet in Dmitry Pisarev, an essayist and literary critic of the *Russkoi Slovo* (Russian Word), the organ of this individualistic Nihilism; but even at this period there was in the movement an undercurrent making in another direction. It may be called social Nihilism as opposed to the individualistic, and was represented in 1860 by Nicholas Tchernyshevsky, the publicist, journalist, economist, and novelist. He was a socialist and the father of the Russian revolutionary movement. He preached the absolute devotion of the individual to the cause of his country, but he gave the idea of self-sacrifice an individualistic interpretation as the fulfillment of the highest personal happiness for people of a high intellectual and moral development. The theory of moralized egotism and egotistical self-abnegation was developed by Tchernyshevsky with admirable skill, and served as a transition to the doctrine of absolute devotion to the good of the community. As time went on and the disastrous results of the economic shortcomings of the emancipation act of 1861 became more and more apparent, the influence of Tchernyshevsky gained upon that of the genuine Nihilism represented by Pisarev. The generation of 1870 was educated by Tchernyshevsky, but it took from him the kernel of his ethics, dropping as useless his theory of all-pervading individualism. Another writer, Schapov, whose name is little known abroad, must be mentioned here, because his influence in shaping the views of the present revolutionary movement was perhaps even greater than that of Tchernyshevsky. Schapov is the historian of the Russian peasantry. His object has been to bring to light the constructive principles of political and social life, adhered to by the masses of the peasantry as opposed to those which the Muscovite, and afterward the St. Petersburg monarchy, forced upon them. These principles are self-government and local autonomy in administrative and ecclesiastical matters, as opposed to the administrative and ecclesiastic centralization of the state; and in the economic domain communistic ownership of land, meadows, forests, fisheries, and all natural riches, as opposed to the system of private property maintained by the state. Thus he has shown the masses of Russian peasantry to be an excellent plastic material for the building up of a community diametrically opposed to the centralized despotism which has been constituted by temporary historical necessity—namely, the military struggle with alien conquerors.

Nihilism since 1870.—Upon the ground thus prepared foreign influences began to work powerfully after 1870, which is the epoch corresponding to the greatest development of international socialism. At that time, as nowadays, international socialists were divided into two sections, the social democrats and the anarchists. The former advocated the abolition of private property in the instruments of labor and their collective ownership by the workmen; but they wished to preserve the present political organizations, which should be made an instrument with which to rebuild the economic structure of the community. Thus for the social democrats the practical object was to take possession of political power. Peaceful electoral agitation was their chief weapon. The anarchists, headed then by the Russian Michael Bakunin (see BAKUNIN, MICHAEL), advocated the total abolition of the state and the substitution for it of a series of small, absolutely independent, and freely constituted communes. Of these two doctrines, the latter had by far the greater fascination for the Russian socialists of 1870. It seemed the shortest way to universal happiness, and it flattered the national feeling of the Russians. The political backwardness of their country was no longer a drawback, but an advantage. The antiquated autocracy was easier to overthrow than a constitutional monarchy based upon the popular vote. According to Bakunin, the village commune (*mir*) had only to be freed from the oppressive tutorship of the state to become an ideal form of the anarchical organization of society. In fact, Bakunin's anarchy was but a queer mixture of the Prudhonian doctrine with the Slavophilism of Khomiakov or *peasantism* of Schapov. The Russian anarchy of 1870 was a mere dream of universal harmony; but it had for its practical result the complete estrangement of the extreme revolutionary party from the majority of advanced Russians. The autocracy was opposed simply because it was a government, no substantial difference being admitted to exist between Russian autocracy and, for example, the English parliamentary *régime*. Accordingly, nothing was expected and nothing was asked from the educated classes and the liberal opposition, which was in favor of a constitutional government for Russia. The socialists of this epoch based all their hopes upon the peasants. Thousands of young people of both sexes, most of them belonging to the upper classes, went on a crusade among the peasants. They renounced all their privileges and became themselves common manual laborers in the fields, in factories, at the wharves and railways, in all places where common workpeople assembled. The movement failed completely. In 1873–74 some 1,500 propagandists and agitators, or their friends and relatives, were arrested in the thirty-seven provinces of the empire and thrown into prison. Half of them were released after a few months' detention; the rest were kept in solitary confinement for from two to four years, during which seventy-three of them either died or lost their reason. In 1877 a part of them (193) were tried and condemned to various punishments, from simple exile to ten years' penal servitude in the Siberian mines.

A number of other trials of the same nature followed, serving to the Russian socialists as an object lesson, showing the childish inconsistency of their indifference to the forms of political government. Sounder views gained ground very rapidly, but passions spoke first. The wanton cruelty with which political prisoners were treated, the horrors of preliminary detention, the barbarous punishments inflicted for trifling offenses, proved unendurable even to the mild, patient Russians. The spirit of revenge was kindled, giving birth to the first attacks, known by the name of terrorism, upon the Government. The terrorism began with the shot of Vera Zassulitch at Gen. Trepoff, who had ordered the flogging of a political prisoner. On Mar. 31, 1878, she was acquitted by the jury, although she had never denied her act. In 1878 the terrorism was accepted as a system of warfare by the Russian revolutionists, whose organ was a paper called *Zemlia i Volia* (Land and Liberty). This was the first practical struggle with the worst representatives of political despotism, and it gradually led to a very radical change in the theoretical programme. In 1880 the most energetic and numerous section of the Russian revolutionists proclaimed that the aim of their attacks upon the Government was the obtaining of a constitution for Russia. This was the *Narodnaia Volia* party with the "executive committee" at its head, which may be considered the embodiment of Nihilism as understood abroad. A minority made a split, founding a paper called *Tcherny Peredíel*, which kept to the exclusively socialist agitation, repudiating all interference in politics. The paper had but a short life, the police having discovered and sequestrated its printing-office immediately after the publication of its first number, and the party had such a small following that it could not recover from this blow. It was soon dissolved.

The whole of the revolutionary strength rallied under the banner of the *Narodnaia Volia*, which in 1880 thus formulated its programme of political and economic reforms: 1. A permanent representative assembly, having supreme control and direction in all general state affairs. 2. Provincial self-government, secured by the election of all public functionaries. 3. Independence of the village commune as an economic and administrative unit. 4. Complete liberty of conscience, speech, press, meetings, association, and electoral agitation. 5. Manhood suffrage. 6. Substitution of the standing army by a territorial militia. 7. Nationalization of land. 8. A series of measures tending to transfer the possession of factories to workmen.

These points make the programme a socialistic one, but it

is strictly social democratic. It is intended that the remoulding of the country's economic structure shall be carried out exclusively by the future national parliament. For the present the obtaining of such a parliament is the object to which are directed all the efforts of the revolutionary body known to outsiders by the name of Nihilists. The early formless anarchism has disappeared so completely as to leave no trace whatever. In fact, since 1879 there have not been any anarchist manifestoes or pamphlets, or any declaration of anarchist opinion at any of the numberless trials. There were two ways in which the Nihilists tried to carry out their campaign against autocracy. The first, which is widely known, is that of direct attempts against the representatives of autocracy. The second, which is little known, was the organizing of military insurrections similar to that of the Decembrists. These insurrections did not take place; the police succeeded in discovering the plots before they were matured. In the years 1882–84 about 300 military officers of all arms were arrested all over the empire.

In 1888 the minority, which had seceded from the bulk of the party and founded the unsuccessful *Tcherny Perediel*, started in Switzerland a paper, *The Social Democrat*, fully indorsing the programme of the German socialists. Owing to the remarkably rapid growth of this party among German workmen, and the direct and indirect influence of this momentous fact upon Russian workmen, this party has made striking progress among the workmen of all large Russian cities. It has for its immediate object the overthrow of the autocracy, but reckons only upon the power of the proletarians, while the majority of the revolutionary party gives greater prominence to the agrarian question, appealing chiefly to the masses of the peasantry on the one hand and to the liberty-loving, educated classes on the other. Its weapon is organized public opinion, which will force the Government to yield to the legitimate demands of the people, which "include alike the conception of the right of the people to political freedom and the conception of their right to satisfy their material needs on the basis of national production. The party considers the guarantees of these rights to be: 1. Representative government on the basis of universal suffrage. 2. Freedom of religious belief. 3. The independence of courts of justice. 4. Freedom of the press. 5. Freedom of meetings and associations. 6. Inviolability of the individual and his rights as a man." The programme adds the demand for wide provincial and territorial self-government, considering that in view of the variety of tribes and nations composing the empire, "a necessary condition of political freedom is the recognition of the right to political self-determination for all the nationalities entering into its composition."

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Niigata, nee′ĕe-gaa′taă: a city and port of Japan; situated on the west coast of the main island, at the mouth of the Shinanogawa; seat of the local government of Echigo (see map of Japan, ref. 5–D). The town is built on a narrow strip of land between the river and the ocean, which is barred from view by high sand hills. Opened to foreign trade in 1869, and nominally a treaty-port and the residence of foreign consuls, Niigata has virtually no foreign trade. The bar at the mouth of the river prevents vessels of foreign build from entering, and the open roadstead is unsafe. During high westerly winds vessels have to seek shelter at the isle of Sado, about 40 miles distant, which, famed for its gold mines, forms part of the prefecture of Niigata. Niigata is a bigoted center of Buddhism. A species of muslin, *chijimi*, made from hemp, is manufactured in the country districts; the apples and watermelons of the province are considered the best in the empire. Pop. 40,778.
J. M. DIXON.

Nijmwegen: See NYMWEGEN.

Nijnii-Novgorod, or **Nijegorod**: government of Central Russia, along the Volga and its affluents, the Oka and the Vetlooga. Area, 19,797 sq. miles. The surface is mostly level; the soil is not very fertile, but excellently cultivated; large quantities of grain, hemp, and flax are raised. In the northern part extensive forests are found, which have given rise to considerable ship-building and manufactures of all kinds of wooden implements. There are also manufactures of Russian leather, soap, iron, and many other articles. Pop. (1897) 1,603,034.

Nijnii-Novgorod: town of Russia; capital of the government of the same name; on the right bank of the Volga, at its confluence with the Oka; 275 miles by rail E. of Moscow (see map of Russia, ref. 6–F). The town is divided into two parts, the principal one being situated on the steep promontory, triangular in shape, and 400 feet high, at the apex of which, on the highest point, stands the Kremlin or citadel, surrounded by a wall 30 feet in height. This portion of the town is mainly made up of three handsomely built streets; the low town consists of one long street along the Volga. The whole town is built of wood, and has few attractions. It is remarkable, however, for a great fair held, from July 15 into September, on a triangular space formed by the junction of the left bank of the Oka with the right bank of the Volga, and so low as to be in other seasons often entirely inundated. (See FAIR.) The ground is laid out for streets, and the Russian Government has established a system of permanent sewerage, extending from river to river. As the time for the fair approaches, a great town springs up, with churches, theaters, hospitals, etc., all built of wood. Hundreds of thousands of people flock here on these occasions, the only means of access from the town being by a bridge of boats across the Oka. The waters are almost completely covered with boats engaged in conveying goods and people, and a large number of people occupy their boats as residences during the fair. The extension of railways and perfection of other means of internal communication does away largely with the motive for fairs of this kind, and this at Nijnii is diminishing in importance. Pop. (1897) 73,033.

Nijnii-Tagilsk: town; in the government of Perm, Russia; in the Ural Mountains; in a district exceedingly rich in iron, copper, lead, and platinum (see map of Russia, ref. 5–I). It contains a mining-school, extensive forges, and manufactures of machinery. Pop. about 40,000.

Nikisch, ARTHUR: See the Appendix.

Nikita, LOUISE: See the Appendix.

Nikko [lit., sun's brightness]: a village of Japan, about 80 miles by rail N. of Tokio, situated at the base of the great range of mountains of which Nantai-san is the chief (see map of Japan, ref. 6–E). Here are situated the finest temples in the empire. Always associated with religious edifices, Nikko became of first importance as a religious resort on the death of IYEYASU (*q. v.*), whose mausoleum was erected on the southern slope of a hill called Hotoke Iwa. About fifty years after the burial of Iyeyasu in 1617, a son of the emperor became abbot of Nikko, and henceforth, till 1868, a prince-abbot was always in residence. A long and magnificent avenue of cryptomerias leads up to Nikko, and its temples are marvels of elegance and beauty. Noteworthy sights are the red-lacquered bridge, crossed only by the emperor, which has been recently renewed, and several fine waterfalls. Nikko, which is a favorite summer resort, is 2,000 feet above sea-level. J. M. DIXON.

Nikolaevsk, nĕ-kō-laa′evsk: fortified town of Eastern Siberia; on the Amur, 23 miles from its mouth (see map of Asia, ref. 2–I). It was founded in 1851, and is an important port. Pop. 2,500.

Nikola I. Petrović-Njegoš, pet′rŏv-ich-ñeg′ŏsh: poet; b. at Cetinje, Montenegro, Oct. 7, 1841; was educated at Trieste and Paris (1856–60); succeeded his uncle Danilo (assassinated Aug. 13, 1860) as reigning Prince of Montenegro; waged successful wars on the Turks in 1862 and again in 1876, considerably enlarging his territory. He gave his country a new code of laws and a sort of constitutional government. He published some of his poems composed in the Servian language in the almanac *Orlić*, over the signature "N." They are lyric songs eulogistic of freedom, and epics modeled after the folk-song. He wrote two historical tragedies, *Vukašin* and *Balkanska carica*. In 1873 he printed a collection of his poems for his private use. Some of his poems have been translated into other Slavonic languages. J. J. KRÁL.

Nikon: Patriarch of Moscow; b. at Nijnii-Novgorod, Russia, 1605; educated in a monastery; rose to be patriarch 1652; introduced Greek music into the Russian Church and revised the Russian liturgy and confession of faith. These reforms excited the violent opposition of the conservatives, some of whom split off, establishing the sect called Raskolniks or Old Believers. By their intrigues he was compelled to retire to a monastery 1658, and in 1666 he was deposed. The new czar canceled this action and restored him to his see, and he was hastening to resume his place when death overtook him Aug. 17, 1681. See Stanley, *History of the Eastern Church*, and W. Palmer, *The Patriarch and the Tsar*, a translation of Nikon's replies to his enemies and a history of his career (6 vols., London, 1871–76). SAMUEL MACAULEY JACKSON.

Nile [from Lat. *Nīlus* = Gr. Νεῖλος, Nile]: probably the longest and most celebrated river in the world, and the most remarkable of the four great streams of Africa. It flows from the equatorial regions along and inside the eastern axis of the continent, and after a course of 4,300 miles (estimated) reaches the Mediterranean in 31° 30′ N. lat. by two principal mouths, forming a delta which begins near Cairo, 100 miles from the sea, and extends 150 miles along the shores. The upper half of the Nile drains vast tropical regions abundantly watered and receives many tributaries; the lower or northern half traverses the rainless portion of the great desert regions, where its valley, bordered by bare rocky bluffs, appears like a band of verdure in the midst of this desolate country.

The basin of the Nile is about 1,500,000 sq. miles, or half the size of the U. S., exclusive of Alaska. For centuries from 200 B. C. the ancient geographers declared that the river rose far S. in great lakes whose position was approximately given by Ptolemy. Their information was discredited by later geographers, and the source of the Nile was the greatest geographical problem until it was solved by several explorers, chief among whom were Speke, the discoverer of Victoria Nyanza, and Baker and Stanley, who revealed Lakes Albert Nyanza and Albert Edward respectively. The ultimate head-waters are not yet definitely determined. The Congo-Nile water parting S. of Victoria Nyanza approaches within 25 to 125 miles of the southern shores of that lake. It is not unlikely that the Kagera affluent of Victoria Nyanza, rising among the mountains near the northeastern shores of Tanganyika Lake (Baumann, 1892), is the most remote source. The main fact is that the Nile proceeds from three lakes lying on high plateaus under the equator—Victoria Nyanza (3,800 feet), Albert Edward (2,850 feet), and Albert Nyanza (2,300 feet). Victoria Nyanza is very remarkable, considering its size, for the small gathering-ground from which it collects its waters. The true Nile issues from the north end of it as a powerful and rapid stream flowing toward the N. W. into Albert Nyanza, where it is joined by the waters received from Albert Edward. Thence it runs with rapid course, and leaves the plateau regions to enter the great plains of the Egyptian Sudan. Here it receives from the W. the waters of a vast network of rivers collected by the Bhar-el-Arab and the Bhar-el-Gazal, and those of the eastern plateaus through the Sobat. After the junction of these rivers, under the name of Bhar-el-Abiad, or White Nile, it follows again a northern course between the tablelands of Kordofan and the plains of Sennaar to Khartum, where the Blue Nile, or Bhar-el-Azrek, brings to it the united waters of the Abyssinian plateau and its snowy mountains. Lower down, about N. lat. 17° 40′, another powerful stream, the Atbara, or Black Nile, pours in the waters of Northern Abyssinia. From this point to the Mediterranean, along its course of nearly 1,500 miles, it receives not a single tributary of importance. Thence making a great bend, it forms a series of rapids, the so-called cataracts of the Nile, the last of which is at Assuan, at its entrance into Egypt.

Like all streams fed by the periodical rains of the tropics, the Nile has its regular season of freshets overflowing its broad valley, transforming Egypt into a widespreading lake from which the cities rise like islands. At Khartum the river begins to rise early in April, but in Egypt generally on June 25. The waters then gradually increase until Sept. 27. At Thebes the flood reaches 40 feet; at Cairo, 27; and at Rosetta, at the mouth of the river, 46 feet. After their retreat the waters leave behind them mud and moisture, in which seeds deposited produce a most luxuriant vegetation and a succession of rich crops. Egypt's proverbial fertility thus entirely depends upon this annual inundation of the Nile, which renews the manure of its soil and provides the necessary moisture in this rainless climate. A rise of only 20 feet at Cairo causes a scarcity; more than 27 feet is unfavorable, and these excessive floods have in recent years caused great destruction of property, including crops. The White Nile contributes very little to the fertility of Egypt, the rich sediment being derived from the Abyssinian tributaries, chiefly the Atbara. At the flood period an enormous volume of the water goes to waste, though it is sorely needed at low water. The necessity of a vast scheme of water-storage is admitted, and engineers (1894) are selecting sites for great reservoirs which may be filled at flood periods and emptied at low water. The Nile is navigable for small vessels for the greater part of its course, but in the White Nile masses of aquatic vegetation, known as the sud, sometimes impede and even imprison vessels.

Revised by C. C. ADAMS.

Niles: city; Berrien co., Mich. (see map of Michigan, ref. 8–H); on the St. Joseph river, and the Cleve., Cin., Chi. and St. L. and the Mich. Cent. railways; 48 miles S. W. of Kalamazoo, 90 miles E. of Chicago. It is in an agricultural region, derives large power for manufacturing from the river, and contains flour and paper mills, iron-foundries, carriage and wagon factories, and other industrial works, two national banks with combined capital of $150,000, a State bank, capital $25,000, and a daily and three weekly newspapers. Pop. (1880) 4,197; (1890) 4,197; (1900) 4,287.

Niles: city; Trumbull co., O. (for location of county, see map of Ohio, ref. 2–J); on the Mahoning river, and the Erie, the Penn., and the Pitts. and W. railways; 5 miles S. E. of Warren, the county-seat, 58 miles E. of Cleveland. It contains 9 churches, public, high, and grammar schools, electric lights, and street-railways, water-works, several manufactories, and a daily and two weekly newspapers. Pop. (1880) 3,879; (1890) 4,289; (1900) 7,468. EDITOR OF "INDEPENDENT."

Nilghau, or **Nylghau** [Hind., liter., blue ox; *nīl*, blue + *gau*, ox, cow; cf. Sanskr. *gāus*: Gr. βοῦς: Lat. *bos*]: a large antelope (*Portax tragocamelus*) found in India, inhabiting the jungles, but apparently preferring the vicinity of cultivated land. The male is of a blue-gray color when full grown, and stands about 4 feet high at the shoulders. The females and young males are tawny red. The horns are 6 or 7 inches long. It is at times very wild, courageous, and resolute, but ordinarily falls an easy victim to the spear or rifle of the hunter. It has never been thoroughly tamed. The flesh is very poor, but the hides have a limited use in the arts. F. A. LUCAS.

Nilsson, CHRISTINE: singer; b. near Wexiö, Southern Sweden, Aug. 3, 1843, of a peasant family. Her father and brother obtained a humble living by playing music at peasant festivities in the neighborhood. Christine attracted the attention of Count Tornërhjelm by her playing and singing in a public market-place, and went by his aid to Halmstad, Stockholm, and Paris, where she finished her musical education by three years' study under Wartel, and made her *début* with eminent success at the Théâtre Lyrique, Oct. 24, 1864, in *La Traviata*. In 1867 she appeared in London in both opera and oratorio, and in 1868 she made a great sensation in Paris by her representation of Ophelia in Ambroise Thomas's *Hamlet*. In that year also she sang in the Crystal Palace, London, at the Handel festival. She first appeared in the U. S. in 1870 in concerts, and in 1871 sang in opera with great success. No singer ever visited the U. S., with the exception of Jenny Lind, who created such an instantaneous furore. She reappeared in London in 1872, and in that year was married in Westminster Abbey to Auguste Rouzeaud, who was connected with a Paris banking-house. He afterward failed in business, and died in an asylum for lunatics in 1882. In 1873 she sang with great success in St. Petersburg. From 1872 to 1877 she sang in London in Italian opera at Drury Lane and at her Majesty's theater, taking the part of Elsa in *Lohengrin* in 1875. She visited her native country in 1876 and again in 1885. In 1883 she made another professional tour in the U. S.; married in Paris Count Casa de Miranda, a Spanish nobleman, Mar. 12, 1887. Soon after she retired from the stage. Her favorite *rôles* are Mignon, Elsa, and Margherita. Her voice possesses remarkable sweetness, brilliancy, and evenness.

B. B. VALLENTINE.

Nilsson, SVEN: naturalist and archæologist; b. Mar. 8, 1787, in Asmundtorfs parish, in Skaane, Sweden, where his

father was a peasant. He was Professor in Natural History in the University of Lund 1832–56, and became widely known as a high authority in zoölogy and palæontology. His most important zoölogical work is his *Skandinaviens Fauna*, in four volumes. A fifth volume of *Illuminated Figures of the Scandinavian Fauna* properly belongs to the set, and the whole constitutes a monumental work. In his later years he devoted himself almost exclusively to Scandinavian antiquities, and by his celebrated work *Skandinaviska Nordens Ur-invånare*, in two magnificent volumes, he became one of the founders of the science of archæology. The first part of this work on the inhabitants of Scandinavia during the stone age was translated into English and published in London by Sir John Lubbock in 1868. The second part treats in a similar manner of the bronze age. Nilsson died Nov. 30, 1887. Rasmus B. Anderson.

Nimeguen: See Nymwegen.

Nîmes, neem (anc. *Nemausus*]: capital of the department of Gard, France; beautifully situated in a valley between hills covered with vineyards and orchards (see map of France, ref. 8–G). It is the see of a bishop, has many excellent educational institutions, and its manufactures of cottons, lace, hosiery, brandy, and especially of silks, are very important. The old portion of the city is poorly built, and is separated by boulevards from the eight modern suburbs, which form the larger part of the town. The architectural monuments which the city contains from the Roman period are of the highest interest. The Maison Carrée is a beautiful Corinthian temple, well preserved, thoroughly restored since 1789, and now used as a museum of paintings and antiquities. Les Arènes is the best preserved amphitheater which exists, containing from thirty-two to thirty-five ranges of seats. In the early Middle Ages it was employed repeatedly as a stronghold; afterward poor people used it as a sort of free tenement-house. Since 1858 it has been completely restored. Pont du Gard, the magnificent aqueduct, is in the vicinity of Nîmes. The citadel, now used as a prison, dates from 1687. The Romans occupied the city in 121 B. C., and during the first emperors it was a magnificent city. Subsequently it suffered much from the Visigoths, Saracens, and Normans, and in the fourteenth century it was nearly deserted. Under Francis I. it rose again, and although it suffered much by the revocation of the Edict of Nantes and during the Revolution, it is very prosperous. Pop. (1891) 71,623; (1896) 74,601.

Nimrod: according to Gen. x. 8–12, a son of Cush and grandson of Ham, "a mighty hunter before the Lord," "a mighty one in the earth," who founded an empire in Shinar or Babylonia and extended his authority northward over the territory of Assyria. This narrative is probably in part an echo of certain ethnic movements. That Assyria was a colony from Babylonia is an assured result of cuneiform study. The name Nimrod, however, has not yet been found in the cuneiform literature. The character is believed by many to be identical with the hero of the great epic, commonly called the Izdubar epic. The Oriental imagination was deeply impressed by the biblical picture of Nimrod, and made of him a tyrant who persecuted Abraham and was guilty of many other acts of cruelty. D. G. Lyon.

Nimrûd, or **Nimroud**: the modern Arabic name of the ruins which represent the ancient Assyrian city Calah (Assyr. *Kalkhu*, Heb. כָּלַח). They lie on the east side of the Tigris, about 20 miles S. E. of Mosul, and about 7 miles above the mouth of the upper Zab. Calah was built by Shalmaneser I. about 1320 B. C., and was after Asshur and Nineveh the third Assyrian capital. After the rise of Calah the three cities flourished contemporaneously, certain of the kings having palaces in more than one of them. When Assur-nazir-pal (884–860) ascended the throne he found Calah in ruins and Assyria in a weak condition. A great warrior, he restored the military power of the nation and rebuilt the city. Here resided likewise his son, Shalmaneser II. (860–824), and his great-grandson, Ramman-nirari III. (811–782). Shalmaneser II. has left inscriptions at Calah, Asshur, Nineveh, Balawat, and other places. Of later kings who adorned Calah may be mentioned Tiglath-pileser III. (745–727), Sargon (722–705), and Esarhaddon (681–668). Sargon's chief architectural work was, however, at his new capital, Dûr-Sharrukin, and that of his sons was at Nineveh. With the accession of the Sargon dynasty therefore the importance of Calah began to decline. The buildings erected here were not only palaces, but also temples and *ziggurats*, or towers, pyramidal in shape. In the last year of the reign of Asshur-nirari (754–745), as we learn from the eponym canon, Calah was the scene of an insurrection. Tiglath-pileser III., the successor of Asshur-nirari, may have made use of this insurrection to seize the throne.

The ruins are about a mile and a half from the Tigris, but formerly the river, which has shifted its course several times, ran along the western and southwestern sides of the city. The inclosure is almost rectangular in shape, not quite a mile and a half from E. to W., and somewhat less than a mile from N. to S. The southern wall, beginning at the southeast angle of the inclosure, runs W. for half a mile, then turns S. and extends another half mile to the old bed of the Tigris. The greatest length from N. to S. is therefore almost as much as that from E. to W. The principal buildings were on an artificial mound or platform in the southwest angle of the inclosure, extending about two-fifths of a mile N. and S. and about one-fourth of a mile E. and W. The Tigris seems to have washed the west and south sides of the mound. George Smith enumerates the buildings as follows: 1. A tower on the northwest corner of the mound, faced with stone to the height of 20 feet, 167 ft. 6 in. each way, built by Shalmaneser II. 2. Temples around the tower built by Assur-nazir-pal. 3. The northwest palace (S. of the tower), about 350 feet square, built by Assur-nazir-pal, repaired by Sargon. 4. The center palace (S. of the northwest palace), built by Shalmaneser II., added to by Ramman-nirari III., dismantled by Tiglath-pileser III., who rebuilt it; destroyed by Esarhaddon. 5. The southwest palace (S. of the center palace), built by Esarhaddon out of materials of the northwest and center palaces. 6. The southeast palace (E. of the southwest palace), built by Shalmaneser II. 7. Temple of Nebo (N. of the southeast palace), built by Ramman-nirari III.

The first excavations at Nimrûd were begun by A. H. Layard in 1845. He was encouraged thereto by Botta's success at Khorsabad. The expenses were borne by Sir Stratford Canning, and the work was successful from the start. Many large and beautiful alabaster bas-reliefs were secured for the British Museum. Those come particularly from the palace of Assur-nazir-pal and are of great value, not only as works of art, but also for the light which they shed on the military methods and the religious beliefs of the times. In the attention paid to the adornment of weapons and furniture, and in the representation of the minute and elaborate embroidery on the dress of the king and his attendants, these sculptures are hardly equaled by any of the work of the two remaining Assyrian centuries. Many of these bas-reliefs were in duplicate, and not a few of the duplicates were sent to the U. S. (See Assyria, under *History*.) Plaster reproductions of the British Museum reliefs may be seen in the Harvard Semitic Museum at Cambridge, in the Metropolitan Museum at New York, and in smaller numbers at other places. Layard's work at Nimrûd occupied parts of several years. Others have also carried on excavations there, notably Hormuzd Rassam and George Smith.

See articles Assyria and Assyrian Explorations and the literature there cited, and for the topography, Felix Jones's *Vestiges of Assyria*, sheet 2. D. G. Lyon.

Nindemann, William F. C.: See the Appendix.

Nine-point Circle: See Circle.

Nineveh (Assyr. *Ninâ* and *Ninua*, Heb. נִינְוֵה, Gr. Νῖνος, Septuagint version, Νινευί): the most celebrated city of the Assyrians. Classical tradition ascribes the founding of the city to Ninus and his wife Semiramis, but this is incorrect. Ninus seems to be a mythical personage. The name Semiramis has with probable correctness been identified with Sammuramat, the name of the wife of Ramman-nirari III. (811–782), but Nineveh had existed for many centuries before the time of Sammuramat. The name of the city resembles the Assyrian word for fish (*nûnu*, Heb. נוּן), and some persons seek a connection between the two. They find corroboration in the complex ideogram (the sign for fish inside the sign for receptacle) by which the city is represented, and also in the story concerning the great fish which swallowed Jonah, the prophet to Nineveh.

The history of the city is intimately connected with that of Assyria. Here was the royal residence during most of the best-known period of Assyrian history. The beginnings of Nineveh antedate our knowledge. A temple to Ishtar, at all periods the favorite deity of the city, existed

there in the nineteenth century B. C. The library of Assurbanipal furnishes a copy of a hymn addressed to Ishtar of Nineveh, the original of which seems to have come from the eighteenth or nineteenth century B. C. In the time of the El-Amarna correspondence (sixteenth century B. C.), the worship of this Ninevite goddess was known in the land of Mitanni, and seems to have been even introduced into Egypt. After this time the temple of Ishtar was restored by many of the kings of Assyria. As Nineveh had overshadowed the older capital Asshur, so it in turn was overshadowed by Calah on the erection of this latter city by Shalmaneser I. (See NIMRÛD.) With the accession of the Sargon dynasty (722–606), however, the loss was more than regained. Sargon himself preferred to build a new city and palace, but his successors Sennacherib, Esarhaddon, and Assurbanipal lavished their time and wealth on the adornment of Nineveh. The extensive conquests of this dynasty, especially in the west, as far as the Mediterranean and Egypt, added greatly to the royal resources. Cedar-trees for the roofs of the buildings were cut down in Lebanon by Manasseh the Judean and neighboring kings, and transported thence to Nineveh. Sennacherib informs us that he tore down the palace of his predecessors, because it was too small and in decay, and that he erected another on a grander scale. This structure must have covered many acres, because it was made large enough, not only for the residence of the king and his attendants, but also for the royal horses and for the storage of booty. In the Bavian inscription he informs us that he enlarged the city, fortified it with lofty walls, irrigated the country around by a system of canals, and surrounded the capital with parks and plantations. Elsewhere he tells us that he built the "Royal Street" 52 cubits wide, leading to the park gate, and published a decree forbidding the abutters, under penalty of death, from laying any part of the foundation of a house within the limits of the street. Esarhaddon, who restored Babylon, which had been destroyed by his father, built a palace at Calah and also one at Nineveh. The last named was considered by its builder superior to any that had gone before. It was likewise surrounded by a park containing rare foreign plants, and its completion was celebrated by a great feast. Assurbanipal lived in the palace built by his grandfather Sennacherib, the restoration of which he records at length and with evident satisfaction. He found it necessary also to strengthen the city walls, which had suffered much from continued heavy rains. The restoration and adornment of the temples of Ishtar and Nebo at Nineveh also engaged his attention. In the palace of Assurbanipal was situated the royal library, that storehouse to which we are so much indebted for our knowledge of Assyrian affairs. Hence, too, have come many of the finest bas-reliefs in alabaster. In the time of the Sargonidæ Nineveh was politically the chief city in the world. West and south, even Asia Minor and Egypt, were subject. Ambassadors came from all known regions bearing tribute; the harem was crowded with princesses from many lands, whose fathers felt honored in being thus allied to the great ruler; the city was thronged with captives and booty, architecture and learning flourished. The prophet Nahum gives an idea of the strength and splendor of the city. A speedy decline followed Assurbanipal. The war with Babylon in the middle of his reign, though successful, was a serious blow to the greatness of Nineveh. His successors were weak, and probably had neither time nor means for extensive building operations. In the sack of the city by the Babylonians and their allies in 606 B. C. the palaces and temples were reduced to ruins, burying in their fall the best products of the Assyrian development.

The tradition of the site of Nineveh has survived until to-day. The ruins lie on the Tigris, E. of Mosul. The river touches the inclosure now only at the northwest and southwest angles. The inclosure has four sides of unequal length. It is about 3 miles long (N. E. to S. W.) while its greatest breadth is a little less than 1½ miles in the northern portion, and its least breadth about three-fifths of a mile at the southern end. The surrounding parks and villages may formerly have been reckoned as part of the city. In Jonah Nineveh is spoken of as a "great city" "of three days' journey." The ruined wall and moat are still distinct. The east side is furthermore defended by several outer lines of embankment. The river Khausar (Assyr. *Khusur*) flows through the city from the E., dividing it into two nearly equal portions, and emptying into the Tigris. Near it is the principal mound, now called Kouyunjik, which is oblong in shape, about 3,000 feet from N. to S., and about half as much from E. to W. across its center. It has as yet been only in part explored. P. E. Botta, French consul at Mosul, was first to make the attempt. His success in digging at Khorsabad, which he believed to be Nineveh, turned his attention from Kouyunjik, and A. H. Layard reaped the great harvest of discovery. Other explorers have been Ross, Hormuzd Rassam, and George Smith. The last named enumerates the buildings in the mound as follows: (1) Three ruined temples, built and restored by many kings in different ages. (2) A palace founded by Shalmaneser I. (B. C. 1320), restored by several subsequent monarchs, destroyed by Sennacherib. (3) A palace founded by Ramman-nirari III. (B. C. 811–782), restored by Sennacherib and Esarhaddon. (4) A palace built by Tiglath-pileser III. (B. C. 745–727). (5) Temple of Nebo and Merodach, restored by Sargon (B. C. 722–705). (6) The southwest palace, built by Sennacherib (B. C. 705–681). (7) The north palace, built by Sennacherib, restored by Assurbanipal (B. C. 668–626).

Nebbi Yunus (the prophet Jonas) is another mound of smaller extent within the inclosure, about three-quarters of a mile S. E. of Kouyunjik. Here also are the ruins of royal buildings, a palace of Sennacherib and one of Esarhaddon; but excavations have been attended with more difficulty than at Kouyunjik, owing to the presence of a Mohammedan cemetery on the mound.

If the Ninevite palaces could be restored as they were in the days of Assurbanipal they would prove to be works of surprising magnificence. Many of the bas-reliefs were so calcined by the fire that they crumbled on exposure to the air. Others have been ruined by the action of the rain, which has carved deep ravines down the sides of the mounds, and still others, during the long centuries, have been dug out by the natives to burn into lime or to use in building houses. Those which reached the British Museum, wonderful as they are, are but a very small portion of what once existed.

The English explorers at Nineveh were more interested in sculptures and inscriptions than they were in architecture. They have accordingly not made such full measurements, drawings, and sketches as the French have done at Khorsabad and at Telloh. The result is that we shall never know the finest Assyrian palaces so well as we do those of less importance.

See Felix Jones's *Vestiges of Assyria*, sheet 1 (Ichnographic Sketch of the Remains of Ancient Nineveh), and ASSYRIA and ASSYRIAN EXPLORATIONS. D. G. LYON.

Ningpo: a foo or departmental city of Cheh-kiang, China, and one of the five ports opened to foreign residence and trade by the treaty made at Nanking in 1842. It is situated at the confluence of the Ts'-ki and the Fŭng-hwa rivers with the Yung, 11½ miles from the sea, and 125 by water from Shanghai; lat. 29° 55′ N., lon. 121° 22′ E. (see map of China, ref. 6-K). Its walls, which are 25 feet high and 22 feet thick at the base, have a circuit of nearly 5 miles, and are pierced by six gates. The streets are clean and well paved and the shops and houses well built. Fire-walls cross the city at distances of 200 to 300 yards. The city, which is an irregular oval in shape, contains many fine buildings, among which are a seven-story pagoda 160 feet high dating from the eighth century, a Mohammedan mosque, a lofty drum-tower near the center of the city, the Temple of the Queen of Heaven, founded near the close of the twelfth century, but rebuilt in 1680 by the Fuh-kien merchants (hence usually known as the "Fuh-kien Temple"), many other Buddhist and Taoist temples, and numerous pai-lows or memorial arches. The foreign settlement is separated from the native city by the Ts'-ki, and occupies the angle between that river and the Yung.

The gold and silver smiths of Ningpo are noted for the delicacy and tastefulness of their work, and Ningpo confectionery is celebrated all over China. The specialty of the place, however, is its elegantly carved and inlaid furniture. Silk-culture is extensively carried on in the surrounding country, and silk-weaving is an important industry. In 1893 498 piculs of silk piece-goods were exported. The development of manufacturing interests in Japan has given a great impetus to cotton-culture, and in 1893 the steam cotton-ginning establishments of Ningpo cleaned over 60,000 piculs of raw cotton. Owing to its proximity to Shanghai the foreign trade with Ningpo is not as great as was anticipated when the port was opened in 1842. According to the returns of the imperial maritime customs, the net volume of trade of the port amounted in 1893 to

15,478,005 taels ($16,251,905 U. S. gold), of which 6,996,717 taels represented foreign imports, 2,192,662 taels native imports, and 6,288,626 taels exports. The chief articles of exports were tea (3,925,551 taels), raw cotton (1,006,116 taels), silk and silk piece-goods, and alum. The imports include opium (5,289 piculs), cottons (639,800 piculs), yarn, sugar (90,237 piculs), tin (581 piculs), vermilion (581 piculs), lead, kerosene oil, and rice (204,854 piculs). The number of vessels entered during the year was 524 (tonnage, 458,646 tons), cleared 530 (tonnage, 459,642). Of the 381 steamers that entered and cleared 162 carried the British flag and 215 the Chinese.

Ningpo has long been an important center of trade. In 1522 the Portuguese settled here by permission and flourished, but their rapacity led to their expulsion in 1542, when 800 of the 1,200 Portuguese residents were massacred, and 25 Portuguese vessels and 42 junks were destroyed. The city was occupied by the British from Oct. 13, 1841, to May 7, 1842, and was captured Dec. 9, 1861, by the Taipings, who, however, were compelled by the foreign fleets then in the river to retire on May 10, 1862. It is an important center of missionary work. Pop. estimated (1893) 255,000.

R. Lilley.

Ninigret: an Indian chieftain of the Narragansett tribe, sachem of Niantic and uncle of Miantonomoh; was neutral during the Pequot war of 1632, but aided the English in that of 1637. Having afterward visited the Dutch at Manhattan and the Western Indians, he was suspected of plotting against the colonists, and war was declared against him by the commissioners of the united colonies 1653, but it was not immediately carried into effect. Meanwhile Ninigret waged war upon the Indians of Long Island, and having refused to obey a summons to Hartford in 1654, Maj. Simon Willard was sent against him, and he was forced to flee. In 1660–62 he sold a large portion of his territory to the colonists, abstained from participation in King Philip's war 1675–76, and died soon afterward.

Niño, neen'yō, Pedro Alonso: navigator; b. at Moguer, Spain, about 1455. He was early connected with Portuguese trading and exploring expeditions to the eastern coast of Africa; was commander of a supply fleet which sailed for Santo Domingo in 1496; and was with Columbus on his third voyage (1498) to Trinidad and the coast of Paria. Returning to Spain immediately after, he associated himself with Cristobal Guerra, a merchant, for a trading expedition to Paria. They left Palos in June, 1499, followed the track which Columbus had taken, coasted Venezuela to Cumaná, and by peaceful trading obtained a large amount of pearls and some gold from the Indians; in Apr., 1500, they returned to Spain. This was, from a financial point of view, the first successful voyage to America. Niño was accused of keeping back a part of the royal perquisites, was arrested, and died before his suit was decided. Herbert H. Smith.

Ninon de l'Enclos: See L'Enclos.

Nio (anc. Ἰος): an island of the Ægean, now, but not anciently, reckoned as one of the Cyclades. It lies N. of Theara and S. W. of Naxos, and is 11 miles long and 5 broad. Area, 20 sq. miles. It is rough, but quite productive, and has a fine harbor and some 4,000 inhabitants.

Ni'obe [= Lat. = Gr. Νιόβη]: daughter of Tantalus, King of Phrygia, and Dione or Taygete; sister of Pelops, and wife of Amphion, King of Thebes, to whom she bore six sons and six daughters (though the number varies). She was on intimate terms with Leto, a wife of Zeus, but boasted arrogantly that she was superior to Leto because she had twelve goodly children, whereas Leto had but two, forgetting that these two were the gods Apollo and Artemis. Enraged at her presumption, Apollo slew her sons and Artemis her daughters. After lying unburied for nine days the children were buried by the gods at Thebes. In pity for the grief of Niobe, the gods changed her into stone and fixed her forever on the side of Mt. Sipylus, E. of Magnesia, on the Hermus. Though turned to stone Niobe still wept, for to this day water oozes from the eyes of the rock-relief, a story which has been noticed by Homer, Sophocles and Ovid. Nowadays the so-called Niobe of Mt. Sipylus is referred to the art of the Hittites, who held sway in Asia Minor before the advent of the Phrygians. The celebrated group of Niobe and her children, in the Uffizi Gallery in Florence, represents the killing of the children by Apollo and Artemis. It was discovered in 1583 on the Esquiline in Rome, and is probably not the group nor a copy of the group mentioned by Pliny as standing in the pediment of the temple of Apollo Sosianus, for the reason that the existing statues can not be grouped in a pediment. Probably this group represents Niobe standing on the summit of a hill, up which the children hasten to her for protection. Remnants of another and more excellent group are preserved in Rome (Museo Chiaramonti). The group mentioned by Pliny was ascribed in antiquity to Scopas or Praxiteles. See any *History of Greek Art* under *Scopas*, or the *Age of Scopas*, but especially see Stark, *Niobe und die Niobiden* (Leipzig, 1863), and his *Nach dem Orient* (1874), p. 243 ff.; Schweisthal, *L'image de Niobé et l'autel de Zeus Hypatos au mont Sipyle* in the *Revue Archéologique* (1887, pp. 213–232); Weber, *Le Sipylos et ses monuments* (Paris, 1880); Humann, *Ein Ausflug in den Sipylos* (Brunswick, 1885); Ramsay, *Sipylos and Cybele* in *Journal of Hellenic Studies*, vol. iii.; Perrot and Chipiez, *History of Art in Phrygia*, etc. (London, 1892), p. 37 ff.; the articles *Niobe* and *Skopas* in Baumeister's *Denkmäler*.

J. R. S. Sterrett.

Niobium: See Columbium.

Niobrara River, or in Fr. **L'Eau qui Court** (i. e. the running water): a tributary of the Missouri. It rises in Laramie co., Wy., and flows 450 miles to the E., through Northern Nebraska, in its lower course separating South Dakota from Nebraska. It is a shallow and very rapid stream. Its upper valley is treeless pasture-land. It next traverses the Great Sandhill region, believed to be almost valueless. It then flows through a rocky region with fertile, well-timbered ravines, and its lower valley has good farming land, with abundant trees.

Niort, nēē'ōr': capital of the department of Deux-Sèvres, France; on the Sèvre-Niortaise; 43 miles N. E. of La Rochelle (see map of France, ref. 6–D). It is a handsome town with beautiful promenades and many elegant buildings. It is a railway junction, and its tanneries, dyeworks, and manufactures of chamois, gloves, and shoes are important. The public gardens are very beautiful. Pop. (1896) 23,674.

Nip'issing: a lake and district of Ontario, Canada. The lake is in lat. 46° 20′ N., about half way between Georgian Bay and the Ottawa river. It is about 40 miles long, 30 wide in its greatest breadth, and of very irregular outline. It receives many streams, of which the most important is the Sturgeon river from the N., and empties by the French river, about 40 miles long, into Georgian Bay. The Canadian Pacific Railway runs along its northern shore. The lake is subject to sudden gales, which make navigation dangerous. Two steamers run on the lake in the summer. The scenery is very picturesque, and a summer hotel has been constructed on one of the numerous islands. Gold has been discovered on the shores near the outlet. The district has a climate as favorable as that of Ottawa, Canada. Good farming lands abound, and the country is being rapidly settled. Mark W. Harrington.

Nipmucs: See Algonquian Indians.

Nipperdey, Karl Ludwig: Latinist; b. in Schwerin, Germany, Sept. 13, 1821; studied under Lachmann and Haupt at Berlin; became privat docent in Leipzig 1850, professor in Jena 1852. D. by suicide Jan. 2, 1875. He edited *Cæsar*, *Cornelius Nepos*, and the *Annals of Tacitus* with German notes, an exegetical masterpiece (9th ed. by G. Andresen, 1892). Cf. R. Schöll, *K. N.* (Jena, 1875), who also published *C. N. Opuscula* (Berlin, 1877). A. G.

Nippon: See Japan.

Nirvāna, nĕĕr-vaa'na [Sanskr. (in Pāli *nibbana*), a blowing out (of the flame of life, or the like), extinguishment, extinction; *nir*, euphonic form of *nis*, out + *vāna*, a blowing, deriv. of √*vā*, blow]: the highest aim and the highest good of the Buddhist saint; the blissful condition of those who by the removal of ignorance and the extinction of desire have arrived at a point where rebirth is no longer necessary and the misery and sorrow incident to life are at an end. (See Nidāna.) This is accomplished by walking in the Noble Eightfold Path. See Buddhism.

The attainment of Nirvāna is not necessarily coincident with death. Gautama became enlightened and attained Nirvāna under the bo-tree. He lived many years thereafter, just as an engine may still run by its momentum after the steam is shut off; but no craving remained and there could be no rebirth, for nothing remained to be reincarnate. At his death he passed away "with that utter passing away in which nothing whatever is left behind."

Men nowadays can not attain Nirvāna. For "enlightenment" all conditions must be favorable. When Gautama was on earth tens of thousands achieved it, and diminishing numbers after his decease; but the opportunity at last passed by, and until another Buddha comes men can hope only to be reborn in a more favorable environment.

Nirvāna, like much else in Buddhism, is an inheritance from the older Indian philosophy, modified by the rejection of pantheism; but a pantheistic influence remains in the Mahāyana schools, and some teachers make Nirvāna mean absorption into the Absolute.

Nirvāna, like many other Buddhist ideas, was too subtle for popular comprehension. The goal was too distant, and now most Buddhists are content to be reborn in one of the heavens, and in the Northern school it has for the most part been supplanted by the doctrine of a Western paradise of sensuous Oriental bliss, where desire is not extinguished but is gratified for numerous æons. See SUKHĀVATI.

See Oldenberg's *Buddha*, translated by Hoey (London, 1884); Alabaster's *Wheel of the Law* (London, 1871); Monier-Williams's *Buddhism* (London and New York, 1889); Max Müller's essay on *Buddhist Nihilism*; Ellinwood's *Oriental Religions and Christianity* (New York, 1892); and the works mentioned under the article BUDDHISM.

GEORGE WILLIAM KNOX.

Nisard, nē̆'zaar', JEAN MARIE NAPOLÉON DÉSIRÉ: literary historian; b. at Châtillon-sur-Seine, France, Mar. 20, 1806. He was liberally educated, taught in the École Normale from 1830 to 1840, was made Professor of Eloquence at the Collège de France in 1843, and director of the École Normale in 1857. He drew attention to himself by criticism noticeable for its lack of sympathy with the romantic movement and the severity of its judgments on its representative writers. The ideal French qualities of mind were to him good sense, clearness, precision, and truth, and these he found in their perfection in the literature of the seventeenth century. From this standpoint his main work, *Histoire de la littérature Française* (4 vols., 1844–61), is written. Its interest centers in its judgments of the main classical writers, the mediæval literature as well as all merely mediocre writers being mainly neglected and the eighteenth and nineteenth centuries being regarded as periods of decay. The same standard of criticism is applied with wider range of subject in his various volumes of essays: *Études d'Histoire et de Littérature* (1859); *Nouvelles Études* (1864); *Mélanges d'Histoire et de Littérature* (1868); *Les quatre grands Historiens Latins* (1874); *Portraits et Études d'Histoire Littéraire* (1875); *Renaissance et Réforme* (1877). He was chosen to the Academy in 1850. D. at San Remo, Italy, Mar. 26, 1888. A. G. CANFIELD.

Nisch, or **Nissa** (anc. *Naissus*): second city of Servia; on the Nissava; 115 miles S. E. of Belgrade (see map of Austria-Hungary, ref. 10–J); always an important military center, now the southern key of Servia. Here the Ottoman armies always mustered before a European war. Pop. (1893) 19,877. E. A. G.

Nishapur': town; in the province of Khorassan, Persia; on the Seka; 53 miles W. of Meshed (see map of Persia and Arabia, ref. 2–J). It is a large city surrounded with walls and ditches, but poorly built and partly in ruins. The surrounding plain, however, situated at an elevation of 4,200 feet, is densely peopled and well cultivated. It has been a city of great importance. The Greeks, who called it Niçaya and Nicæa, believed it to be the birthplace of the god Dionysos. Pop. of the town (1884) 11,000, according to Schindler. Revised by M. W. HARRINGTON.

Ni'si Pri'us [Lat., unless sooner]: a term of English law used (mostly adjectively) to designate a trial of issues of facts in a civil case before a single judge and a jury, the record of the trial, the writ by which the jury is summoned, or the whole system of proceeding at such trials. The phrase is also commonly employed in the U. S. with a similar meaning, though in some States the expression "trial at circuit" is used. (See CIRCUIT.) The rulings and opinions rendered by the judge in trials of this kind are termed *nisi-prius* decisions. *Nisi-prius* trials and decisions are distinguished from those at bar or in banc, that is, those before a full court, either for the trial of issues of fact or for the hearing of appeals upon questions of law from an inferior court. The origin of this peculiar technical phrase is as follows: By the ancient English practice actions of various kinds were tried only in the superior courts sitting at Westminster, and it was therefore necessary for parties and counsel to resort thither from all parts of the realm to attend to the hearing of the causes in which they were interested. In order to remedy this inconvenience, it was provided by Magna Charta that actions of certain kinds should be triable in the county where the cause of action arose, before justices to be sent into each county once a year. Subsequently, this system of local trial was extended to other actions, till it became the uniform practice to try all common-law actions (as distinguished from suits in courts of equity) in the first instance before a judge and jury in the county where the cause of action arose; but the action was still nominally instituted as before, in the superior court, and the jury were summoned by writ to appear there, "unless before" (*nisi prius*) the day appointed the justices came into the proper county to hold a session of court. These important Latin words in the writ then became a convenient designation for the system of trial. These matters are now regulated by the judicature acts, and the *venire* no longer contains the words *nisi prius* or *nisi*, but the words occur in the record and judgment roll. *Nisi-prius* decisions upon questions of law are more commonly reported in England than in the U. S. As they are rendered by a single judge, and often on the spur of the moment, they are not generally deemed to have as high value and authority as decisions rendered by a full court or an appellate court. Their weight and importance of course vary with the ability and reputation of the presiding judge. The most valuable English *nisi-prius* reports are those of Peake, Espinasse, Campbell, Carrington and Payne, and Foster and Finlason. For fuller particulars, see the works of Archbold, Selwyn, Stephens, etc., on *nisi-prius* law, and Henry J. Stephen's *New Commentaries on the Laws of England* (11th ed., London, 1890). Revised by F. STURGES ALLEN.

Nissa, or **Nish**: same as NISCH (*q. v.*).

Nissen, HEINRICH: archæologist and historian; b. in Hadersleben, Germany, Apr. 3, 1839; studied in Kiel and Berlin; was privat docent in Bonn in 1867; professor in Marburg 1869–1876; was called to Göttingen in 1877, to Strassburg in 1878, and to Bonn in 1884. His principal works are *Kritische Untersuchungen über die Quellen der 4. und 5. Decade des Livius* (1863); *Das Templum* (1869); *Pompeianische Studien zur Städtekunde des Alterthums* (1877); *Italische Landeskunde*; *Griechische und Römische Metrologie* (in J. Müller's *Handbuch der class. Alterthumswissenschaft* (1887). ALFRED GUDEMAN.

Nithisdale, or **Nithsdale**, WILLIAM MAXWELL, Earl of: b. in Scotland in 1676; married Lady Winifred Herbert, daughter of the Earl of Powis; took part in the rebellion headed by the Earl of Mar 1715; fell into the hands of the Government at Preston; was committed to the Tower of London, and condemned to death; escaped from the Tower disguised in the clothes of the countess, who had paid him a visit and remained in his stead; took refuge with the Venetian ambassador, and made his way to the Continent. D. at Rome, Mar. 20, 1744. The countess died in 1749.

Nito'cris (*Neit-Âker, Nit-Âqert*): an Egyptian queen; the last ruler of the sixth dynasty, who reigned seven years. Her name has been found in the royal list of the Turin papyrus, but upon no monuments. Our information comes mainly from Herodotus (ii., 100). She is said to have received the throne after the murder of her brother by conspirators, who afterward made her regent. Her brother's death she avenged by drowning those implicated in the plot in a large subterranean chamber into which they were invited to partake of a feast of inauguration. To escape retribution she took her own life. She is also said to have built the third largest pyramid, but she appears rather to have enlarged and faced with granite the pyramid of Mycerinos of the fourth dynasty, in which it is believed that her funeral chamber was located. A story similar to that of Cinderella attaches to her under the name of Rhodopis. Nitocris was also the name of the wife of Psammetichus II., and of his daughter. Herodotus also mentions a Nitocris, Queen of Babylon (i., 185 f.). CHARLES R. GILLETT.

Nitrate of Silver and **Nitrates**: See NITRIC ACID.

Nitre: See SALTPETRE.

Nitric Acid [*nitric* is a deriv. of *niter*]: one of the compounds which nitrogen forms with oxygen and hydrogen. So far as known, nitric acid was first prepared by the Arabian chemist Geber (probably in the ninth century A. D.) by distilling a mixture of niter or saltpeter, cyprian vitriol (sulphate of copper), and alum. He called it *aqua dissolutiva*.

Later it was prepared by other methods and called *aqua fortis*, *spiritus nitri acidus*, and *acidum nitri*. Glauber first showed that the acid can be most easily made by treating saltpeter with sulphuric acid. This led to the name *spiritus nitri fumans Glauberi*. Lavoisier discovered that nitric acid contains oxygen, and later showed that it contains nitrogen. Nitric acid occurs in nature in combination as salts called nitrates. The ammonium, potassium, and sodium salts are very widely distributed over the earth's surface, and in a few places nitrates are found in very large quantities. Small quantities of nitrates occur in the air and in all bodies of natural water. From the soil the nitrates pass into the plants. Nitrates are formed wherever organic substances containing nitrogen, especially refuse animal matter, undergo decomposition in the soil in contact with alkaline bases or their carbonates. This conversion is of great importance in nature, and it has been the subject of much investigation. It was first thought that *nitrification*, as the process is called, was due simply to the action of oxygen, but the work of Schlösing and Müntz, as well as that of Warrington, has shown that it is caused by the action of organized ferments. (See FERMENTATION.) It appears that the nitrifying ferment is present in the soil, and that where the conditions are favorable it acts upon waste nitrogenous matter yielding nitrates. Thus the waste matter is converted into material that is of value for vegetation. Generally the nitrates do not accumulate in the soil, because they are soluble in water. Bodies of water in the neighborhood of places where animal matter is undergoing nitrification always contain nitrates, and their presence is an indication that the water is probably contaminated with sewage.

Nitric acid is made from either potassium nitrate, KNO_3, commonly called *saltpeter*, or sodium nitrate, $NaNO_3$, commonly called *Chili saltpeter* or *cubic niter*, by treating with sulphuric acid. At the same time, in case potassium nitrate is used, either potassium sulphate, K_2SO_4, or acid potassium sulphate, $HKSO_4$ (bisulphate of potash), is formed, or both may be formed according to the proportion of sulphuric acid used. The equations representing the reactions are:

$$KNO_3 + H_2SO_4 = KHSO_4 + HNO_3,$$
$$2KNO_3 + H_2SO_4 = K_2SO_4 + 2HNO_3.$$

In the laboratory the preparation of the acid is carried on in glass vessels so constructed that the acid does not come in contact with anything but glass. On the large scale the composition of the saltpeter by the sulphuric acid takes place in cast-iron retorts, and the acid formed is condensed in earthenware jars. Generally the proportion of saltpeter and sulphuric acid is such that the product left in the retorts is acid potassium sulphate, as this, being easily melted, can be removed from the retorts with less difficulty than the ordinary sulphate, which is hard and requires to be broken up before it can be taken out. It will be seen then that all the nitric acid used is obtained from nitrates found in nature, and these have probably been formed by the action of the nitrifying ferment upon organic matter containing nitrogen.

The acid obtained by the process described is not pure, but always contains water and other compounds of nitrogen which are formed by the action of heat in the acid. In this state it is always more or less colored. The nitrates from which nitric acid is made always contain other substances, especially chlorides, and the acid itself is therefore impure for this reason. On the large scale natural sodium nitrate, or Chili saltpeter, is now used altogether in the preparation of nitric acid, both concentrated and dilute. Pure nitric acid is made from the commercial product by distilling it again. The chlorine, hydrochloric acid, and oxides of nitrogen pass over first, then comes pure acid, and the iodic acid, from the iodate in the saltpeter (see IODINE), and sulphuric acid, and non-volatile impurities remain in the retort. Nitric acid perfectly free from water has probably never been prepared, but Roscoe prepared an acid containing 99·5 to 99·8 per cent. of the compound HNO_3. This concentrated acid is an exceedingly energetic substance. It acts upon organic matter, disintegrating it, and in many cases setting fire to it. It must be handled with the greatest care. In dilute form it also acts readily upon other things producing deep-seated changes. The acid found in the market generally contains about 68 per cent. acid, the rest being principally water. The pure acid boils at 86° C. (186·8° F.), undergoing slight decomposition. It acts upon metals as iron, copper, silver, tin, zinc, etc., yielding in most cases salts called nitrates which are soluble in water. Thus when silver is treated with the acid nitrate of silver, $AgNO_3$, is formed, and this dissolves in the water which accompanies the acid. The metal is therefore said to dissolve in the acid. Whenever nitric acid acts upon a metal a reddish-brown gas is seen. This is nitrogen peroxide, NO_2. Upon organic substances nitric acid acts in different ways. In its most concentrated form it decomposes them. The action in these cases is mainly oxidation. The substances are burned up by the oxygen given up from the acid. When the action does not go to this length nitro-products and ethereal salts of nitric acid may be formed. Thus when the acid acts upon BENZENE (*q. v*) NITROBENZENE (*q. v.*) is formed, thus:

$$\underset{\text{Benzene.}}{C_6H_6} + \underset{\text{Nitric acid.}}{HNO_3} = \underset{\text{Nitrobenzene.}}{C_6H_5.NO_2} + \underset{\text{Water.}}{H_2O}.$$

When it acts upon GLYCERIN (*q. v.*) nitroglycerin (see EXPLOSIVES) is formed, thus:

$$\underset{\text{Glycerin.}}{C_3H_5\begin{cases}OH\\OH\\OH\end{cases}} + 3HNO_3 = \underset{\text{Trinitroglycerin.}}{C_3H_5\begin{cases}O.NO_2\\O.NO_2\\O.NO_2\end{cases}} + 3H_2O.$$

NITROCELLULOSE (*q. v.*) is formed by the action of the acid upon cotton which is nearly pure CELLULOSE (*q. v.*). Nitrocellulose is guncotton. (See PYROXYLIN and EXPLOSIVES.) PICRIC ACID (*q. v.*) is formed by treating CARBOLIC ACID (*q. v.*) with nitric acid. It is trinitrophenol, and is formed as represented in the equation:

$$\underset{\substack{\text{Carbolic acid}\\\text{or phenol.}}}{C_6H_5OH} + 3HNO_3 = \underset{\substack{\text{Picric acid}\\\text{or trinitrophenol.}}}{C_6H_2(NO_2)_3OH} + 3H_2O.$$

Nitric acid is sometimes used in calico-printing to produce a yellow pattern on an indigo ground, in consequence of its power to destroy the color of indigo. "It serves, further, under the name *rouille*, for producing a compound of iron fraudulently used for 'loading' or 'weighting' black silks in the process of dyeing" (*Wagner*).

Nitrates.—These are the SALTS (*q. v.*) of nitric acid. The most common are the potassium and sodium salts, which will be more fully treated under POTASSIUM and SODIUM (*qq. v.*). The calcium salt is made artificially. (See CALCIUM and SALTPETER.) Nitrate of *silver*, or lunar caustic, is of value in the arts, as is nitrate of *lead*; nitrates of *barium* and *strontium* are used in pyrotechny; and nitrate of *bismuth* in medicine. Each of these receives notice under the head of the metal contained in the salt. IRA REMSEN.

Nitrification: See NITRIC ACID.

Nitrite of Amyl: an amber-colored, highly volatile liquid, smelling like ripe bananas, insoluble in water, but soluble in alcohol. It is obtained by the action of nitric acid on amylic alcohol or "fusel oil." Its formula is $C_5A_{11}NO_2$. Amyl nitrite was discovered in 1844, but was not used as a medicine till 1865, when it was brought to notice by Dr. B. W. Richardson, of London. If two or three drops of it be poured on a handkerchief and the vapor inhaled, almost immediately the blood-vessels of the head, face, and neck are felt to throb rapidly and violently; the face becomes crimson and hot, and the head aches from the sensation of fullness. Simultaneously, there is felt an indescribable commotion within the chest, with a feeling of breathlessness and oppression due to a violent and disorderly throbbing of the heart. These effects come on within a few seconds after breathing the fumes of the amyl nitrite, and disappear entirely within a few minutes, unless an overdose be taken. Physiologically, the singular symptoms are largely referable to depression of the vagus nerves and the vasomotor system of nerves, and to paralysis of the unstriped muscular elements in many parts of the body. Hence in spasmodic affections of these parts this substance is used medicinally. In *angina pectoris*, or "breast-pang," and in spasmodic asthma it often relieves with a suddenness and completeness almost magical, if the condition is due to spasm of the arterioles. It is given by inhalation or internally.

Revised by H. A. HARE.

Nitrites: See NITROUS ACIDS.

Nitrobenzene, Nitrobenzol, or **Essence of Mirbane** ($C_6H_5NO_2$): a heavy yellow liquid; discovered in 1834 by Mitscherlich; produced by treating benzene with strong nitric acid. On mixing the two liquids they become warm, assume a brown color, and soon emit red fumes and boil. The color becomes finally orange. On adding water the nitrobenzene separates and settles to the bottom of the vessel. A mixture of sulphuric acid and nitrate of soda is preferred to nitric acid: $C_6H_6 + HNO_3 = C_6H_5NO_2 + H_2O$.

The nitrobenzene is washed with water, a trace of free acid neutralized by a very dilute solution of soda, unchanged benzene distilled off by steam, and the liquid freed from moisture, which makes it turbid, by filtration over dry powdered chloride of sodium (common salt). It has an odor like that of bitter almonds, whence it is often called improperly artificial oil of bitter almonds. It is extensively used as a perfume for soap. Its chief importance is due, however, to the fact that it is converted by reducing agents into aniline: $C_6H_5NO_2 + H_6 = C_6H_7N + 2H_2O$. See ANILINE, ANILINE COLORS, and BENZENE.

Revised by IRA REMSEN.

Nitrocellulose: a general term for the product resulting from the treatment of cellulose, as cotton, wood-fiber, etc., with a mixture of strong nitric and sulphuric acids, whereby one or more atoms of hydrogen are replaced by an equal number of molecules of nitryl (NO_2). Several varieties are known. Hadow (*Chem. Soc. Qu. Jour.*, vii., 201) gives the formulas of three, as follows:

$C_{18}H_{21}(NO_2)_9O_{15}$ or $C_6H_7(NO_2)_3O_5$,
$C_{18}H_{22}(NO_2)_8O_{15}$,
$C_{18}H_{23}(NO_2)_7O_{15}$, Gladstone's cotton xyloïdin.

The first is called trinitrocellulose, and is chiefly used as an explosive. The guncotton for photographers' collodion consists of mixtures of the last two. See COLLODION and PYROXYLINE; also EXPLOSIVES. Revised by IRA REMSEN.

Nitrogelatin: See EXPLOSIVES.

Nitrogen [Lat. *ni'trum*, niter + *-gen*, producing, found in Gr. γεννᾶν, beget, produce, and Lat. *genera're*, beget, produce]: a chemical element, from 79·1 to 79·2 per cent., by volume, of the atmosphere of the earth. It is also found, in small but essential proportion, in the bodies of all animals and plants, and in those constituents of the solid earth which are formed from their remains, such as coal and other apozoic mineral matter. In the earth and waters it occurs also, though in relatively very minute proportion, in the form of nitrates and of ammonia.

Before 1772 air was considered homogeneous and elementary, being convertible by continued respiration wholly into *carbonic acid*, then called "fixed air" and by several other names. At that date, however—which was two years previous to the discovery of oxygen by Priestley—the English chemist Rutherford discovered that after separating from air that had been repeatedly breathed all its carbonic acid, a peculiar irrespirable gas was left. Hence this chemist is recorded as the discoverer of nitrogen. Soon afterward Scheele and Lavoisier discovered that air consists of this gas and oxygen, and that it remains behind after the oxygen is removed.

Preparation.—Nitrogen gas, nearly pure, may be prepared by separating from atmospheric air its other constituents, which are oxygen, carbonic acid, and water. The oxygen, constituting a little over one-fifth of the volume, may be abstracted by passing air over some metals at incandescence. On a small scale, metallic copper in wire or turnings is used, and iron may also be used and is much cheaper, but may give nitrogen contaminated with carbonic oxide. Small remaining traces of oxygen, together with carbonic acid, which is always present, are most certainly removed by passing through a potash or soda lye to which has been added some pyrogallol. If the nitrogen is required to be anhydrous, sulphuric acid or chloride of calcium must also be employed to make it so. These modes of obtaining nitrogen from its most abundant source, the atmosphere, are, however, the most troublesome and expensive modes of all. It is much easier and cheaper to obtain it from a nitrite, nitrite of potassium being generally used. This is mixed in solution with sal ammoniac and boiled, when pure nitrogen gas comes off:

$$NH_4Cl + KNO_2 = KCl + 2H_2O + N_2.$$

Ammonium nitrite, when heated, breaks up entirely into pure nitrogen and water:

$$NH_4NO_2 = N_2 + 2H_2O,$$

but this salt is more expensive.

Nitrogen when pure is a gas, colorless, inodorous, and tasteless, of density = ·97 (air = 1). It is but slightly soluble in water. Chemically, nitrogen has an exceptional inertness toward most other substances; but some metals, as *titanium*, *tungsten*, *boron*, and *carbon*, combine powerfully with it at very high temperatures. By the electric spark it may be made to combine with oxygen directly to form nitric acid, and Bunsen found that when 100 volumes of air were mixed with 226 volumes of the explosive mixture (in the proportion to form water, 2 : 1) of hydrogen and oxygen, and the whole exploded, 11·5 per cent. of the air at once disappeared, combining to form nitrogen acids. During electric storms nitric acid is believed to be formed in the air in small proportion. Nitrogen and carbon may be made to combine directly to form *cyanogen*, by heat in the presence of an alkaline substance. Baryta performs this function best, and it has even been proposed to use this method for the manufacture of ammonia, which is easily obtained from the cyanide of barium.

The nitrogen of the air serves as an essential food for plants. To a considerable extent it is first converted into ammonium salts, particularly the nitrate. These find their way into the soils, and then are converted into substances that can be used by the plants. By the growth of plants nitrogenous compounds are constantly being withdrawn from the soil, but it appears, further, that plants have the power to take up from the air a part of the nitrogen which they need, whether directly or not has not yet been determined.

Nitrogen forms a large number of important compounds, among which may be mentioned AMMONIA, NITRIC ACID, NITROUS OXIDE, etc. These are described under the proper heads. The compound sometimes called hyponitric acid is now more commonly known as nitrogen peroxide. It has the composition NO_2. Revised by IRA REMSEN.

Nitroglycerin: See EXPLOSIVES.

Nitro-hydrochloric Acid (Eng. also *a'qua re'gia*, Fr. *eau régale*, Germ. *königswasser*, *goldscheidewasser*, *salpetersalzsäure*): the product of mixing together strong nitric and hydrochloric acids. The name *aqua regia*, royal water, refers to the power of such mixture to dissolve gold, the "king of metals"—a power which neither of the acids possesses alone. Aqua regia fumes in the air, has a deep-yellow or red color, and evolves free chlorine and a compound, NOCl, known as *nitrosyl chloride*. It was believed at one time that another compound of nitrogen, oxygen, and chlorine, of the composition $NOCl_2$, was also formed, but later investigations make it appear probable that this supposed compound is nitrosyl chloride, containing some free chlorine mixed with it. The energetic action of *aqua regia* is due to the free chlorine and to the chlorine given up by the unstable nitrosyl chloride. It is highly valuable in the arts and in the laboratory in operations with gold and platinum. It is also used in the destruction of organic bodies in the wet way, as when a mineral poison is to be isolated from a stomach or other viscus in toxicological cases, though more powerful agents are sometimes substituted in this case. A somewhat cheaper substitute for the ordinary *aqua regia* may be made by dissolving nitrate of soda in strong hydrochloric acid. Freely diluted with water it forms a valuable tonic in cases of indigestion.

Revised by IRA REMSEN.

Nitroleum: another name for NITROGLYCERIN.

Nitrous Acids and Nitrites: When potassium nitrate, KNO_3, is heated it gives up part of its oxygen, and is converted into *potassium nitrite*, KNO_2, and from this other *nitrites* can be made. These are salts of an acid of the formula HNO_2, which, however, can not be made in the free state. Nitrites are formed in nature in the decomposition of organic matter, and they are often found in well waters. Their presence beyond a certain limit indicates contamination with sewage. IRA REMSEN.

Nitrous Oxide, Nitrogen Monoxide, or **Laughing-gas**: a colorless, transparent, nearly odorless gas, having a sweet taste, and freely soluble in cold water. It is obtained from ammonium nitrate, which by being heated in a retort breaks up into water and nitrogen monoxide. This gas supports combustion nearly as energetically as pure oxygen, but its most important property is its anæsthetic effect on the animal system when breathed instead of ordinary air. Being free from all irritant or offensive properties, it is as readily inhaled as air, but, being incapable of decomposition in the body, it furnishes no oxygen for the needs of the blood. Inhaling the gas thus amounts to temporarily cutting off the usual supply of oxygen through the breath, while not interfering with the respiratory movements or the elimination of carbonic acid. The result is that the individual, without any distress or disagreeable sensation whatever, becomes speedily asphyxiated into complete uncon-

sciousness. In this condition anæsthesia is perfect, and surgical operations can be performed without pain, as by the use of chloroform or ether. On withdrawing the gas and allowing air to be breathed, the blood becomes immediately re-arterialized. The recovery of consciousness is then as swift as its loss, and there are no unpleasant after-effects. When pure and intelligently given, the use of the gas is perfectly safe; but of course if it be continuously breathed too long, the asphyxia will end in death. When breathed diluted with air an exhilarating or intoxicating effect is produced, under the influence of which the experimenter is irresistibly impelled to do all kinds of silly and extravagant acts; hence the old name of "laughing-gas." Nitrogen monoxide can be liquefied and solidified by pressure, and in this state a large supply can be conveniently kept for use in a small iron cylinder. For use in surgery the gas is inhaled through a mouthpiece so made that the expired gases do not mix with the contents of the bag. Revised by H. A. Hare.

Nitzsch, Christian Ludwig: anatomist and ornithologist; b. in Beucha, Germany, Sept. 3, 1782. D. at Halle, Aug. 16, 1837. His knowledge of the anatomy of birds was comprehensive, and he was the first to appreciate the importance of the condition of the carotid artery in the classification of birds. His reputation, however, rests upon the fact that he was the founder of the science of Pterylography (*q. v.*), or the arrangement of the feathers of birds. His first essay was published at Halle, Saxony, in 1833, under the title *Pterylographiæ Avium Pars Prior*, and after his death his papers were edited by Burmeister and the work issued at Halle in 1840 with the title *Pterylographie*. An English translation, by Dr. Sclater, was printed by the Ray Society, London, in 1867. F. A. Lucas.

Nitzsch, Gregor Wilhelm: classical scholar; b. in Wittenberg, Germany, Nov. 22, 1790; was Professor of Ancient Literature in Kiel 1827; was deposed 1852; was called to Leipzig as Professor of Classical Philology; d. July 22, 1861. He is chiefly known as the most learned and persistent advocate of the unity of the Homeric epics, whose nuclei he ascribed to one poetic genius. He wrote *Erklärende Anmerkungen zu Homers Odyssee* (3 vols., 1826–40); *Meletemata de historia Homeri* (2 vols., 1837); *Die Sagenpoesie der Griechen* (1852); *Beiträge zur Geschichte der epischen Poesie der Griechen* (1862). See Lübker, *G. W. Nitzsch in seinem Leben und Wirken* (Jena, 1864). Alfred Gudeman.

Niu-chwang, or **New-chwang**: the town of the province of Shing-king or Southern Manchuria, designated in the treaties made with China in 1858 as a place to be opened to foreign residence and trade. It is a walled village, standing in a purely agricultural region, about 40 miles from the coast of the Gulf of Liao-tung, on a small silted-up branch of the Liao river, in lat. 40° 25′ N. and lon. 122° 40′ E. (see map of China, ref. 3–K). The walls are of mud and much broken down, and the population is small. Being entirely unsuitable for foreign trade, the village of Muh-kow-ying, usually called Yingtse, or "the camp," about 30 miles nearer the coast, was chosen by foreigners as the port of Niu-chwang, and this is the town now designated *Niu-chwang* in diplomatic and consular documents and in customs and trade reports. It was opened to trade in the spring of 1861. It is situated on the left or south bank of the Liao river, about 13 miles from its mouth, where there is a dangerous bar. The foreign settlement lies above the native town (in the other ports it is usually below) and extends along the river bank for over 1,000 yards. The main road leading from the coast to the interior bounds it in the rear. The river here is about half a mile wide, and has a depth at low water of 7 to 9 fathoms.

The native town consists of one long main street running E. and W. parallel to the river, and eight or ten shorter ones at right angles to this thoroughfare. The surrounding country is flat and marshy, only a few feet above the level of the sea, and presents a very dismal appearance. The river is closed by ice for four and a half or five months every year. In winter the temperature is frequently as low as zero; in summer it rises to 80° and 87°. The hottest months are June, July, and August.

The chief industry of the place is the manufacture of bean oil and bean-cake, pulse being a staple agricultural product in Shing-king.

The trade of the port in 1893, according to the imperial maritime customs report, amounted to 17,659,854 haikwan, or custom-house taels ($18,542,846 U. S. gold). Of this, imports of foreign origin amounted to 5,548,403 taels, and of native origin 2,801,027 taels; exports of native produce to foreign ports 2,167,111 taels, and to Chinese ports 7,143,313 taels. The chief foreign imports were cotton and woolen goods, metals, kerosene oil (both U. S. and Russian), and needles, and the chief native imports raw cotton, silk piece-goods, and sugar. The chief exports were beans (4,392,648 taels), bean-cake, used as food for cattle in Northern China and as manure in Southern China (2,327,215 taels), bean oil (345,365 taels), ginseng (741,932 taels), and raw silk (510,008 taels). In the same year 397 vessels, chiefly ocean-going steamers, with a tonnage of 296,654 tons, entered the port and the same number cleared. Of these, 52 per cent. were British, 25 per cent. German, 14 per cent. Chinese, and 6 per cent. Japanese. Pop. (1893) 60,000. R. Lilley.

Nix, or **Nix'ie** (Germ. *nix*): in the popular mythology of the Teutonic races, a water-spirit usually malignant, and often assuming the human form, though able to take any other shape at will. Nixies were resorted to to determine the future, and their good will might be obtained by gifts. From the same etymological root we have "Old Nick" as a name for the devil.

Ni'za, or **Niz'za**, Marcos, de: a Franciscan missionary, discoverer of Arizona; b. at Nice, Italy, about 1495. He went to America in 1531, labored in Guatemala, and in 1534 was with Alvarado in Peru. Later he was in Mexico, and was one of three Franciscans who accompanied Coronado to the N. in 1538. In the next year, under Coronado's instructions, he led an expedition to verify Cabeza de Vaca's reports of rich cities to the N. W. From friendly natives he heard accounts of seven "great cities" (probably the Zuñi pueblos), but after sending a Negro of his party to Cibola, one of them, where he was killed, Niza contented himself with a distant view of the place and returned. He brought to Coronado an exaggerated account of the riches of the seven cities obtained from the reports of the Indians, and probably embellished by his own fancy. The illusion was dispelled by Coronado's expedition in 1540. (See Vasquez de Coronado.) Niza accompanied it, but was sent back in disgrace after the true character of the pueblos had been discovered, and died soon after at Mexico. His report has been repeatedly published. H. H. Smith.

Nizā'mī: Persian poet of the romantic epic; b. in 1141 (A. H. 535), probably at Ganjah in Arran, where most of his days at least were spent. His full name is Abū Mohammed Nizām-ad-Dīn. His father, Yūsof bin Muyid, was a native of Kumm; his mother, as we learn from his writings, was of Kurdish descent. Much of the first part of Nizāmī's life was passed amid the sternness of religious asceticism; illumination came in the form of an outburst of poetic inspiration, when, according to received accounts, he was already approaching his fortieth year, and he gave to the world the *Makhzan-al-asrār* (Treasury of Mysteries), the first of his well-known works. The beautiful romantic epic, *Khosrū and Shīrīn*, a story of love, followed (about 1180). This won court favor for Nizāmī, but he still preferred his life of retirement. His *Dīvān*, or collection of short odes alphabetically arranged, was next completed. The romantic love-story of *Laila and Majnūn* added fresh laurels to his fame. Nizāmī now turned his attention to the heroic subject of Alexander the Great, and produced the *Iskandarnāmah*, treating in the first part the conqueror's victories, and in the second part presenting Alexander in the light of prophet, philosopher, and ethical teacher. The poet's last romance is called *Haft Paikar* (The Seven Portraits), written about A. D. 1197, and purporting to be seven stories narrated by the wives of the Sassanian King Bahrām-Gōr. The above enumerated fivefold group of poems by Nizāmī, omitting the *Dīvān*, is known as the *Khamsah* (Quintuple), or is sometimes called the *Panj Ganj* (Five Treasures). D. at Ganjah in 1203 (A. H. 599). See W. Bacher, *Nizāmī's Leben und Werke* (Leipzig, 1871); S. Robinson, *Persian Poetry for English Readers* (1883); and Rieu, *Catalogue of the Persian MSS. in the British Museum* (vol. ii., p. 563, *seq.*, 1881). There is a lithographed edition of Nizāmī's works (Bombay, 1834 and 1839; Teheran, 1845); lithographed editions also of separate poems have appeared in Europe, Persia, and India; there are partial translations by J. Atkinson, Hindley, von Hammer, and H. Wilberforce Clarke. A. V. Williams Jackson.

Nizam's Dominions: See Haidarabad.

Njord: in Scandinavian mythology, a divinity that presides over the winds, quiets the sea, and is worshiped by sailors and fishermen. He was reared in Vanaheim, but the Vans gave him as a hostage to the Æsas when the war be-

tween them was ended. His wife is Skade, daughter of the giant Thjasse. His dwelling is Noatun, near the sea. He is the opposite of the sea-giant Ægir, who represents the turbulent ocean. See SCANDINAVIAN MYTHOLOGY. R. B. A.

No: the name given to classical dramatic performances in Japan, and usually, but wrongly, associated with dancing. The No has been compared to the old Greek drama from its stateliness, solemnly chanted choruses, quasi-religious element, and from the fact that it is performed in the open air. Scenery is absent, but the robes of the performers are magnificent. The music, though scarcely agreeable to Western ears, has a mysterious grace of its own. These No performances are kept up by the aristocracy, and are a feature of polite Japanese society. Each piece takes about an hour to act, but, in addition to the half-dozen pieces in a complete performance, comic interludes are interspersed, causing the performance to take up the greater part of a day.

No. Lake: See the Appendix.

Noah [from Heb. *Nōach*, Noah, liter., rest]: the patriarch who, on account of his piety, was saved by God from the Deluge, and thus became the second founder of the human race; he was a son of Lamech, and the father of Shem, Ham, and Japheth (Genesis v. 28–ix.). See DELUGE.

Noah, MORDECAI MANUEL: lawyer and editor; b. in Philadelphia, Pa., July 19, 1785; became a lawyer at Charleston, S. C.; engaged actively in politics as a Democrat; went as consul to Riga 1811, to Morocco and Algiers 1813–15; settled in New York, and was connected as editor or proprietor successively with seven newspapers, of which the most important were *The National Advocate* and *The Enquirer* (1826), afterward merged in *The Courier and Enquirer*. Soon after his return from Morocco, Maj. Noah endeavored to form a Jewish colony upon Grand island in the Niagara river, where they were to build a "New Jerusalem" under his administration as "judge in Israel," but few of the Hebrew race responded to the invitation. Noah was elected sheriff of New York, and subsequently appointed surveyor of the port and judge of the court of sessions. He published several successful dramas; a volume of *Travels* (1819); a translation of a spurious *Book of Jasher* (1840); a *Discourse on the Restoration of the Jews* (1845); *Gleanings from a Gathered Harvest* (1845); and other miscellaneous works, chiefly speeches. D. in New York city, Mar. 22, 1851.

Noailles, nō'aal', LOUIS MARIE, Viscount de: soldier; b. in France, Apr. 17, 1756; was second son of the Marshal de Mouchy and a brother-in-law of Lafayette, with whom he served in the American war of independence; was a good tactician; commanded the Soissonnais regiment at the siege of Yorktown, and was one of the commissioners to receive the capitulation of Cornwallis. He bore a patriotic part in the French National Assembly of 1789, proposing, on the night of Aug. 4, that the nobility should voluntarily give up their privileges—a proposition which he maintained with great fervor, and which gave him great influence in the Assembly; received an important command in the army, but resigned in May, 1792, in despair for the cause of liberty, and went to the U. S., while the viscountess, remaining in Paris, became a year later a victim to the Revolutionary tribunal. In 1803 Noailles re-entered the French army, went to St. Domingo, was mortally wounded in an engagement with an English vessel, and died at Havana, Jan. 9, 1804.

No-am'on (Nah. iii. 8, *μερὶς Ἀμμών*), or **No** (Ezek. xxx. 14–16, Jer. xlvi. 25, *Διόσπολις*): the Hebrew name of Thebes in Upper Egypt, the Diospolis Magna of the Greeks. The name corresponds with the Egyptian *Nu-amen*, city of Amon, or *Nu*, "the city" *par excellence*. C. R. G.

Nobility: as a term of rank, a state of social dignity, transmissible by descent and often accompanied by political privilege. In ancient Egypt, as now in India, nobility was inherent in the highest castes, the sacerdotal and the military. In Sparta the nobility originated from conquest; at Athens it resulted from older settlement, the nobles or eupatrids being the descendants of those who at one time had constituted the entire people. In Rome the patricians, who, as at Athens, had originally been the whole people, formed for a long time an exclusive caste, allowing no intermarriage with inferiors, and possessing nearly all the political power; but gradually the plebeians gained equal political rights, and after this those among them who became curule magistrates were not only accounted noble themselves by virtue of their office, but also transmitted dignity to their descendants. Nobility in the old German tribes was of immemorial origin, the earliest records of Teutonic peoples showing clearly the division into noble, simple freeman, and bondman. The origin of the existing nobility of Europe, however, can generally be traced to personal service to the king, who granted certain privileges or immunities either as a reward for past or an inducement to future service. (See FEUDALISM.) Thus in Gaul the lands conquered by the Franks were divided into governments over which various officers were appointed—dukes (from Lat. *dux*, a leader), counts (from *comites*, companions), and marquises (guardians of the frontier "marches"). Both in France and Germany lands and dignities bestowed originally for life became hereditary, and their possessors acquired practical independence of the crown. The result was the feudal anarchy of the Middle Ages. The greater nobles were often able to defy the royal authority, while against their tyranny over their own vassals there was no redress. With the decline of feudalism their power was gradually weakened. Surnames and armorial bearings, adopted in the eleventh and twelfth centuries, and soon becoming general, increased the exclusiveness of the nobles, especially in France and Germany. In the latter country a child could inherit no fief of the empire unless both his parents were of pure blood; and in France, though the son by marriage of a noble father and a mother of ignoble birth might inherit property and receive knighthood, he could enter no order of chivalry. The granting of letters of nobility was a blow to aristocratic exclusiveness. French sovereigns often replenished their treasury by compelling rich subjects to buy letters of nobility, as English kings obliged people to purchase knighthood. The policy of Richelieu, Mazarin, and Louis XIV. was directed to depriving the nobles of their political power, while leaving them their dignities and revenues. Nobility was abolished in France June 19, 1790, and the title of noble became a title to banishment or the guillotine. In 1806 Napoleon founded a new nobility, creating princes, dukes, counts, barons, and chevaliers. The imperial noblesse, generally a reward for services rendered to France, was the only kind acknowledged, and edicts were issued against usurpers of titles. At the Bourbon restoration the old noblesse was again recognized, and that of Napoleon's creation was suffered to remain. In 1848 nobility was abolished by the provisional government, but was again restored by Napoleon III.

The Italian nobility lived generally in strong castles, and were feared by the people, who, when it was possible, excluded them from political power, as in Florence and Genoa, where high birth was a disqualification for government. At present Italian nobles are of two kinds—those of ancient lineage, and others who, having bought estates, take the titles belonging thereto. Titles descend to the eldest son only, but the younger children are called by courtesy *dei principi*, *dei duchi*, etc. Spanish nobility is very ancient: being *hijo d'algo* (son of somebody) implies noble birth and entitles a gentleman to be called *don*, which name, however, is, like *esquire* in the U. S. and Great Britain, very generally given. The estates and titles of the higher nobles or grandees are entailed. Russian nobility was formerly patriarchal, but Peter the Great introduced the European system of titles. In England the Anglo-Saxon nobles sometimes possessed sufficient power to set at naught the will of the sovereign, but from the time of the Conquest, when William the Conqueror made every vassal dependent upon the king, the barons had no such irresponsible power as they gained on the Continent. In Great Britain the term nobility is used in an exclusive sense, being limited to the five temporal ranks of the peerage, duke, marquis, earl, viscount, and baron. Baronet is a title of honor and confers no political privileges. See the articles on these respective titles; Sir J. Lawrence *On the Nobility of the British Gentry*; C. F. Ménestrier, *Les Diverses Espèces de la Noblesse* (Paris, 1683); *Le Blason de la Noblesse* (Paris, 1683); the works of Hallam, Stubbs, May, Guizot, and other historians. Revised by F. M. COLBY.

Noble, JOHN WILLOCK, LL. D.: lawyer; b. at Lancaster, O., Oct. 26, 1831; was educated at Miami University, Ohio, and at Yale College, where he graduated in 1851; was admitted to the bar and settled in St. Louis in 1855, but removed to Keokuk, Ia., in 1856; was city attorney 1859–60; enlisted in the Union army as a private on the outbreak of the civil war; became first lieutenant and adjutant in the Third Iowa Cavalry; became judge-advocate of the Army of

the Southwest and afterward of the department of the Missouri; was promoted to a colonelcy in 1865; breveted brigadier-general of volunteers Mar. 13 same year; served as U. S. district attorney at St. Louis 1867–70, then resumed private practice; became Secretary of the Interior under President Harrison, receiving his commission Mar. 6, 1889.

Noblesville: city; capital of Hamilton co., Ind. (for location of county, see map of Indiana, ref. 6–E); on the White river, and the Chi. and S. E. and the Lake Erie and W. railways; 20 miles N. of Indianapolis. It is in an agricultural and natural-gas region; contains 9 churches, a public high and 3 ward schools, and a daily and 2 weekly newspapers, and has a large strawboard-mill, flour-mill, and carbon-works. Pop. (1880) 2,221; (1890) 3,054; (1900) 4,792.
EDITOR OF "LEDGER."

Nobuna'ga: general and statesman; b. in 1533 of a petty noble family named Ota, in the province of Owari, Japan. He early showed himself an intrepid and capable soldier. Having increased his domains and power, he found himself in collision with the Buddhist priesthood, whose headquarters at Hiyeisan he burned to the ground in 1573. After deposing the last shogun of the Ashikaga house, he became virtual ruler of Japan under the title of Dainagon, and began the work of political reconstruction and concentration, to be perfected later by Hideyoshi and Iyeyasu. Again from 1575–80 he had to struggle against a new coalition of Buddhist monks. In 1582 he fell a victim to treachery. Nobunaga favored the introduction of Christianity, possibly as a counterpoise to Buddhism. J. M. DIXON.

Nocera, nō-chā'răa (anc. *Nuceria Alfaterna*): town in the province of Salerno, Italy; in a district well suited to the raising of sheep and cattle (see map of Italy, ref. 7–F). It is a bishop's see, and has cotton-manufactures. It was destroyed by Carthage for taking part with Rome, flourished again, and was again destroyed by the Normans. Pop. about 12,500.

Noctilion'idæ [Mod. Lat., named from *Noctil'io*, the typical genus, from Lat. *nox*, night; cf. Lat. *vespertil'io*, bat, deriv. of *ves'per*, evening]: a family of insectivorous bats (Cheiroptera) without nasal appendages. The ears are moderate, and provided with a distinct tragus to each; the tail perforates the interfemoral membrane through its upper surface, or, when that is truncated, is produced beyond it; the intermaxillary bones are generally united (sometimes separated); the molars are large and have W-shaped ridges; the incisors are variable ($\frac{2}{1}$, $\frac{1}{1}$, $\frac{2}{2}$, or $\frac{1}{3}$ by 2); the middle finger has two phalanges; the stomach is sacciform and its extremities inclined toward each other. The species are mostly confined to the tropical regions of both hemispheres.
Revised by F. A. LUCAS.

Noctilu'cine [from Lat. *noctilu'ca*, something that shines at night; *nox*, *noc'tis*, night + *luce're*, shine]: a name given by T. L. Phipson to an organic substance supposed to cause the production of light in phosphorescent fish, insects, and decaying matter. At ordinary temperatures it is semi-fluid and whitish in color. It contains nitrogen and water. It dries up readily, yielding amorphous films. Noctilucine is slightly soluble in water and insoluble in alcohol and ether. Sulphuric and nitric acids dissolve it with decomposition. When moist it absorbs oxygen and evolves carbon dioxide. In ozone it is more luminous than when in oxygen, the luminosity apparently being due to oxidation. The spectrum of the light emitted is nearly monochromatic. Noctilucine is secreted in a pure form by the luminous centipede, *Scolopendra electrica*. See *Chem. News*, xxvi., 130, No. 668; *Am. Chem.*, iii., 244; *Comptes Rendus*, lxxv., No. 9; Watt's *Dict.*, 2d supplement, p. 861.

Noctuina: See LEPIDOPTERA.

Nodal Points or **Lines**: See ACOUSTICS.

Noddy: popular name of a species of tern (*Anous stolidus*) whose popular and scientific names relate to the stupid, stolid behavior of the bird, which often alights on ships, and suffers itself to be taken by hand. The noddy is about 16 inches in length, including the long, graduated tail; the adult is sooty brown in color, but has a whitish head. The species is widely distributed over the warmer parts of the globe, and nests in great numbers on mangrove and other bushes. The nest is built of sticks; the eggs are buff with reddish-brown markings, and in some localities are taken in considerable numbers for food. F. A. LUCAS.

Nodes [from Lat. *no'dus*, earlier **gno'dus*, knot: Eng. *knot*]: the points in which the path of any planetary or cometary body intersects the plane of the ecliptic, or any other plane of reference; also the points in which the orbit of any satellite intersects the plane of the orbit of its primary. Nodes are distinguished as *ascending* and *descending*. The ascending node is that through which the body passes from the south to the north side of the plane of reference; the descending, that through which it passes from N. to S. The first is denoted by the sign ☊, the second by the sign ☋. The nodes of most other members of the solar system undergo gradual displacement in the heavens, making, in a period of time longer or shorter, a complete revolution. The period for the moon is short, being but about $18\frac{2}{3}$ years, but for the planets it reaches many thousands of years. The direction of nodal movement is generally retrograde, or from E. to W. Revised by S. NEWCOMB.

Nodier, nō'di-ā', CHARLES: author; b. at Besançon, France, Apr. 29, 1780; studied at Strassburg, and led subsequently an errant and adventurous life, first as an ardent republican, then as a zealous royalist, writing sentimental novels, as *Stella* (1802) and *Le Peintre de Salzbourg* (1803), after the model of *Werther*, and satires against Bonaparte, as *La Napoléone* (1802), and editing *Télégraphe Illyrien* in 1814 under the auspices of Junot and Fouché; became a contributor to the *Journal des Débats* in 1815; librarian to the library of the arsenal of Paris in 1824, member of the Academy in 1834, and died in that city Jan. 26, 1844. He was a very prolific writer, and touched almost every field of literature from lexicography to satire. Some of his works have an interest still: *Dictionnaire des Onomatopées françaises* (1808); *Histoire de Sociétés secrètes de l'Armée* (1815). His chief literary significance, however, lay in his knowledge of the German literature and the services he rendered romanticism by rallying the young romanticists about him. Revised by A. R. MARSH.

Noé, AMEDÉE, de: See CHAM.

Noel, BAPTIST WRIOTHESLEY, M. A.: clergyman; a brother of the first Earl of Gainsborough; b. July 10, 1799, at Leightmont, Scotland; graduated at Cambridge 1826; became one of the queen's chaplains and incumbent of St. John's, Bedford Row, London, but in 1848 left the Established Church and became a Baptist minister in London. He was an eloquent preacher; published a number of volumes of sermons, besides numerous other works, chiefly religious (*Notes of a Tour in Switzerland*, *Essay on Christian Baptism*, 1849; *Letters on the Church of Rome*, 1851; *A Selection of Psalms and Hymns*, 1852, enlarged 1853; *Hymns about Jesus*, mostly original, 1869); and was distinguished for philanthropic labors among the poor of London. D. at Stanmore, Middlesex, England, Jan. 20, 1873.

Noë'tians: name given to the followers of Noëtus, a Patripassian who flourished probably about 200 A. D. (instead of 230, the date formerly given). All we know of him is derived from Hippolytus (d. 236), Epiphanius (d. 403), and Theodoret (d. 457, 8), and they do not quite agree in their statements, Hippolytus and Theodoret saying he was born at Smyrna, and Epiphanius calling him an Ephesian. Perhaps he was born at Smyrna and lived at Ephesus. He was excommunicated for his heresy, which Hippolytus connects with the pantheism of Heraclitus. Through his disciples, Epigonus and Cleomenes, the Roman bishops Zephyrinus (202–218 A. D.) and Callistus (218–223 A. D.) were carried over into the same heresy. See PATRIPASSIANS.

Noko'mis: town (incorporated in 1867); Montgomery co., Ill. (for location of county, see map of Illinois, ref. 7–D); on the Cleve., Cin., Chi. and St. Louis Railway; 16 miles N. E. of Hillsboro, the county-seat, 85 miles N. E. of St. Louis. It is in an agricultural, fruit-growing, and stock-raising region; contains 6 churches, graded public school, a national bank with capital of $50,000, and 3 weekly newspapers; and has a flour-mill and 2 grain elevators. Pop. (1880) 1,062; (1890) 1,305; (1900) 1,371.
EDITORS OF "FREE PRESS-GAZETTE."

No'la: town; in the province of Caserta, Italy; about 14 miles N. E. of Naples (see map of Italy, ref. 6–F). The Castello Cicala and the ex-convent of the Capuchins on a hill above the town give it a picturesque aspect, but the interior has a desolate appearance. Of the sixteen churches, the old Italian Gothic cathedral is the only one of interest. Nola was one of the most ancient and renowned cities of Campania, being of older origin than Rome itself. The

Samnites first conquered the Pelasgian settlers, were in turn driven out by the Romans, but recovered it during the Social wars, and the inhabitants burned it rather than yield to Sulla; Spartacus occupied it afterward. In the time of Vespasian it was called *Augusta Felix*, and this was its most flourishing period. It was strongly walled, had twelve gates, magnificent temples, and two large amphitheaters, between which rose the temple of Augustus, said to have been erected on the site of the house in which that emperor died. Pop. (1881) 7,496.

Nöl'deke, THEODOR: Orientalist; b. at Harburg, Hanover, Mar. 2, 1836; was educated at the gymnasium in Lingen, Hanover, and at the University of Göttingen; was privat docent in Göttingen 1861–64; professor in Kiel 1864–72; has been Professor of Semitic Languages at Strassburg since 1872; is author of *Geschichte des Korans* (1860); *Untersuchungen zur Kritik des alten Testaments* (1869); *Grammatik der neusyrischen Sprache* (1868); *Mandäische Grammatik* (1875); *Syrische Grammatik* (1880); *Geschichte des Perserreiches zur Zeit der Sassaniden* (1879); *Aufsätze zur persischen Geschichte* (1887); *Orientalische Skizzen* (1892); besides a large number of important contributions to journals, etc. He is one of the first authorities in Arabic philology and Oriental history. B. I. W.

Nolet de Brouwere van Steeland, nō'lā-de-brow'ā-rā-văn-stā'lănt, JOANNES CAROLUS HUBERTUS: Flemish poet; b. at Rotterdam, Holland, Jan. 23, 1815. After studying in the University of Louvain he went to Brussels, where he became instructor in the university, and where he has since lived. In 1849 he became a member of the Brussels Academy. For a generation he was the leading literary man of Belgium. His career as a writer began with a brief *Geschiedenis van het Joodsche Votk van de schepping der wereld tot na de verwoesting van Jeruzatem* (The Hague, 1835). His first important poetical work, however, was *Noami* (Louvain, 1840). This was followed by *Ambiorix* (1841); *Dichtluimen* (1842); *Ernst en Boert* (1847); *Zwart op wit* (1853); *Het groote dietsche vaderland* (1857); *Gedichten, etc.* (2 Deel, 1859). In prose he has published the somewhat caustic book *Een Reisje in het Noorde* (1843); *Het Communismus in zijne vroegere en latere vormen*, 1871), etc. In his earlier years he was an ardent admirer of Germany and of German ideas (cf. his *Aen de Germanen*, 1847); but after 1866 he conceived a deep antipathy for Prussia, and strove against German influence upon Belgian literature. This feeling he has most clearly expressed in his academic address, *Du pan-germanisme et de ses influences sur la littérature flamande* (1868). His *Œuvres complètes* (7 vols., 1859–84) contain his *Gedichten* (3 vols., 1859–71), his earlier prose works (2 vols., 1873), his later *Poëzij en Proza* (1877), and *Poëzij en lettercritiek* (1884). A. R. MARSH.

Nolhac, nō'lăk', PIERRE, de: scholar; b. at Ambert, Puy-de-Dôme, France, Dec. 15, 1859. After studying in Paris he passed three years (1882–85) in Rome, as a member of the French school. Returning to Paris he was for a brief time attached to the Bibliothèque Nationale, and was then (1886) appointed Professor in the École des Hautes Études, and associate director of the Museum of Versailles. He has occupied himself chiefly with the beginnings of humanism and of the Renaissance in Italy and France, and has published numerous brilliant studies in this field. Among these are *Le dernier amour de Ronsard* (1832); *Lettres de Joachim du Bellay* (1883); *La bibliothèque d'un humaniste* (1883); *Les collections d'antiquités de Futvio Orsini* (1884); *Le Canzoniere autographe de Pétrarque* (1886); *Fac-similés de l'écriture de Pétrarque et notices sur sa bibliothèque* (1887); *Petites notes sur l'art italien* (1887); *La bibtiothèque de Fulvio Orsini* (1887); *Érasme en Italie* (1888); *Les études grecques de Pétrarque* (1888); *Les correspondants d'Alde Manuce, matériaux nouveaux d'histoire tittéraire, 1483–1514* (1889); *Pétrarque et l'humanisme* (1892); *Études sur la cour de France: La reine Marie-Antoinette* (1892). Besides these de Nolhac has published a volume of verse, *Paysages d'Auvergne* (1888). A. R. MARSH.

Nol'lekens, JOSEPH, R. A.: painter; b. in London, England, Aug. 11, 1737; son of a painter from Antwerp; became a pupil of the sculptor Schumaker; afterward studied at Rome, where he remained ten years; was very successful in executing bas-reliefs, groups of figures, and busts; settled in London 1770; made busts of George III., Fox, Pitt, Warren Hastings, Johnson, Garrick, and the principal celebrities of the time, which were generally considered excellent likenesses; executed numerous commissions for public monuments and statues, as well as mythological groups; married a lady of rank, and accumulated a handsome fortune. D. in London, Apr. 23, 1823.

Nol'le Pros'equi [Lat., to be unwilling to prosecute]: a declaration or undertaking by the plaintiff or prosecuting officer in an action or prosecution at law that he will discontinue further proceedings in the cause against the defendant. It is entered upon the records of the court, and puts an end to the particular proceeding or litigation, in the course of which it is introduced. It was formerly a common practice to enter a *nolte prosequi* both in civil and in criminal cases, but in civil actions other modes of effecting a discontinuance of the proceeding are now more generally adopted. In criminal prosecutions, however, the former practice still remains commonly in force. It usually lies in the discretion of the prosecuting officer to enter a *nol. pros.* (as the phrase is commonly abbreviated), but it is sometimes provided that he must obtain the leave of the court before such a course can be taken. The causes which most frequently induce such action are, that there is an insufficiency of evidence to procure the defendant's conviction, or that the testimony of one of several defendants who have been indicted is desired to be introduced against the others. Such a step might also be taken because, on account of the state of public opinion at a particular time, it was improbable that a jury could be obtained which would be likely to convict the prisoner, or because the trial would be detrimental to the public interests. A *nolle prosequi* may be entered at any stage of the case; but according to the preponderance of authority a *nolte prosequi* entered after the completion of the impaneling of a jury in the case will have the same effect as an acquittal. Otherwise it does not operate as an acquittal, but only as an indefinite suspension of the proceedings, and the prosecution may be again instituted against the defendant when the prosecuting officer deems it desirable. See Bishop's *Criminal Procedure* and Bishop's *Criminal Law*. Revised by F. STURGES ALLEN.

Noma: See CANCRUM ORIS.

Nom'bre de Di'os: a former Spanish settlement on the northern coast of the Isthmus of Panama. Nicuesa's transient settlement of that name was probably on or near the site of the modern Porto Bello; it was abandoned in 1511. In 1519 a new town of Nombre de Dios was founded on the Bay of San Blas, and this became the northern terminus of the route over the isthmus from Panama. During the sixteenth century all the trade of Peru, and much of that from Western Mexico, Guatemala, and the Spice islands, passed through it; it was thus one of the most important ports in America. Owing to its unhealthful location it was only frequented by the merchants on the arrival of the annual fleets from Spain; about sixty of the houses were built of wood, the rest being thatched. The town was attacked by Drake in 1572, and destroyed by him in 1595. It was abandoned in 1597, Porto Bello taking its place. H. H. S.

Nome'idæ [Mod. Lat., named from *No'meus*, the typical genus]: a family of small fishes related to the mackerels. The body is oblong, compressed, and covered with cycloid scales; the lateral line continuous and unarmed; the head compressed; the opercula unarmed; the nostrils double; the mouth with a lateral cleft, upper jaw scarcely protractile; teeth small and conical, on the palate as well as jaws; branchial apertures extensive; branchiostegal rays five or six; dorsal more or less divided, and with the spinous portion shorter than the soft. The skeleton has numerous vertebræ (in *Nomeus* 16 + 26); the stomach very numerous pyloric appendages. The species are all marine, and found in tropical or warm temperate seas.

Nominalism: the doctrine of the NOMINALISTS (*q. v.*).

Nom'inalists [from Lat. *nomen, nominis*, name]: those Schoolmen who held the doctrine that universals (general notions, such as those of man, animal) have no real existences corresponding to them, but are mere names or words (*flatus vocis*). The chief Nominalists were Roscellinus and William of OCCAM (*q. v.*). In modern times their doctrine has been adopted by Thomas Hobbes (but not consistently, inasmuch as he holds the doctrine that the state is a general power, or leviathan, more real than the individual citizen) and John Stuart Mill. Herbert Spencer, though claiming to be a Nominalist, is likewise a Realist when he holds that the persistent force is an ultimate reality producing and annulling the particular forces. Abelard was a Conceptualist or moderate Nominalist, and in this class we are

to place John Locke, Thomas Reid, Dugald Stewart, Dr. Thomas Brown, Sir William Hamilton, and other modern psychologists. See also CONCEPTUALISM, REALISM, and PHILOSOPHY (*History of Philosophy*). WILLIAM T. HARRIS.

Nominating Conventions: in the U. S., meetings of delegates of a political party to nominate candidates for national, State, or local offices. Such nominations were formerly made by the legislative CAUCUS (*q. v.*), which in the case of State elections began to give place to the nominating convention in 1825. In national elections the choice of candidates by the congressional caucus occasioned much complaint, and in 1824 the nominees of the caucus were defeated in the presidential election. From that time there was a steady tendency toward a more popular method of choosing candidates, and in 1831 the first national nominating convention was held by the Anti-Masonic party at Baltimore. Similar conventions were held by the two great national parties in 1832, and since 1840 all candidates for the presidency have been chosen in this way. The conventions meet in the summer immediately preceding the presidential election, which is held in November. They are composed of delegates chosen by the voters of the party, each State being entitled to twice as many delegates as it has persons representing it in Congress. Delegates from the Territories and the District of Columbia are also admitted, though these political divisions have no vote in the presidential election.

Nomina'tion: in politics, an act of designation to office, the ratification of which depends upon another person or body of persons. The President of the U. S. nominates to the Senate the incumbents of high Federal offices, and makes the appointments only after approval. The head of an executive department nominates to the President those whom he desires as his subordinates, and a national, State, county, or town convention of a political party nominates its candidates for office in anticipation of the elections. See NOMINATING CONVENTIONS.

Nomos: one of the territorial divisions of ancient Egypt. See EGYPT, ANCIENT.

Nomsz, JOHANNES: poet; b. at Amsterdam, Holland, in 1738. Little is known of his life, except that it was dissipated and unstable. For a time his name was in everybody's mouth, and he was confidently expected to be one of the greatest stars in the constellation of Dutch poets; but his conduct and the fickleness of his political opinions brought him into discredit, and he died neglected in a hospital at Amsterdam, Aug. 25, 1803. In the course of his life he had tried his hand at almost all kinds of literature, though with best success as a playwright. His first work was a translation of Piron's *Ferdinand Cortez* (1764). He made many other translations during his life, among them Racine's *Athalie*, Corneille's *Le Cid*, Voltaire's *Zaïre*, La Fontaine's *Fables*, part of Tasso's *Gerusalemme Liberata*, etc. He wrote more than fifty dramatic pieces of his own, the best among them being perhaps *Maria van Lalain*, *De Ruiter*, and *Anthonius Hambroek, of de Belegering van Formoza*. He composed two considerable epic poems: *Willem de Eerste, of de Grondlegging der nederlandsche vryheid* (Amsterdam, 1779); and *Maurits van Nassau, Prins van Oranje* (1789). Other poetical work was his *Trionf der Teekenkunst* (1768), and occasional pieces in his *Mengelwerken* (Amsterdam, 1782). In prose he essayed the romance, with mediocre success even in his best work, *Mohammed, of de Hervorming der Arabieren* (1780). In his *Vertelsels* (3 parts, 1781–85) he imitated the *Contes moraux* of Marmontel. Dramatic criticism is the subject of his *Historie van Piet Snot de Toneelspectator*; personal reminiscences of *Myne Uitspanningen* (2 parts, 1789). The literary model of Nomsz was, more than any one else, Voltaire; but it is clear that he never really understood the purposes which the Frenchman cherished in spite of his scoffings. A. R. MARSH.

Non-commissioned Officers: army officers intermediate between the privates and the commissioned officers, such as corporals, sergeants, sergeant-majors, etc. They are not commissioned, but (in the U. S.) receive a warrant; in the British army the latter is the case only with the higher grades. In the U. S., besides those above mentioned, there are ordnance, quartermaster, commissary, and saddler—sergeants, hospital stewards, drum-majors, orderly sergeants, and certain musicians who have the rank of sergeant or corporal. In the British army there are included bombardiers, master gunners, staff clerks, band-masters, etc.

Non-conductors: See ELECTRICITY.

Nonconformists, or **Dissenters**: a name applied to those residents of Great Britain and her colonies who are not connected with the Church of England. There are nearly 300 denominations in Great Britain. The larger and more important may be traced back to the Presbyterians, Brownists (afterward called Independents), Anabaptists, and Roman Catholics of the sixteenth century, or to the Methodists, who arose much later. See the articles on those religious bodies; also FRIENDS.

Nonius, MARCELLUS: a Latin grammarian from Africa, of the beginning of the fourth century, whose work, *Compendiosa doctrina ad filium*, in twenty books, is extremely valuable because of its numerous citations from earlier writers, no longer extant. The compilation in itself is mechanical, and shows little scholarship or judgment. See editions of L. Quicherat (Paris, 1871) and L. Müller (2 vols., Leipzig, 1888). M. WARREN.

Nonjurors: those members of the Church of England who refused to take the oath of allegiance to William and Mary. Sancroft, Archbishop of Canterbury, with several of the bishops and about 400 priests, declined to take it, upon the ground that they were already bound by their oath of allegiance to King James II. In consequence of their refusal they were deprived by act of Parliament in 1691 of their ecclesiastical preferments. The deprived bishops were Sancroft, Turner, Frampton, White, Ken, and Lloyd. Many of the laity, regarding the deprivations as unlawful, adhered to these prelates and formed a religious communion, which they called the faithful remnant of the Church of England. The earlier Nonjurors were not Jacobites. On the contrary, many of them had opposed the violent measures of King James, and most of them were disposed to submit peaceably to the new settlement of the succession. They were willing to live as orderly citizens, but not to bind themselves by new oaths during the life of King James, nor to recognize the claims of Parliament to deprive bishops of their sees. Some of the chief men in the kingdom in influence and learning were among the Nonjurors. The motives of the first Nonjurors appear to have been strictly religious; those of their successors were political. After the death of James II. and of Lloyd and Ken, the last of the deprived bishops, many of them returned to the Established Church, while the rest, looking forward to the possible restoration of the exiled royal family, determined to keep up an episcopal succession. Dissensions, however, arose among them, and they were divided into two communions. Gordon, the last bishop of the original line, died in 1779, and Boothe, the last bishop of the Nonjurors of the Separation, in 1805. Nonjuring congregations continued to exist a little longer; and it is said that a nonjuring clergyman was living as late as 1815. The regular body adhered strictly to the doctrine and discipline of the Church of England, but the separation introduced many changes. A book of *Devotions for Primitive Catholicks*, compiled by Dr. William Deacon, one of their bishops, was used for some time in the congregations of the latter body. It differs widely from the Book of Common Prayer. The Nonjurors, being to a great extent cut off from active life, devoted themselves to literature. The celebrated historian Jeremy Collier was one of their bishops. Leslie, the controversialist, William Law, the able polemic and mystic, and Robert Nelson, the well-known commentator on the feasts and fasts, belonged to their communion. Among the more celebrated of their writings were Deacon's *Devotions*, already mentioned; a treatise on the *Intermediate State*, by Archibald Campbell, a Scottish bishop resident in London; and a learned and elaborate folio called *The Hereditary Right of the Crown of England*. This is believed to have been written by Harbin, a nonjuring clergyman, during the reign of Queen Anne, at a time when the restoration of the Stuarts was thought to be possible. Hilkiah Beaford, however, another nonjuror, assumed the responsibility of it, and was fined and imprisoned for publishing a seditious libel. A history of the Nonjurors was published in 1845 by the Rev. Thomas Lathbury.

Revised by W. S. PERRY.

Nonnus: a Greek epic poet of Panopolis, in Egypt. His date is uncertain, but he is commonly assigned to the fifth century A. D. Originally a heathen, he became a Christian in his old age. The heathen side is represented by the *Dionysiaca* (Διονυσιακά), or *Adventures of Bacchus*, a vast epic in forty-eight books, without plan, without unity, of endless details, of extravagant fancies, a strong contrast to the simplicity and plastic clearness of the old epic. Yet

Nonnus is a genius in his way, and his versification is unequaled for rapidity and smoothness, though fatiguing by reason of its uniform flow. An edition was published by Graefe (1819–26) and one by Köchly (1859). The Christian side of Nonnus is represented by his hexametrical transcription of the Gospel of St. John. See editions by Passow (1834), Marcellus (1861). B. L. GILDERSLEEVE.

Non-residence: See CITIZEN.

Nonsuit, or, more fully, **Judgment of Nonsuit**: in law, a judgment allowing or ordering the plaintiff to discontinue the action which he has instituted. A nonsuit is generally granted on the ground of a default or insufficiency of the evidence offered by the plaintiff, and in case of a nonsuit the plaintiff pays the costs of the action. A nonsuit may generally be taken either at any time before the rendering of the verdict by the jury or a judgment by the court, according to the common-law practice; or, as in some of the U. S., at any time before the case is finally submitted to the jury or the court.

A nonsuit, being merely a default, is no bar to another action on the same ground; and the plaintiff frequently finds it to his advantage to elect to be nonsuited, in order that he may begin his suit over again, or prosecute it at a later time, when his evidence may be more conclusive or other circumstances more favorable. He may submit to a nonsuit by failing to appear for the trial of the case, by absenting himself when the verdict of the jury is about to be rendered, etc. When the judgment for nonsuit is the result of his voluntary act, he can not appeal from the judgment or have it set aside. He may be nonsuited involuntarily on the motion of the defendant when his evidence is insufficient, or for any other cause for which a nonsuit may be ordered. Formerly, in the English practice, a compulsory nonsuit on the ground of the insufficiency of the evidence could not be ordered by the court against the plaintiff, but he might insist that the case should go to the jury; but it was usual for the plaintiff in such a case to submit to a nonsuit, with leave to make a motion to the full court to set the judgment aside. By the judicature acts, however, it has been provided that a nonsuit may be ordered by the judge at or after the hearing or trial upon such terms as to costs, and as to any other action and otherwise as may seem fit; and if the plaintiff does not appear when the action is called for trial the defendant is entitled to a judgment dismissing the action. It was also provided that any judgment of nonsuit, unless the court otherwise directed, should have the effect of a judgment upon the merits, except in case of mistake, surprise, and accident; but this provision has been abrogated.

The former English practice still prevails in the Federal courts of the U. S. and in several of the States, and no nonsuit can be ordered without the consent of the plaintiff; but in other States the plaintiff can be compelled to be nonsuited for insufficiency of evidence. In those States in which a code of civil procedure has been adopted a nonsuit is called a dismissal of the complaint. For a fuller treatment, see the works on practice referred to under the article PRACTICE.

F. STURGES ALLEN.

Noot'ka Dog: a large dog found among the Indians of Vancouver's island, British Columbia, chiefly remarkable for its long woolly hair, which is spun and woven into cloth by the natives.

Nootka Indians: See WAKASHAN INDIANS.

Noph (Ezek. xxx. 16; Isa. xix. 13; Jer. ii. 16), or **Moph** (Hos. ix. 6): the Hebrew name of Memphis, capital of Lower Egypt.

Norbertines: the name of a monastic order, better known as PREMONSTRATENSIANS (*q. v.*).

Nord, nōr: the most northerly department of France; bounded N. E. by Belgium and N. W. by the Straits of Dover. Area, 2,193 sq. miles. The ground is generally low and the surface flat, with the exception of the southeastern part, where some hills and low mountains occur which are rich in coal and iron. The soil is fertile and excellently cultivated, yielding large crops of wheat, hemp, flax, beetroot, tobacco, and fruits. The Aa and the Scheldt, with their numerous tributaries, all navigable, pass through the country, which, moreover, is traversed by several canals. Manufacturing of linen, silk, cotton, and woolen goods, lace, beetroot-sugar, porcelain, chemicals, and iron is extensively carried on; the fisheries, too, are important. The department is strongly fortified, and has many battle-fields. Pop. (1896) 1,811,868.

Nordenskjöld, nōr'den-skyöld, ADOLF ERIK: explorer; b. at Helsingfors, Finland, Nov. 18, 1832; descended from a Swedish family whose members through several generations had distinguished themselves as scientists. He studied geology, mineralogy, and natural history in the university of his native town, and very early received appointment in the mining department; but he could not avoid incurring the suspicion of the Russian Government, and was finally compelled to leave the country. He settled in Sweden, and was appointed superintendent of the mineralogical museum of Stockholm in 1858; accompanied Torell on his Arctic expeditions in 1859 and 1861; led similar expeditions himself in 1864, 1868, and 1872, and made a scientific journey to Greenland in 1870. The results of his researches were published in geographical and mineralogical monographs, and especially in his *Redogörelse for en Expedition till Grönland* (1871). Meanwhile, his attention had been turned to Siberian explorations, and in 1875 he sailed through the Karian Sea to the mouth of the Yenisei, ascended the river in a small boat, and returned home overland. The next year he repeated the voyage, but returned from the Yenisei by sea. His experiences having given him a reasonable hope of accomplishing the northeast passage, he started in July, 1878, in the Vega, supported partly by the Swedish Government and partly by two merchants. Thus the Vega became the first vessel which doubled the northernmost point of the Old World, Cape Tchelyuskin. She wintered in Bering Straits, and reached Japan on Sept. 2, 1879; and the northeast passage was found. On his return home Nordenskjöld was created a baron and loaded with honors. The full report of his voyage was published in Swedish, English, German, and French in 1884.

Nordhausen, nōrt'how-zen: town of Prussia, province of Saxony; at the foot of the Harz Mountains, on the Zorge; 48 miles by rail N. N. W. of Erfurt (see map of Germany, ref. 4–E). It has large distilleries, manufactures of tobacco, chemicals, and leather, and an active trade. It was founded in 874, and was finally annexed to Prussia in 1815. Pop. (1890) 26,847.

Nordhoff, nōrt'hōf, CHARLES: journalist; b. at Erwitte, in Westphalia, Prussia, Aug. 31, 1830. In 1835 his parents emigrated to the U. S.; in 1843 he was apprenticed to a printer in Cincinnati; at the age of fourteen went to sea, and was a sailor for nine years; then worked in newspaper offices. Between 1861 and 1871 he was editorially connected with the New York *Evening Post*, subsequently served as a correspondent of *The New York Tribune*, and became an editor of *The New York Herald*. Among his published works are *Man-of-war Life* (Cincinnati, 1855); *The Merchant Vessel* and *Whaling and Fishing* (Cincinnati, 1855–56); *Cape Cod and Along Shore*, a collection of stories (New York, 1868); *California for Health, Pleasure, and Residence* (New York, 1872); *Northern California, Oregon, and the Sandwich Islands* (New York, 1873); *The Communistic Societies of the United States* (New York, 1874); *Politics for Young Americans* (1875); *The Cotton States in the Spring and Summer of 1875* (1876); *God and the Future Life* (1881); *Peninsular California* (1888). D. July 15, 1901.

Revised by H. A. BEERS.

Noreen, ADOLPH GOTTHARD: philologist; b. at Östra Emtervik, Sweden, Mar. 13, 1854; was educated at the gymnasium of Karlstad in Värmland and at the University of Upsala (1873–77); privat docent at Upsala 1877–87; since 1887 Professor of the Scandinavian Languages at the same university; author of *Äldre Västgötalagen* (1876); *Fryksdalsmålets Gudläre* (1877); *Ordbok öper Fryksdalsmålets* (1878); *Svensk språklära* (i., 1881); *Altisländische und altnorwegische Grammatik* (1884; 2d ed. 1892); *Förläsningar i urgermansk judläre* (1888–90; also in Germ. transl.); *Geschichte der nordischen Sprachen* (in Paul's *Grundriss*, 1889); besides many lesser works, articles in journals, and reviews. He is one of the most active and aggressive of the younger school of comparative philologists, and a leading authority in the field of Scandinavian grammar. B. I. W.

Norelius, E., D. D.: clergyman; one of the pioneers of the Swedish Lutheran Church in the U. S.; b. in Hasseln, Sweden, Oct. 26, 1833; emigrated to the U. S. 1850; studied at Columbus, O. After a pastorate of a year at Lafayette, Ind., he became in 1856 missionary in Minnesota, with Red Wing as his center, and published in 1857 the first Swedish paper in Minnesota. Almost his entire ministerial life has been spent in that State. He has been president of the Augustana synod, and editor of *Augustana*, the organ of that

body. He published in Swedish a history of the Swedish Lutheran churches of the U. S. (1892). H. E. Jacobs.

Norfolk, nōr'fŭk: county of England; bounded N. and N. E. by the North Sea, S. and S. E. by Suffolk, and W. by Cambridge, Lincoln, and the Wash. Area, 2,119 sq. miles. The surface is level or slightly undulating, well tempered, and well watered, the principal rivers being the Ouse, the Yare, the Bure, and the Waveney, which in their course link together the numerous broads of the northeastern district. The soil consists chiefly of a sandy loam. Barley, turnips, and mangold are the chief agricultural products, and cattle and poultry, especially geese and turkeys, are extensively reared for the London market. There are manufactures in Norwich (*q. v.*), and important herring-fisheries connected with Yarmouth and other ports. Pop. (1901) 313,438.

Norfolk: city; Madison co., Neb. (for location of county, see map of Nebraska, ref. 9–F); on the Chi., St. P., Minn. and Om., the Fremont, Elk. and Mo. Val. and the Union Pac. railways; 75 miles S. W. of Sioux City, 130 miles N. W. of Omaha. It is in an agricultural and sugar-beet raising region; has 8 churches, 5 public-school buildings, electric lights, electric street-railway, and a daily and 4 weekly newspapers; and contains the largest beet-sugar factory in the State (established 1891). Pop. (1880) 547; (1890) 3,038; (1900) 3,883. Publisher of "Daily News."

Norfolk: city, port of entry, and U. S. naval station (settled in 1680, bombarded and nearly destroyed by the British in 1776, town organized in 1705 by act of Assembly, chartered as a city in 1845); Norfolk co., Va. (for location, see map of Virginia, ref. 7–I); on the Elizabeth river (an arm of the Chesapeake Bay), the Albemarle and Chesapeake Canal and Dismal Swamp Canal, and 7 important lines of railway; 8 miles from Hampton roads, 17 miles from the Atlantic Ocean, 88 miles S. E. of Richmond. It has an excellent harbor, large, safe, and of sufficient depth to accommodate the largest war vessels, and is in regular steamship communication with various U. S. and European ports, West Indies, and South America. The climate is genial, tempered by the Gulf Stream, which runs nearer the shore off Capes Henry and Hatteras than at any other point on the Atlantic coast. Norfolk and Portsmouth, on the opposite side of the river, constitute the largest naval station in the U. S., and a single U. S. customs district. The foreign trade in 1900 was represented by imports valued at $318,401, and by exports valued at $11,505,729. The city is an important coaling-station, handling 2,350,100 tons annually. The fourth cotton port in the U. S.; has a cotton business of about 1,000,000 bales annually, an annual oyster business valued at $2,500,000, and an annual truck business valued at about $6,000,000, and is the principal peanut-market of the country. There are 30 churches, an academy, a mission college, a college for young ladies, public-school property valued at over $350,000, 3 libraries containing nearly 12,000 volumes, 2 national banks with combined capital of $600,000, 6 State banks with capital of $765,000, board of trade, and cotton exchange, real estate exchange, and other trade and manufacturers' associations. Norfolk has the Holly system of water-works, drawing its supply from several lakes 7 miles distant; thorough sewerage; gas and electric light plants; 4 daily, 5 weekly, and 2 monthly periodicals; and Union stock-yards, business $2,500,000 annually. Four seaside resorts can entertain 8,000 people. Industries: 2 breweries, 6 bottling-works, 2 grain-mills, 2 creosoting plants, 7 peanut-mills, 3 paper-box factories, 3 book-binderies, 9 barrel, box, and crate factories, 5 ice-factories, 8 cotton knitting-mills, 2 cotton-compresses, 10 fertilizer-factories, 4 agricultural-implement works, 3 wagon and carriage works, 6 foundries, machine-shops, and boiler-works, 5 ship-yards, 1 grain elevator, 18 saw and planing mills, 2 furniture-factories, 6 brick plants, 3 electric-supply works, and several minor industries. In 1900 the assessed valuation was $25,924,210, and on Feb. 15, 1901, the net debt was $4,788,147.84: amount in the sinking-fund, $525,000; bonds bear 4 per cent., taken at a premium. Pop. (1880) 21,966; (1890) 34,871; (1900) 46,700.

John Whitehead.

Norfolk, Dukes of (1483), Earls of Arundel (1139), of Surrey (1483), and of Norfolk (1644): a family of the English nobility which enjoys the distinction of hereditary earl-marshal, premier duke, and premier earl of England. The earldom of the East Angles was conferred by Henry I. (1135) upon Hugh Bigod, who lost that title by rebellion against Stephen and Henry II., but was reconciled to the latter monarch and made Earl of Norfolk 1167. His grandson, Roger, was made earl-marshal on the failure of the male line of the Earls of Pembroke 1225, but both titles became extinct on the death of his nephew, of the same name, 1307. After having been held by Thomas of Brotherton, brother of Edward II. (1313–38), and by Thomas Mowbray (1386–1413), both titles were granted by Richard III., June 28, 1483, to John Howard, lord-admiral of England, France, and Aquitaine, a distinguished statesman and military leader, who was killed at the battle of Bosworth Field, Aug. 22, 1485, and attainted shortly afterward.—His son, Thomas Howard, who had been ennobled (as Earl of Surrey) at the same time as his father, whose attainder he also shared, was restored to his original title 1488; distinguished himself in war and diplomacy; was made earl-marshal 1510, and second Duke of Norfolk Feb. 1, 1514, as a reward for having gained the battle of Flodden Field; d. at Framlingham, May 21, 1524.—His son, Thomas Howard, third duke, in many respects the most noted member of the family, b. about 1474, took a very prominent part in public affairs; repeatedly commanded armies of invasion against Scotland; presided over the court which sentenced Queen Anne Boleyn to death, May 19, 1536; suppressed the rebellion known as the "Pilgrimage of Grace" 1537; was thrown into the Tower Dec., 1546, sentenced to death and attainted Jan. 27, 1547, but escaped through the opportune death of Henry VIII. on the following day; had his title restored by Queen Mary; d. Aug. 25, 1554. The cause of his fall might doubtless be traced to the previous misconduct and disgraceful death of his niece, Catharine Howard, third queen of Henry.—His brother, Lord Edward Howard, had been lord high admiral of England, and was killed in an attempt to destroy the French fleet 1513; while his eldest son, Henry Howard, celebrated as a poet under the title of Earl of Surrey, aspired to the hand of the Princess Mary, and was beheaded on Tower Hill, Jan. 19, 1547.—Surrey's son, Thomas Howard, b. about 1536, became fourth duke; intrigued for the hand of Mary, Queen of Scots, and was beheaded at London, June 2, 1572.—His grandson, Thomas Howard, b. 1592, was restored in blood by act of Parliament as Earl of Arundel and of Surrey 1603; was distinguished in the service of Charles I.; was restored to the earldom of Norfolk 1644, and is known to history under the title of Arundel, through the great collection of Grecian marbles made in his name.

Revised by C. K. Adams.

Norfolk Island: an island in the South Pacific, about half way between New Caledonia and New Zealand; lat. 29° S., lon. 168° E.; area, 10 sq. miles; pop. 750; under the supervision of the governor of New South Wales. It is one of the most solitary and inaccessible of the islands of the globe. Originally it was inhabited, and was discovered by Cook in 1774. From 1788 to 1805 and from 1825 to 1842 it was used as a penal colony by New South Wales. In 1856 many of the descendants of the mutineers of the Bounty were transported thither from Pitcairn island. These numbered 149 at the time of the transfer; their descendants now comprise all the inhabitants except those of the Melanesian mission station and school established here. Pop. (1896) 750. The climate is agreeable and healthful, and the soil fertile, but the inhabitants are indolent. M. W. H.

Nor'icum: province of the Roman empire, extending between the Danube and the Save, and bounded E. by Pannonia and W. by Vindelicia and Rhætia. It corresponded approximately to the portion of Austria proper S. of the Danube, together with the provinces of Styria, Carinthia, and Salzburg. It was conquered late in the reign of Augustus. Its principal city was Noreia (the modern Neumarkt in Styria).

Revised by G. L. Hendrickson.

Normal [from Lat. *nor'ma*, carpenter's square, rule; etymol. doubtful, possibly for **nōnma*, ninth, ninth letter, in allusion to the shape of letter L; cf. *germen* < **genmen* (?), *carmen* < **canmen* (?)]: a term used in mathematics. A normal to a plane curve is a straight line in that plane perpendicular to a tangent at the point of contact. The equation of the normal in rectangular co-ordinates is

$$y - y' = -\frac{dx'}{dy'}(x - x'),$$

in which y' and x' are the co-ordinates of the point on the curve. When the length of a normal is spoken of, we generally mean the distance from the point of normalcy to the

point in which the normal cuts the axis of x. In this case the formula for the length is

$$N = y' \sqrt{1 + p'^2},$$

in which y' is the ordinate of the point of contact, and p' the corresponding value of the first differential coefficient of the ordinate. The distance from the point on the curve to the center of the corresponding osculating circle is sometimes taken as the length of the normal, in which case this length is given by the formula

$$N = \frac{(1 + p'^2)^{\frac{3}{2}}}{p''},$$

p' having the same signification as before, and p'' being the corresponding value of the second differential coefficient of the ordinate.

A normal to a curve of double curvature is a straight line lying in the osculating plane and perpendicular to the tangent at its point of contact. In this case the length of the normal is the same as the length of the radius of the osculating circle to the curve at the point of contact. A plane is said to be normal to a curve at any point when it is perpendicular to the tangent at that point. A normal line to a surface is a straight line perpendicular to a tangent plane to the surface at the point of contact. Any plane through a normal line to a surface is a normal plane.

Revised by S. Newcomb.

Normal: city; McLean co., Ill. (for location of county, see map of Illinois, ref. 5–E); on the Chi. and Alton and the Ill. Cent. railways; 2 miles N. of Bloomington, 124 miles S. S. W. of Chicago. It is noted as the seat of the Illinois State Normal University, organized in 1857, which in 1890–91 had 19 instructors and 682 professional and graduate and 145 non-professional students. It is also the seat of the Illinois Soldiers' Orphans' Home, founded in 1869. The Normal University has a library of over 7,000 volumes, and the Orphans' Home one of over 3,000. The city is in a coal region, has extensive nurseries, and contains a national bank, a savings-bank, and 3 periodicals. Pop. (1880) 2,470; (1890) 3,459; (1900) 3,795.

Normal Schools: See Schools.

Norman: village (founded in 1889); capital of Cleveland co., Okl. (for location, see map of Oklahoma, ref. 3–D); near the Canadian river, and on the Atch., Top. and Santa Fé Railroad; 50 miles S. of Guthrie. It is in a corn, grain, and cotton region, and contains the University of Oklahoma, 8 churches, 2 public-school buildings, High Gate Female College (Methodist Episcopal South), 3 State banks, flour and cottonseed-oil mills, and a daily, a monthly, and 3 weekly periodicals. Pop. (1890) 787; (1900) 2,225.

Editor of "State Democrat."

Normandy [Fr. *Normandie*, deriv. of *Normand*, Norman. See Normans]: an old province of France, bordering on the English Channel, and comprising an area of 10,534 sq. miles; now divided into the departments of Seine-Inférieure, Eure, Orne, Calvados, and Manche. The ground is naturally fertile, and the inhabitants are descendants of the old Normans (*q. v.*). When, in 1066, their duke, William II., conquered England, Normandy entered into a close political relation to that country, which continued, generally as a formal union, until, in 1204, Philip Augustus conquered the province and made it a part of France. After the battle of Agincourt, in 1415, the English once more held it, but only till 1449, when Charles VIII. finally united it to France.

Norman French: properly, the French dialect or dialects of Normandy, or the region occupied by the invading Normans or Northmen, which was granted their leader by Charles the Simple early in the tenth century. In English the term is used to designate the Old French brought into England as a result of the Norman conquest, and there having a history somewhat different from that of any form of French in France. At the time of the conquest the French brought into England was not very different from that which is the parent of the modern literary French, but some words of a distinctly different dialect type came in also (cf. *catch* and *chase*, respectively from *cachier* and *chacier* in Old French, the latter of which has become the modern *chasser*, the origin of both being the same). In England certain changes arose; for instance, the diphthong *ie* became close *e*, and, at a later time, *a* before a nasal followed by a consonant appears very often as *au*, whence our frequent spellings with *au* as in *launch*, *aunt*, *avaunt*, *haunt*, etc. The original French diphthong *ei* became to a great extent *oi* in literary French, even in the Old French time, but this change did not take place in Anglo-French. The letter *u* had two distinct values in the early French of England, one like or nearly like that of modern French *u*, the other about like English *u* in *rude* (short or long). Of these two sounds the second was often represented later by *ou*, while in many such words the literary French developed a sound written *eu*; hence in modern English, for example, the common adjective ending *-ous* (= Lat. *-ōsus*), corresponding to modern French *-eux*, as in *generous*, Fr. *généreux*. The Old French *ch*, *j*, and *g* before *e* and *i* still keep in English in old borrowings from French their Old French sounds, as in *chant*, *gist*, *Jew*, *jest*, etc., while in modern literary French they have changed their value. Some words were rather early taken into English from the literary French, and such borrowings have continued up to modern times. In consequence of this and of borrowings directly from Latin and other languages at various times in the history of English, our language shows two or more different forms for many words. Compare *chair* and *chaise* (and even *shay*); *petrify* and *pier*; *peer* and *par* (cf. also *pair*); *cavalier* and *chevalier*, *feeble* and *foible*, etc. A dictionary of the French as used in England is much needed. For the language and its relations to English, see especially Behrens, *Beiträge zur Geschichte der französischen Sprache in England* (in *Französische Studien*, v.), and the same in Paul's *Grundriss der germanischen Philologie*, i., 799–836; also Skeat, *Principles of English Etymology*, 2d series, *The Foreign Element* (1891; this book is reviewed in *Modern Language Notes*, Nov., 1892).

E. S. Sheldon.

Normans [from Fr. *Normand*, from Dan. *Normand*, liter., Northman]: I. *The Northmen.*—Toward the end of the eighth century Western Europe began to be scourged by the inroads of Scandinavian pirates, known to the inhabitants of the British isles as "East-men" and "Danes"—to those of the Continent as "North-men." They were of Teutonic stock, a vigorous, seafaring race, not yet Christianized, peopling the coasts and islands of the Baltic and of the peninsulas of Jutland and Scandinavia. Need and the national thirst for adventure and for strife drove forth swarms of Vikings (i. e. bay-men, frequenters of bays and inlets) from the thickening population down upon the sunnier, richer, weaker south. These scoured the coasts of England, Germany, and France, pressed with their small, sharp, open vessels up the narrowest streams, burned, slew, and plundered, and sailed away laden with booty and with slaves. About the middle of the ninth century these raids began to assume an altogether new character and importance. The consolidation of the three great Scandinavian kingdoms broke the power of the petty kings and independent nobles, and drove many of them forth, with their followers, to seek a freer life in some new home. Northmen threw themselves in larger bands upon England, which the Wessex kings had not yet fairly centralized; upon the Frankish kingdoms, fast falling asunder under the later Carolingian rulers; harried the country, besieged and sacked the cities, wintered at the mouths of the rivers, and by the end of the century had wrested from Alfred half his kingdom, and had begun to plant colonies upon the coasts of France. Northmen ravaged Spain and the shores of the Mediterranean, fell upon Western Italy, penetrated Greece and Asia Minor, and there met others of their countrymen who had pressed down through Russia. In the Russia of that day Scandinavian invaders (Varangians) had become the ruling class, a military aristocracy; and those who made their way still farther south had formed the famous Varangian body-guard of the Byzantine emperors, which maintained its existence and its distinctive character for five centuries. During the latter half of the ninth century, also, Scandinavians, sailing westward, found and settled Iceland, where the old free Germanic community life held for nearly 400 years; whence Greenland was visited and colonized; whence, also, it seems, navigators made their way farther down the North American coast to a "Vinland" where settlements were attempted, and to a still more southerly "Hvitramanaland."

With the establishment, early in the tenth century, of settlements upon the Continent, with the occupation which Scandinavian energy found at home in wars between the three new kingdoms, and with the gradual triumph of Christianity in the north, Europe gained, at last, comparative rest. England's period of misery and humiliation under Ethelred (979–1016), which terminated with the establishment of a Danish dynasty (1017–42), marks the last great outburst of the pent-up heathenism.

II. *Normandy.*—Of all the settlements of the Northmen, one alone was destined to play a really important part in history. By the treaty of Claire-sur-Epte (912) Charles the Simple enfeoffed a viking, Rolf or Rollo, with the lands upon either side of the Seine of which he and his followers were in actual possession. In return the new duke of the Northmen recognized the Carolingian king as his overlord, and received baptism. It seemed highly probable that this latest Teutonic settlement would prove a powerful diversion in favor of the waning authority of the Frankish kings of Laôn against the increasing influence of the French duchy of Paris, which had first risen to importance as a mark against the Northmen, and at whose expense the "Terra Northmannorum" was now created. Duke Rolf, indeed, remained loyal to his Carolingian lord, and, fighting in his cause, won for himself the Bessin; but William "Longsword" (927–943), who added to his domains the Cotentin, was largely French in feeling, and his allegiance to the Carolingians was a wavering one. The third duke, Richard "the Fearless" (943–996), became the "man" of Hugh the Great of Paris, and, later, of his son "Capet," to whose establishment upon the throne he lent decisive aid. It was thus the settlement of these northern pirates, says Freeman, which finally made Gaul French in the modern sense. It was at the same time the alliance with Romanic France which brought the Northmen fully under the influence of French language, law, and custom, which made them *Normans*, the foremost apostles alike of French chivalry and of Latin Christianity. Under Richard "the Good" (996–1026) Norman arms began to be borne beyond the borders of the Norman duchy. Robert of Toesny warred against the infidel in Spain; Rainulf began his career of conquest in Apulia. To the brothers Richard III. (1026–28) and Robert "the Devil" (1028–35) succeeded the "Bastard of Falaise," William the Conqueror. The duchy of Normandy—which before his conquest of England (1066) he had widened by the winning of Maine (1063)—he left at his death (1087) to his first-born Robert, from whom it was wrested (1106) by his brother, Henry I. of England. Thenceforth it was held by the English kings until its seizure by the French crown in 1203.

For the Norman conquest of England and its political consequences, see ENGLAND, HISTORY OF. For the influence which Norman institutions exercised in the development of the English common law, see MUNICIPAL LAW of England.

III. *The Normans in the Sicilies.*—The Sicilies at the beginning of the eleventh century were divided and disputed between Langobards, Greeks, and Saracens. A band of Norman knights, entering Apulia upon a pilgrimage, lent their aid to the Langobards, who were Latin Christians, in an attempt to expel the Greeks. This enterprise miscarried; but the reckless courage and strict discipline of the Normans brought their further assistance into great demand, and won them soon great fame and influence. In 1030 they built the city of Aversa; eight years later their leader Rainulf received from Conrad II. of Germany the title of count. Such beginnings drew from overcrowded Normandy fresh swarms of adventurers, with whose aid the Greek viceroy won from the Moslems (1038) the greater part of the island of Sicily. Swindled in the sharing of the booty, the Normans attacked the Greek possessions in Southern Italy with such success that their leader, William "Iron-arm," son of Tancred d'Hauteville, soon styled himself Count of Apulia; in which title we find his brother and successor, Drogo, confirmed by the German emperor, Henry III. With the third Apulian count, Humphrey, Pope Leo IX. came into strife over Benevento. Defeated and captured in the battle of Civitate (1053), the pontiff was fain to strike a peace upon the condition of Norman vassalage to the holy see. Still another son of Tancred, the famous Robert Guiscard, succeeded his brother Humphrey (1056). "By the grace of God and of St. Peter, Duke of Apulia and Calabria," he spent the first twenty years of his long rule in making good his title over Greek, Langobard, and Norman. Meanwhile his younger brother, Roger, passing with a few hundred knights into Sicily, won a series of brilliant victories, and finally, with Robert's aid, made himself master of the island. In 1081 Robert invaded Greece and defeated the East Roman emperor at Durazzo in Albania. Already Byzantium trembled, when disturbances in Apulia and the repeated summons of the pope, in hot strife with Henry IV. of Germany, drew the Guiscard back to Italy. Bursting into the Campagna with 6,000 horse and 30,000 foot, he pressed back the German emperor, delivered Gregory (besieged in St. Angelo), and sacked Rome (1084). Dying the next year, he left the ducal title to his second son, Roger. His first-born, Bocmund, won great fame in the first crusade and established an independent principality in Antioch. In 1127 the Guiscard line became extinct, and Roger, second Count of Sicily, united the conquests of the house of Tancred, reigning as King of Sicily and Naples; as did also his son and grandson after him, William I. (1154–66) and William II. (1166–89). From the raising of the siege of St. Angelo, through all the conflicts between the papacy and the German empire, the former found in the Sicilies, under the Norman supremacy, its firmest support; but in 1186, through the marriage of Henry VI. of Germany with Constance, aunt and heiress of the childless William II., the succession to the Sicilian throne passed over to the imperial house of Hohenstaufen. Upon William's death (1189) the pope and the Norman nobility set up the illegitimate Tancred; but in 1194, invading the Sicilies with a German army, Henry crushed out all opposition. His son by Constance, Frederick II., afterward united and ruled both realms. Under the Norman kings and the half-Norman Frederick the Sicilies furnished the one example of the time of full religious toleration. Greek and Saracen dwelt together in the enjoyment of civil equality and freedom of faith. The art and the learning of both races found generous encouragement. Sicily and Spain, the points at which the Eastern civilization touched the Western most closely, became the centers from which the culture of the Saracen and the reawakening of scientific study spread throughout Europe. In 1266 Charles of Anjou, in league with the papacy, defeated and slew King Manfred, Frederick's son, and made himself master of the Sicilies. After the overthrow of their supremacy, the Normans, as in France and in England, became blended with the races they had ruled.

LITERATURE.—Palgrave, *History of Normandy and England* (London, 1857): Freeman, *History of the Norman Conquest of England* (Oxford, 1870), especially vol. i., ch. iv., and vol. ii., ch. viii.

MUNROE SMITH.

Norns (Icelandic plural *Nornir*): the goddesses of fate in Scandinavian mythology. There are three—Urd (the Past), Verdande (the Present), and Skuld (the Future). They dwell near Urd's fountain, by one of the roots of the great ash Ygdrasil, where the gods meet in council. They water the branches of Ygdrasil to keep the tree from withering and fading. They weave the web of men's lives, stretching it from the radiant dawn to the glowing sunset. The destiny of the world is in the hands of the norns, and even the gods must submit to their decrees. The three witches in Shakspeare's *Macbeth* have their origin in the Scandinavian norns.

RASMUS B. ANDERSON.

Noroña, nō-rōn'yăă, GASPAR MARÍA DE NAVA ÁLVAREZ, Conde de: poet and soldier; b. at Castellón de la Plana, Spain, May 6, 1760; d. in Madrid in 1815. He became a royal page in 1766; captain of dragoons in 1778. He greatly distinguished himself in the siege of Gibraltar. When peace with Great Britain was declared, he was sent as ambassador to Russia. In 1792 he returned to the army, and became lieutenant-general in command of part of the Spanish army in Galicia. Throughout his career he cultivated letters as a pastime. He wrote a tragedy in verse, *Madama González*; and two comedies in prose, *El Hombre marcial* and *El Cortejo enredador*. He wrote also many lyrics and occasional poems (published under the title *Poesías*, 2 vols., Madrid, 1799), and a dull epic, *Ommiada* (2 vols., Madrid, 1816). He translated into Spanish various poems from the Arabic, Persian, and Turkish (*Poesías asiáticas*, Paris, 1833). The best of his work is to be found in vol. lxiii. of Rivadeneyra's *Biblioteca de Autores Españoles* (Madrid, 1871).

A. R. MARSH.

Noronha, FERNANDO, de: See FERNANDO DE NORONHA.

Norridgewocks: See ALGONQUIAN INDIANS.

Norris, WILLIAM EDWARD: novelist; b. in London, 1847, a son of Sir William Norris, chief justice of Ceylon. He was educated at Eton, and admitted to the bar in 1874. Among his novels, which have been likened to Thackeray's, are *Matrimony* (1881); *Thirlby Hall* (1884); *Adrian Vidal* (1885); *The Rogue* (1888); *Marcia* (1890); *Mr. Chaine's Sons* (1891); *His Grace* (1892); *A Deplorable Affair* (1893).

H. A. B.

Norris, WILLIAM FISHER: ophthalmologist; b. June 6, 1839, in Philadelphia, Pa.; was educated at the University of Pennsylvania; is assistant surgeon and brevet captain

U. S. army; surgeon of the Wells Eye Hospital; Professor of Ophthalmology, University of Pennsylvania. He is author of *Medical Ophthalmology* (in Pepper's *System of Medicine*), and, with Charles A. Oliver, of *A Text-book of Diseases of the Eye.* C. H. T.

Norristown: borough (incorporated in 1812, enlarged in 1853); capital of Montgomery co., Pa. (for location of county, see map of Pennsylvania, ref. 6–J); on the Schuylkill river, the Schuylkill Canal, and the Phila. and Reading, the Penn. and the Stoney Creek railways; 16 miles N. W. of Philadelphia. It is in an agricultural and mineral region, and in some parts is 200 feet above the river. The water-supply is from the Schuylkill river, the distribution being from a reservoir at a height of nearly 200 feet above the level of the river. Several bridges across the river connect the borough with that of Bridgeport. The borough is the seat of one of the State hospitals for the insane, having twenty buildings and accommodations for nearly 2,000 patients, and has over 20 churches, public-school property valued at $200,000, 3 national banks with combined capital of $550,000, 4 libraries (the Norristown Library Association, founded 1796; Montgomery County Law, founded 1869; the William McCann High School, founded 1870; and the insane hospital, founded 1880) containing together over 20,000 volumes, and 3 daily, 5 weekly, and 2 other periodicals. The industries include the manufacture of cotton and woolen goods, shirts, hosiery, glass, carpets, brick, flour, and iron furnace and rolling-mill products. Pop. (1880) 13,063; (1890) 19,791; (1900) 22,265. EDITOR OF "HERALD."

Norr'köping: town of Sweden, in lat. 59° N., on the Motala, near the Baltic. The river is here crossed by several substantial bridges, and lined with commodious quays and spacious docks (see map of Norway and Sweden, ref. 12–F). Norrköping ranks as the second manufacturing city in Sweden; it has important ship-building and sugar-refining establishments, a salmon-fishery, and manufactures of paper, tobacco, leather, cotton, linen and woolen goods, and other articles. In 1888 its factories numbered 75. Pop. (1891) 32,826. Revised by R. B. ANDERSON.

Norse Literature: See EDDA.

Norse Mythology: See SCANDINAVIAN MYTHOLOGY.

North, CHRISTOPHER: See WILSON, JOHN.

North, EDWARD, L. H. D., LL. D.: educator; b. at Berlin, Conn., Mar. 9, 1820; graduated at Hamilton College in 1841; was principal of the Grammar School, Clinton, N. Y., 1841–42; was Dexter Professor of Greek and Latin in Hamilton College 1843–62; has been Professor of Greek Language and Literature in the same institution since 1862. He has been necrologist of the alumni society; editor of the *Triennial*, and of *Alumniana* in the *Hamilton Literary Monthly*; since 1881 a member of the board of trustees; was acting president 1892. C. K. HOYT.

North, FRANCIS: jurist; Baron Guilford, son of the fourth Baron North; b. in England, Oct. 22, 1637; studied at Cambridge and at the Middle Temple; was called to the bar 1661; was retained by the crown in important cases; was knighted and became solicitor-general 1671; appointed attorney-general 1673, chief justice of the common pleas 1675, privy councilor 1679, lord keeper of the great seal 1682; created Baron Guilford Sept., 1683. D. Sept. 5, 1685.—Of his brothers, Sir DUDLEY, b. May 16, 1641, was a wealthy Turkey merchant and M. P., author of *Discourses upon Trade*, etc., which entitles him to a high rank among the political economists of the seventeenth century, and even anticipates the doctrines of Adam Smith and the Manchester school. D. Dec. 31, 1691.—JOHN, b. in London, Sept. 3, 1645, became a fellow of Cambridge, Professor of Greek, master of Trinity College, doctor of divinity, and editor of Plato's *Dialogues*. D. at Cambridge, Apr., 1683.—ROGER, b. about 1650, became attorney-general under James II., was author of biographies of the above three brothers (1740–42) and of several treatises on law, politics, and music. D. Mar. 1, 1734.

North, FREDERIC, Earl of Guilford, best known as Lord NORTH: statesman; b. in England, Apr. 13, 1733; educated at Eton and at Trinity College, Oxford; entered the House of Commons as a Tory at an early age; became a lord of the treasury 1759, and in 1763 moved the expulsion of John Wilkes; supported the American Stamp Act 1765; became joint paymaster of the forces 1766; became Chancellor of the Exchequer and leader of the House of Commons on the death of Charles Townshend 1767; First Lord of the Treasury and Prime Minister 1770; proposed the colonial tea duty 1773, and the Boston Port Bill Mar., 1774; retired from office Mar. 20, 1782; became joint Secretary of State with Fox in the "coalition ministry" 1783; became blind 1787; succeeded to the earldom 1790; died Aug. 5, 1792.

North Adams: town; Berkshire co., Mass. (for location of county, see map of Massachusetts, ref. 2–C); on the Hoosac river, and the Boston and Albany and the Fitchburg railways; at the west terminus of the Hoosac tunnel. (See TUNNELS AND TUNNELING.) It is surrounded by the high and picturesque Berkshire hills, comprises several villages, and has Greylock, the highest mountain in Massachusetts, and Hudson's brook, where there is an interesting natural bridge of soft marble, in its vicinity. The town contains a large number of cotton and woolen mills and shoe-factories, and was one of the first manufacturing places in the Northern and Eastern States to make use of Chinese labor. It has 2 national banks, capital $700,000, 2 savings-banks, a daily and 3 weekly newspapers, and a public library (founded 1884) with over 10,000 volumes. Pop. (1880) 10,191; (1890) 16,074; (1900) 24,200. EDITOR OF "TRANSCRIPT."

North America: See AMERICA.

Northamp'ton, or **Northamptonshire**: an inland county of England; bounded N. by Leicester, Rutland, and Lincoln. E. by Huntingdon, Bedford, and Bucks, S. by Oxford, and W. by Warwick. Area, 984 sq. miles. The surface is finely diversified with richly wooded hills and well-watered valleys, and the soil, consisting mostly of a black mould or a brown loam, is very fertile. Wheat and green crops are largely grown. On the broads many cattle are grazed and dairy farming is carried on. The principal minerals are limestone and ironstone of a good quality. It returns four members to Parliament. Pop. (1901) 248,585.

Northampton: capital of the county of Northampton, England; on the Nene; 50 miles S. E. of Birmingham (see map of England, ref. 10–I). It has a fine town-hall, a free library, a museum, schools of science and art, and thirteen churches, among which is St. Sepulchre's, one of the few remaining round churches in England. In the neighborhood of the town is a fine racecourse at which there are two meetings annually. Its manufactures of hosiery and lace have declined, but those of leather, boots, and shoes are very important: also its breweries, iron-foundries, and flour-mills. The parliamentary borough returns two members to Parliament. Pop. (1901) 87,021.

Northampton: city (settled in 1754); capital of Hampshire co., Mass. (for location of county, see map of Massachusetts, ref. 3–E); on the Connecticut river, and the Boston and Maine, the Conn. River, and the N. Y., N. H. and Hart. railways; 17 miles N. of Springfield, 95 miles W. of Boston. It has an elevated site, affording a fine view of Mt. Holyoke and Mt. Tom, and is connected with Hadley by a bridge across the river. Among its notable institutions are Smith College for young women (non-sectarian, chartered 1871), the Clarke Institution for Deaf Mutes (founded 1867, endowed by John Clarke with $3,000,000), a classical school for girls, the State Lunatic Asylum (established 1858), and a Soldiers' and Sailors' Memorial Hall (cost $75,000). There are 6 libraries (Public, Smith College Reference, Clarke Institution, Burnham Classical School, Hampshire County Law, and Lunatic Asylum) containing over 40,000 volumes; 3 national banks with combined capital of $1,150,000, 2 savings-banks, and a monthly, 2 daily, and 2 weekly periodicals. The industries include the manufacture of baskets, sewing-machines, pocket-books, cotton, woolen, and silk goods, brushes, paper, buttons, and cutlery. The beauty and salubrity of its location have made it a popular summer resort. Pop. (1880) 12,172; (1890) 14,990; (1900) 18,643. EDITOR OF "HERALD."

North Anna, BATTLES OF: See WILDERNESS, BATTLES OF THE.

North Attleboro: town; Bristol co., Mass. (for location of county, see map of Massachusetts, ref. 4–I); on the N. Y., N. H. and Hart. Railroad; 14 miles N. by E. of Providence, 30 miles S. S. W. of Boston. It is noted for its manufactures of jewelry, and contains a public library, national bank with capital of $150,000, savings-bank, and a daily newspaper. Pop. (1890) 6,727; (1900) 7,253.

North Baltimore: village; Wood co., O. (for location of county, see map of Ohio, ref. 2–D); on the Balt. and O. and the Cin., Ham. and Dayton railways; 38 miles E. of Defiance. It is in a natural-gas region, has manufactures

of lumber and staves, and contains a national bank with capital of $60,000, a State bank with capital of $37,500, and two weekly newspapers. Pop. (1880) 701; (1890) 2,857; (1900) 3,561.

North Bay: a town of Ontario, Canada; on the north shore of Lake Nipissing; station on the Northern Pacific Railway; 244 miles N. W. of Ottawa (see map of Ontario, ref. 1–E). It was founded in 1884 and develops rapidly. Population, principally French Canadian, 1,400. M. W. H.

Northbrook, Thomas George Baring, Viscount: statesman; eldest son of the first baron; b. at Stratton Park, near Winchester, England, in 1826; graduated at Oxford 1846; was successively private secretary to Mr. Labouchere at the Board of Trade, to Sir George Grey at the Home Office, to Sir Charles Wood at the India Board and at the Admiralty; entered Parliament in the Liberal interest 1857; was a lord of the admiralty 1857–58; Under Secretary of State for India June, 1859–Jan., 1861, for War from the latter date to June, 1866, and again on the accession of Mr. Gladstone to office Dec., 1868, till Feb., 1872, when he was appointed Viceroy and Governor-General of India, having succeeded to the barony in Sept., 1866. In 1876 he resigned and was created a viscount; in 1880 he was appointed First Lord of the Admiralty in Gladstone's cabinet, but in 1886 opposed the home-rule policy of the Premier.

North Brookfield: town; Worcester co., Mass. (for location, see map of Massachusetts, ref. 3–F); on the North Brookfield branch of the Boston and Albany Railroad; 20 miles W. of Worcester, one of the county-seats. It is in an agricultural and dairying region, is extensively engaged in the manufacture of shoes, and has two libraries (Appleton, founded 1859, and Free Public, founded 1880) containing over 10,000 volumes, a savings-bank, and a weekly newspaper. Pop. (1880) 3,427; (1890) 3,871; (1900) 4,587.

North Cape: See Cape North.

North Carolina [Mod. Lat. (sc. *ter'ra*, land), land of Charles, liter., femin. of *Caroli'nus*, pertaining to Charles, deriv. of *Ca'rolus*, Charles. Named in honor of Charles I.]:

Seal of North Carolina.

one of the U. S. of North America (South Atlantic group); the twelfth of the original thirteen States that ratified the Federal Constitution.

Location and Area.—It lies between 33° 50′ and 36° 33′ N. lat. and 75° 27′ and 84° 20′ W. lon.; is bounded on the N. by Virginia, on the E. and S. E. by the Atlantic Ocean, on the S. by the Atlantic, South Carolina, and part of Georgia, on the W. by Tennessee. Extreme length from E. to W., 503¼ miles; extreme breadth N. to S., 187½ miles; average breadth, 100 miles. Area, 52,250 sq. miles, of which 3,670 are water surface.

Physical Features.—A line drawn from Weldon, on the Roanoke river, to Raleigh, and thence to Columbia, S. C., divides the State into two geologic regions—the eastern or coastal plane region, the formations of which are comparatively recent in age and are composed mainly of sands and clays, with occasional composites of marl and limestone; and the western, the formations of which are of older rocks, mostly granites, gneisses, and crystalline schists, containing two narrow and irregular strips of coal-bearing red sandstone and shale (Triassic or Newark). Along the western border of this eastern region the surface is undulating, and has an elevation varying from 200 to 300 feet above the sea. Eastward, approaching the ocean, the elevation decreases to but a few feet above the sea, and the surface becomes nearly level, in many places marshy, and extensively intersected by the sounds and estuaries of the rivers. The western region, undulating along its eastern border, becomes more hilly westward through the middle and Piedmont counties until the hills become small mountains, and these in turn give place to the Blue Ridge and adjacent mountain chains, which reach their maximum development in the Black Mountains. The eastern region contains large areas of the finest farming lands of the State and valuable forests of pine. The occasional economic mineral products are marls, limestone, and phosphate. In the middle and western counties the mineral products occur on a larger scale. Granite and granitic gneiss suitable for building, monumental, and paving stone are widely distributed. Sandstones—brown, red, and gray—are found in the middle section, and marble—white, pink, and blue—occurs in the western. Slate suitable for roofing has been quarried in two counties; the conglomerates of the Triassic are successfully used as millstones; kaolin occurs in large quantities and of excellent quality. Talc is mined on a considerable scale in the extreme southwest; agalmatolite is found abundantly in Chatham and Moore Counties; baryta occurs extensively, and is mined in Madison County; corundum is extensively mined in Jackson, Macon, and Clay Counties; mica occurs as large crystals associated with quartz and feldspar; and veins of bituminous and anthracite coal in the Triassic formations in Chatham, Moore, Rockingham, and Stokes Counties. Iron ores, copper, silver, and gold are widely distributed through the State. For nearly a century gold-mining has attracted attention, and upward of $22,000,000 worth has been obtained. More than 180 species of minerals have been discovered, including gems such as the diamond, ruby, sapphire, hiddenite, emerald, beryl, amethyst, garnet, and zircon.

North Carolina is well drained, though none of its streams are large. In the mountain plateau are the Hiwassee, Tennessee, Pigeon, French Broad, Nolechucky, and the Watauga, all flowing toward the Mississippi river. The New river flows northward into the Ohio. Eastward of the Blue Ridge, the Broad, Catawba, and Yadkin flow to the Atlantic through South Carolina, the Broad becoming the Wateree and the Catawba the Congaree, the two uniting to form the Santee. The Yadkin, uniting with the Uwharrie, becomes the Pedee. The Dan, the longest river in the State, has part of its course in Virginia. Other rivers rising at some distance from the mountains are the Tar, near its mouth called the Pamlico, the Neuse, the Cape Fear, formed by the Haw and the Deep, the Lumber, changing its name in South Carolina to Little Pedee, and the Waccamaw. All of the rivers E. of the Blue Ridge are navigable 100 or more miles for light craft.

The largest sheets of inland water are Albemarle and Pamlico Sounds. The former is about 50 miles long and of variable width, the maximum being about 15 miles, and Pamlico is about 75 miles long and 15 to 25 miles broad. Between them and the ocean are long, narrow islands of sand, which extend into the ocean, in some places 100 miles, forming dangerous shoals, of which Cape Hatteras, Cape Lookout, and Cape Fear are the most prominent visible points. Lakes are found only in the eastern section. The largest is Mattamuskeet, in Hyde County, 15 miles long and 5 to 7 wide. Waccamaw Lake, in Columbus County, is 8 miles long and about 5 miles broad.

The area occupied by the swamps is nearly 4,000 sq. miles, mostly in the counties bordering on the ocean and the sounds. Some are mere peat-bogs, having a growth of juniper and cypress, while the best have black gums, poplars, ash, and maple. The largest continuous area of swamp is between Albemarle and Pamlico Sounds, nearly 3,000 sq. miles. More than 100 sq. miles of the Great Dismal Swamp is in North Carolina.

The mountain section is a high plateau bounded on the E. by the Blue Ridge and on the W. by the chain known under the names of Iron, Smoky, and Unaka Mountains. Between these are the cross chains, called, beginning at the N., the Black, Craggy, Pisgah and New Found, Balsam, Cowee, Nantehala, Valley River, Cheowah, and Long Ridge Mountains. The average elevation of the Blue Ridge is about 4,000 feet, the highest peaks being the Grandfather and the Pinnacle, nearly 6,000 feet high. The Smoky Mountains have peaks higher than this, as Clingman's Dome (6,660) and Mt. Guyot (6,636 feet). The highest E. of the Rocky Moun-

NORTH CAROLINA

tains are among the Black Mountains, Mt. Mitchell being 6,688 feet high. In all, there are 43 peaks over 6,000 feet high and 82 between 5,000 and 6,000 feet. East of the Blue Ridge are various lower and smaller detached ranges, such as the Sauratun, Brushy, South, Linville, Green River, Tryon, and Hungry Mountains. Belonging to the first named is the picturesque, solitary peak called the Pilot, with the Pinnacle, a sheer mass of rock like a castle.

Flora and Fauna.—North Carolina has an extraordinary variety of flora. Out of 22 oaks indigenous to the U. S. she has 19. She has all the 8 pines, 4 of the 5 sprnces, 6 of the 8 hickories, and all of the 7 magnolias. Some of the best varieties of grapes had their origin here. No country has a more abundant display of rhododendrons, kalmias, honeysuckles, jasmines, ferns, and grasses. In the waters and swamps of the east are turtles and terrapins, including the much-sought diamond-backed variety. Swarms of wild geese, swans, ducks, and the other aquatic fowls attract the sportsman, as does the quail (or partridge) on the uplands. Large catches of mackerel, bluefish, flounder, mullets, etc., are made in the ocean, and of herrings, shad, rock bass, etc., in the sounds and rivers. Immense numbers of menhaden and other fish are caught to be made into fertilizers.

Soil and Productions.—The soil varies considerably in character, being generally a loam which becomes more sandy in the eastern and frequently more clayey in the central and western regions. The great variety of soils and the wide range of climate give rise to a rich and varied forest growth. In the southeastern counties, under the influences of the Gulf Stream, are found the magnolias, palmettos, live-oaks, and other semi-tropical trees, while on the higher mountains of the west are the spruces and firs, characteristic of Canada and New England. The pines (chiefly *Pinus tæda* and *P. palustris*) are the characteristic timber trees of the eastern counties; oaks predominate in the midland and western counties, but in the mountain forests they are interspersed abundantly with chestnut, hemlock, and the tulip-tree. Hickories and other hard-wood trees also abound in the central and western counties, and to a less extent in the east.

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	157,609	178,359	13·2
Total acreage of farms	22,363,558	22,651,896	1·3
Value of farms, with buildings and fences	$135,793,602	$183,977,010	35·5

* Increase.

The following table shows the acreage, yield, and value of the principal crops in the calendar year 1900:

CROPS.	Acreage.	Yield.	Value.
Corn	2,482,515	29,790,180 bush.	$16,980,403
Wheat	620,917	5,960,803 "	4,887,858
Oats	263,030	5,046,117 "	2,270,753
Rye	46,212	411,287 "	312,578
Tobacco (1896)	134,567	68,629,170 lb.	5,490,334
Potatoes	17,434	1,063,474 bush.	691,258
Hay	125,305	176,680 tons	1,978,816
Totals	3,689,980	.....	$32,612,000

In 1900 the cotton crop amounted to 503,825 bales.

On Jan. 1, 1900, the farm animals comprised 148,164 horses, value $7,926,938; 112,512 mules, value $7,141,558; 243,298 milch cows, value $4,428,024; 274,843 oxen and other cattle, value $3,383,726; 235,260 sheep, value $379,945; and about 1,500,000 swine, value $6,000,000.

Climate.—The following table shows the mean monthly and annual temperature in degrees Fahrenheit:

MONTHS.	Eastern District.	Central District.	Western District.	State.
January	43·6°	40·7°	38·5°	40·8°
February	46·0	44·2	41·8	44·3
March	49·5	49·2	46·0	48·0
April	57·8	59·8	56·3	57·7
May	67·4	68·2	64·1	66·9
June	75·1	75·7	70·9	74·4
July	78·8	78·7	74·4	77·8
August	77·2	76·0	72·2	75·8
September	72·3	69·8	66·2	70·2
October	62·4	59·2	55·3	59·7
November	52·7	49·1	45·6	49·7
December	45·2	43·2	39·8	42·7
Year	60·7	59·5	55·9	59·0

The following table shows the mean monthly and annual precipitation in inches. It will be noticed that North Carolina belongs to the region of the U. S. characterized by the largest precipitation.

MONTHS.	Eastern District.	Central District.	Western District.	State.
January	4·60	4·30	4·75	4·52
February	3·48	4·25	5·40	4·25
March	4·64	4·21	5·56	4·90
April	4·20	3·75	3·75	3·84
May	4·01	4·00	4·34	4·34
June	4·40	4·00	4·34	4·34
July	5·98	4·66	5·19	5·44
August	6·66	5·33	5·42	6·09
September	5·64	4·30	3·88	4·65
October	4·04	3·47	3·38	3·66
November	3·42	3·53	3·35	3·40
December	4·16	3·73	3·92	4·00
Year	55·23	49·85	53·32	53·29

The average fall of snow is less than 5 inches. The average date of the first killing frost is Oct. 10. Tornadoes with funnel-shaped clouds occur at rare intervals. The storms on the Atlantic coast, especially off Hatteras, are violent and destructive to shipping.

Divisions.—For administrative purposes the State is divided into ninety-seven counties, as follows:

COUNTIES AND COUNTY-TOWNS, WITH POPULATION.

COUNTIES.	* Ref.	Pop. 1890.	Pop. 1900.	COUNTY-TOWNS.	Pop. 1900.
Alamance	2-G	18,271	25,665	Graham	2,052
Alexander	2-D	9,430	10,960	Taylorsville	413
Alleghany	2-D	6,523	7,759	Sparta	501
Anson	4-F	20,027	21,870	Wadesboro	1,546
Ashe	2-D	15,628	19,581	Jefferson	230
Beaufort	3-J	21,072	26,404	Washington	4,842
Bertie	2-J	19,176	20,538	Windsor	597
Bladen	4-H	16,763	17,677	Elizabethtown	144
Brunswick	5-H	10,900	12,657	Southport	1,336
Buncombe	3-C	35,266	44,288	Asheville	14,694
Burke	3-D	14,939	17,699	Morgantown	1,938
Cabarrus	3-E	18,142	22,456	Concord	7,910
Caldwell	2-D	12,298	15,694	Lenoir	1,296
Camden	2-K	5,667	5,474	Camden	.....
Carteret	4-J	10,828	11,811	Beaufort	2,195
Caswell	2-G	16,028	15,028	Yanceyville	.....
Catawba	3-D	18,689	22,133	Newton	1,583
Chatham	3-G	25,413	23,912	Pittsboro	424
Cherokee	3-A	9,976	11,860	Murphy	604
Chowan	2-J	9,167	10,258	Edenton	3,046
Clay	3-A	4,197	4,532	Hayesville	142
Cleveland	3-D	20,934	25,078	Shelby	1,874
Columbus	5-G	17,856	21,274	Whiteville	634
Craven	4-I	20,533	24,160	Newbern	9,090
Cumberland	4-G	27,321	29,249	Fayetteville	4,670
Currituck	2-K	6,747	6,529	Currituck	.....
Dare	3-D	3,768	4,757	Manteo	312
Davidson	3-F	21,702	23,403	Lexington	1,234
Davie	2-E	11,621	12,115	Mocksville	745
Duplin	4-I	18,690	22,405	Kenansville	271
Durham	2-G	18,041	26,233	Durham	6,679
Edgecombe	2-I	24,113	26,591	Tarboro	5,142
Forsyth	2-F	28,434	35,261	Winston	10,008
Franklin	2-H	21,090	25,116	Louisburg	1,178
Gaston	3-D	17,764	27,903	Dallas	514
Gates	2-J	10,252	10,413	Gatesville	200
Graham	3-A	3,313	4,343	Robbinsville	.....
Granville	2-H	24,484	23,263	Oxford	2,059
Greene	3-I	10,039	12,038	Snow Hill	405
Guilford	2-F	28,052	39,074	Greensboro	10,035
Halifax	2-I	28,908	30,793	Halifax	306
Harnett	3-G	13,700	15,988	Lillington	65
Haywood	3-B	13,346	16,222	Waynesville	1,307
Henderson	3-C	12,589	14,104	Hendersonville	1,917
Hertford	2-I	13,851	14,294	Winton	688
Hyde	3-K	8,903	9,278	Swan Quarter	.....
Iredell	3-E	25,462	29,064	Statesville	3,141
Jackson	3-B	9,512	11,853	Webster	.....
Johnston	3-H	27,239	32,250	Smithfield	764
Jones	4-I	7,403	8,226	Trenton	328
Lenoir	4-I	14,879	18,639	Kinston	4,106
Lincoln	3-D	12,586	15,498	Lincolnton	828
McDowell	3-C	10,939	12,567	Marion	1,116
Macon	3-B	10,102	12,104	Franklin	335
Madison	2-C	17,805	20,644	Marshall	337
Martin	3-I	15,221	15,383	Williamston	912
Mecklenburg	3-E	42,673	55,268	Charlotte	18,091
Mitchell	2-C	12,807	15,221	Bakersville	511
Montgomery	3-F	11,239	14,197	Troy	878
Moore	3-G	20,479	23,622	Carthage	605
Nash	2-H	20,707	25,478	Nashville	479
New Hanover	5-H	24,026	25,785	Wilmington	20,976
Northampton	2-I	21,242	21,150	Jackson	441
Onslow	5-I	10,303	11,940	Jacksonville	309
Orange	2-G	14,948	14,690	Hillsboro	707
Pamlico	4-J	7,146	8,045	Bayboro	292
Pasquotank	2-J	10,748	13,660	Elizabeth City	6,348
Pender	5-H	12,514	13,381	Burgaw	387

* Reference for location of counties, see map of North Carolina.

COUNTIES AND COUNTY-TOWNS—CONTINUED.

COUNTIES.	* Ref.	Pop. 1890.	Pop. 1900.	COUNTY-TOWNS.	Pop. 1900.
Perquimans	2-J	9,293	10,091	Hertford	1,382
Person	2-G	15,151	16,685	Roxboro	1,021
Pitt	3-I	25,519	30,889	Greenville	2,565
Polk	3-C	5,902	7,004	Columbus	334
Randolph	3-F	25,195	28,232	Ashboro	992
Richmond	4-F	23,948	15,855	Rockingham	1,507
Robeson	4-G	31,483	40,371	Lumberton	849
Rockingham	2-F	25,363	33,163	Wentworth	.....
Rowan	3-E	24,123	31,066	Salisbury	6,277
Rutherford	3-C	18,770	25,101	Rutherfordton	880
Sampson	4-H	25,096	26,380	Clinton	2,401
Scotland†	4-F	.....	12,553	Laurinburg	1,334
Stanly	3-F	12,136	15,220	Albemarle	1,382
Stokes	2-F	17,199	19,866	Danbury	.....
Surry	2-E	19,281	25,515	Dobson	327
Swain	3-B	6,577	8,401	Bryson City	417
Transylvania	3-C	5,881	6,620	Brevard	584
Tyrrell	3-K	4,225	4,980	Columbia	382
Union	4-E	21,259	27,156	Monroe	2,427
Vance	2-H	17,581	16,684	Henderson	3,746
Wake	3-H	49,207	54,626	Raleigh	13,643
Warren	2-H	19,360	19,151	Warrenton	836
Washington	3-J	10,200	10,608	Plymouth	1,011
Watauga	2-D	10,611	13,417	Boone	155
Wayne	3-H	26,100	31,356	Goldsboro	5,877
Wilkes	2-D	22,675	26,872	Wilkesboro	635
Wilson	3-H	18,644	23,596	Wilson	3,525
Yadkin	2-E	13,790	14,083	Yadkinville	256
Yancey	2-C	9,490	11,464	Burnsville	207
Totals	.....	1,617,947	1,893,810		

* Reference for location of counties, see map of North Carolina.
† Organized from part of Richmond in 1900.

Principal Cities and Towns, with Population for 1900.—Wilmington, 20,976; Charlotte, 18,091; Asheville, 14,694; Raleigh, 13,643; Winston, 10,008; Greensboro, 10,035; Newbern, 9,090; Concord, 7,910; Durham, 6,679; Elizabeth City, 6,348; Salisbury, 6,277; Goldsboro, 5,877; Washington, 4,842; Fayetteville, 4,670; Gastonia, 4,610; High Point, 4,163; Kinston, 4,106.

Population and Races.—In 1860, 992,622; 1870, 1,071,361; 1880, 1,399,750; 1890, 1,617,947 (native, 1,614,245; foreign, 3,702; males, 799,149; females, 818,798; white, 1,055,382; colored, 562,565, including 561,018 of African descent).

Industries and Business Interests.—The census of 1890 showed that 3,667 manufacturing establishments reported. These had a combined capital of $32,745,995, employed 36,214 persons, paid $7,830,536 for wages and $22,789,187 for materials, and had products valued at $40,375,450. In 1894 there were 146 cotton-mills, with 665,000 spindles and 9,128 looms; 14 woolen-mills; 28 fruit-canning and 14 oyster-canning establishments; 16 fertilizer works; 14 oil-cake factories; 8 hosiery-mills; 16 building-stone quarries; and more than 100 factories manufacturing tobacco in some form. The tobacco industry has made rapid progress, and the towns of Durham, Winston, and Henderson have been created by it. Durham has manufactured in a single year 620,200,000 cigarettes, 4,865,835 lb. of plug and smoking tobacco, 2,263,250 cigars, and 71,500 lb. of snuff, and paid a revenue tax on these manufactures of $616,129; and Winston has paid a revenue tax of over $660,000 on similar manufactures. The manufacture of wagons, carriages, furniture, sash, doors, and blinds, paper, and of miscellaneous iron-work, shows a rapid increase and a large volume. The fisheries industry represents a capital of $506,560, employs over 5,000 persons, 95 vessels, and nearly 2,800 boats.

Finances and Banking.—The total interest-bearing debt of the State in 1900 was $6,287,350; the non-interest-bearing debt, $240,420. The revenue for the year ending Nov. 30, 1900 was $1,618,103.91, the disbursements in the same year were $1,647,824.99.

The assessed valuations in 1898 were: Real estate, $156,800,107.09; personal, $76,967,160; railway, $32,099,931.90—total, $265,867,197.99. Sept. 5, 1900, there were 31 national banks with combined capital of $3,043,500, surplus and profits of $1,434,216.07, and deposits of $7,477,057.97. On June 30 there were 54 State banks, capital $2,217,231, surplus and profits $726,341, and deposits $6,345,312; 25 private banks, capital $274,985, surplus and profits $171,660, and deposits $1,218,328; and 9 stock savings-banks, capital $158,972, surplus and profits $73,509, and $1,717,158 in savings deposits from 8,550 depositors.

Post-offices and Periodicals.—On Jan 1, 1901, there were 3,125 post-offices, of which 59 were presidential (4 first-class, 7 second-class, 48 third-class) and 3,066 fourth-class; 492 were money-order offices. Of newspapers and periodicals there were 27 of daily publication, 14 semi-weekly, 180 weekly, 1 bi-weekly, 7 semi-monthly, and 24 monthly—total, 253.

Means of Communication.—At the close of 1893 there were within the limits of the State 3,577·33 miles of railway, of which the Atlantic Coast Line system had 714·97 miles; the Richmond and Danville Line system, 1,128·69; the Seaboard Air Line system, 661·65; and miscellaneous lines, 1,072·02. The total mileage June 30, 1899, was 3,708·88. The Albemarle and Chesapeake Canal is an important communication between the eastern counties and Norfolk, and the portion in North Carolina is valued at about $100,000.

Churches.—The census of 1890 gave the following statistics of the principal religious bodies:

DENOMINATIONS.	Organizations.	Churches and halls.	Members.	Value of church property.
Baptist, Regular, South	1,480	1,479	153,648	$1,662,405
Baptist, Regular, Colored	1,193	1,198	136,856	717,862
Methodist Episcopal South	1,288	1,230	114,385	1,471,135
African Meth. Episcopal Zion	541	540	111,949	485,711
Presbyterian in the U. S.	282	284	27,477	678,565
Methodist Episcopal	287	282	16,433	195,645
African Methodist Episcopal	61	147	16,156	112,998
Methodist Protestant	199	194	14,351	126,800
Disciples of Christ	186	153	12,437	71,157
Primitive Methodist	317	315	11,914	130,100
Lutheran, United Synod in the South	119	110	11,759	263,690
Protestant Episcopal	178	171	8,186	546,010
Presb. in the U. S. of America	109	105	6,516	89,180

Schools.—In 1899 there were 607,387 children of school age, of whom 390,616 were enrolled in the public schools, and 207,310 in average daily attendance. There were 6,784 schools, and 8,204 teachers—4,127 men and 4,077 women; average monthly salaries, men $25.07, women $22.24. The total value of school property was $10,938,805; the revenue (1897–98), $986,514; and the expenditure, $931,143. There are 12 colleges for women, 106 endowed academies, seminaries, and other private secondary schools, and the following institutions for higher education: University of North Carolina, at Chapel Hill (non-sectarian); Biddle University, at Charlotte (Presbyterian); Davidson College, at Davidson (Presbyterian); Guilford College, at Guilford; North Carolina College, at Mt Pleasant (Evangelical Lutheran); Catawba College, at Newton; Shaw University, at Raleigh (Baptist); Rutherford College, at Rutherford (non-sectarian); Livingstone College, at Salisbury (African Methodist Episcopal Zion); Trinity College, at Trinity College (Methodist Episcopal South); and Wake Forest College, at Wake Forest (Baptist). There are an agricultural and mechanical college for white students and one for colored, five State normal schools for colored teachers, a number of county normal schools for white teachers, graded schools, supported by special taxation, in nearly all the prosperous towns, and a State normal and industrial school for girls at Greensboro.

Charitable, Reformatory, and Penal Institutions.—The various charitable institutions are under the supervision of a State board of public charities. The State maintains hospitals for the Insane at Raleigh and Morganton for whites, and at Goldsboro for colored patients; an institution for the blind at Raleigh; an institution for the deaf and dumb at Morganton; and appropriates $10,000 annually toward the support of the Oxford Orphan Asylum, a Masonic institution. There are also orphan asylums maintained by the Presbyterian, Baptist, and Protestant Episcopal Churches, and by the order of Odd Fellows. The State penitentiary has an extensive farm for the employment of convicts.

Political Organization.—The executive department is composed of the Governor, Lieutenant-Governor, secretary of State, auditor, treasurer, superintendent of public instruction, and attorney-general. The Governor is ineligible for re-election until after an intervening term. He has full pardoning power after conviction; can be removed from office by the House of Representatives beginning an impeachment, but resumes office if acquitted; has no veto power; and does not sign legislative acts. The Senate and the House of Representatives are limited to 50 and 120 members respectively. The judges of the Supreme and Superior courts are elected by the people for eight years; justices of the peace are elected by the General Assembly. The distinction between law and equity practice is abolished. Among the declarations of the constitution are that the State has no right to secede from the Union; that the primary allegiance of citizens is due to the U. S.; that the

State shall not lend its credit except by a vote of the people; that the General Assembly shall provide public schools, the white and colored races to be taught separately, and support the university; that capital punishment shall be inflicted only for murder, arson, burglary, and rape; that the suffrage shall be allowed to males, twenty-one years old or upward, born in the U. S., or naturalized, and residents of the State twelve months and of the county ninety days; and that all voters are eligible to hold office, excepting such as deny the being of Almighty God.

History.—The first charter for a settlement was granted to Sir Walter Raleigh in 1584. He sent a fleet under Amadas and Barlow, who sighted the coast on July 27 of that year. The next year a colony was sent to Roanoke island under Ralph Lane, as governor, but the colonists returned to England in 1586, shortly before Sir Richard Greenville arrived with succor. In 1587 another colony arrived with John White as governor, who shortly went to England for re-enforcements, leaving among the colonists his daughter, wife of Ananias Dare, and her infant, Virginia, the first white child born in America. In 1629 a charter was granted for part of the territory previously known as Virginia, between 31° and 36° 30′ N. lat., under the name of Carolina, to Sir Robert Heath. Nothing having been accomplished under this charter, Charles II. in 1663 conveyed the territory between 36° and 31° N. lat., under the same name, to eight lords proprietors, and in 1665 enlarged the grant to 36° 30′ and 29° N. lat. Palatine powers were granted to the lords proprietors and they inaugurated a government under the "fundamental constitutions," drawn by John Locke. This "grand model" was singularly unsuited to the character and condition of the people, was never fully put into operation, and was after a while abandoned. In 1712 Edward Hyde was commissioned Governor of North Carolina, as distinguished from South Carolina. In 1728 (often erroneously stated as 1729) the shares of seven of the lords proprietors were sold to the crown for £2,500 each, but John, Lord Carteret, afterward Earl Granville, retained his one-eighth part of the soil, surrendering only the jurisdiction. In 1744 his share was laid off to him in severalty, a rectangular area bounded by the Mississippi river and the Atlantic, lat 35° 34′ N., and the Virginia line. Much land was sold by him prior to the Revolutionary war. After the sale to the crown and transfer of jurisdiction the colony increased rapidly in prosperity, gaining much immigration, especially from Virginia, Pennsylvania, north of Ireland, the highlands and lowlands of Scotland, and from the Protestants of Germany, including Moravians. As the governors and other chief officers represented first the lords proprietors and then the crown, collisions with the people sometimes occurred. The first, called the "Culpepper rebellion," in 1678, seems to have arisen from harsh attempts to enforce the navigation laws. The second, called the "Cary rebellion," in 1708–10, apparently had its beginning in the unwillingness of the Quakers to take oaths of office, and degenerated into a party squabble between the aristocracy and the democratic element. In Gov. Johnston's time (1734–52) the counties of old Albemarle refused to submit to an attempt to deprive them of their larger number of representatives, and set at naught the enactment of the Legislature. Afterward they refused to submit to the authority of the superior courts because the crown disallowed the court law passed by the General Assembly. These disputes were settled without bloodshed, but in Gov. Tryon's incumbency a body of men, chiefly in the district allotted to Earl Granville, calling themselves regulators, exasperated at the large fees of officers and the pressure of taxes and quit-rents, combined with the scarcity of currency, rose in arms, broke up a court, and threatened to march on the capital, Newbern. They were easily defeated by Tryon with the militia, May 12, 1771. In 1711 occurred the Tuscarora war, in which the Indians were defeated by aid of a force sent from South Carolina, and the remnant afterward joined the Five Nations in New York, making the Six Nations. North Carolina was forward in resisting the measures of the British Parliament which led to the War of Independence, and in co-operating with the other colonies. The first provincial congress was held on Aug. 25, 1774. The General Assembly of the State has placed on its seal the date of May 20, 1775, as that of the resolutions passed by the people of Mecklenburg demanding independence. On Apr. 12, 1776, the first resolutions authorizing delegates in the Continental Congress to vote for independence were passed by the provincial congress of North Carolina. In July and August following a large force of militia crushed the power of the Cherokee Indians. On Dec. 18, 1776, the first State constitution was adopted. Troops of the State fought gallantly in all the battles of the Revolutionary war from Brandywine to Yorktown. In 1780–81 the people suffered terribly from the invading army, but, in spite of a considerable Tory element, continued steadfast. They assisted in winning the battle of King's Mountain and crippling Cornwallis at Guilford Court-house, and by their persistent hostility forced him to his fate at Yorktown.

North Carolina sent delegates to the Constitutional Convention in 1787, but her convention of 1788 decided to postpone the question of ratification of the Federal Constitution, in order to secure certain amendments. Finding that the most important of these were certain of adoption, ratification was carried by a large majority in 1789. In the same year the General Assembly offered to cede the territory of Tennessee to the U. S., which was accepted in 1790. In 1791 the General Assembly took steps for the location of the seat of government, which had been theretofore migratory. The new capital was called the city of Raleigh. The University of North Carolina was chartered in 1789 and opened in 1795. In 1820 much attention was given to improvement of the river transportation by slackwater navigation, and there was large waste of money on insufficient works. This fever, and the subsequent rise of the railway excitement, led to a heated contest between the eastern and western counties for a change of the constitution under which each county elected a Senator and two members of the lower House. The agitation culminated in a convention held in 1835, which required the division of the State into fifty senatorial districts, each paying one-fiftieth of the public taxes, and, confining the House to 120 members, gave one to each county and divided the remainder among the counties in proportion to the federal population. The public school system had been pressed as early as 1820, but little was done until the distribution of the surplus money of the U. S. in 1837, North Carolina investing her share in bank and railway stock and devoting the stock to the schools. A good system was being developed when the civil war made the fund worthless. What has been done since that war has been effected by taxation.

North Carolina did not at first favor secession from the Union as the best mode of settling the questions relating to slavery and its extension into the territories. When the question of calling a convention of the people for considering these matters was had the vote in Feb., 1861, was adverse by a few hundred majority; but when war broke out she promptly and by a unanimous vote in convention, May 20 following, passed an ordinance of secession, and supported it by large levies of money and of troops, who formed a great part of the army of Gen. Lee in Virginia. In August following Fort Hatteras was captured by the Federal forces. In the spring of 1862 the whole of the country along the sounds from Beaufort to the Virginia line was in their hands. Plymouth was recaptured, with 1,600 prisoners, by the Confederates under Gen. Hoke in Apr., 1864, but recovered by the Federals in October. Wilmington was largely used by the Confederates as a point from and to which their steamers could run despite the blockade. An unsuccessful attempt was made in Dec., 1864, to stop this by capturing Fort Fisher at the mouth of the Cape Fear. Another attack (Jan. 15, 1865) succeeded. Wilmington was soon after captured; Sherman's army marched into Raleigh on Apr. 13, and on the 26th Johnston's army was surrendered. The scheme of reconstruction inaugurated by President Johnson was begun on May 29, 1865, by the appointment of W. W. Holden as provisional governor, who called a convention of the people for which only the white men included in the President's amnesty proclamation were allowed to vote. This convention repudiated the war debt, abolished slavery, and declared the ordinance of secession void. The government, under the "reconstruction laws" of Congress, was inaugurated July 1, 1868. The General Assembly ratified the fourteenth amendment to the U. S. Constitution on the next day, and the fifteenth amendment on Mar. 4, 1869. During the Ku-Klux Klan excitement Gov. Holden declared martial law in Alamance and Caswell Counties, and made many arrests of leading citizens. For his conduct connected with this movement he was impeached and convicted. The present constitution was adopted in 1876, the centennial of the adoption of the first constitution of free North Carolina. Since the civil war, although her losses therein were immense both in men and money, the people of the State have made notable progress.

GOVERNORS OF NORTH CAROLINA.

Under the Lords Proprietors.

William Drummond	1663–67
Samuel Stephens	1667–70
Peter Carteret	1670
Samuel Stephens	1670–74
Peter Carteret	1674–75
John Jenkins (acting)	1675
John Harvey (acting)	1675–76
Thomas Eastchurch	1676–77
Thomas Miller (acting)	1677–78
John Harvey (acting)	1678
John Jenkins	1678–81
Henry Wilkinson	1681–83
Seth Southwell (Sothel)	1683–89
Philip Ludwell	1689–91
Alexander Lillington	1691–94
Thomas Harvey	1694–99
Henderson Walker	1699–1704
Robert Daniel	1704–05
Thomas Cary	1705–06
William Glover (acting)	1706–07
Thomas Cary (acting)	1707–08
Thomas Cary and William Glover, contestants	1708–10
Edward Hyde	1710–12
Thomas Pollock (acting)	1713–14
Charles Eden	1714–22
Thomas Pollock (acting)	1722
William Reed (acting)	1722–24
George Burrington	1724–25
Edward Mosely (acting)	1725
Sir Richard Everard	1725–29

Under the Crown.

George Burrington	1729–34
Nathaniel Rice (acting)	1734
Gabriel Johnston	1734–52
Nathaniel Rice (acting)	1752
Matthew Rowan (acting)	1752–54
Arthur Dobbs	1754–65
William Tryon	1765–71
James Hazell (acting)	1771
Josiah Martin	1771–75

Governors of the State.

Richard Caswell	1777–79
Abner Nash	1779–81
Thomas Burke	1781–82
Alexander Martin	1782–84
Richard Caswell	1784–87
Samuel Johnston	1787–89
Alexander Martin	1789–92
Richard D. Spaight	1792–95
Samuel Ashe	1795–98
William R. Davie	1798–99
Benjamin Williams	1799–1802
James Turner	1802–05
Nathaniel Alexander	1805–07
Benjamin Williams	1807–08
David Stone	1808–10
Benjamin Smith	1810–11
William Hawkins	1811–14
William Miller	1814–17
John Branch	1817–20
Jesse Franklin	1820–21
Gabriel Holmes	1821–24
Hutchings G. Burton	1824–27
James Iredell	1827–28
John Owen	1828–30
Montford Stokes	1830–32
David L. Swain	1832–35
Richard D. Spaight, Jr	1835–37
Edward B. Dudley	1837–41
John M. Morehead	1841–45
William A. Graham	1845–49
Charles Manly	1849–51
David S. Reid	1851–54
Warren Winslow (acting)	1854–55
Thomas Bragg	1855–59
John W. Ellis	1859–61
H. T. Clark (acting)	1861–62
Zebulon B. Vance	1862–65
W. W. Holden (prov.)	1865
Jonathan Worth	1865–68
William W. Holden	1868–70
Tod R. Caldwell	1870–74
Curtis H. Brogden	1874–77
Zebulon B. Vance	1877–78
Thomas J. Jarvis	1878–85
Alfred M. Scales	1885–89
Daniel G. Fowle	1889–91
Thomas M. Holt	1891–93
Elias Carr	1893–97
Daniel L. Russell	1897–1901
Charles B. Aycock	1901–

AUTHORITIES.—Reports of the North Carolina Geological Surveys, by W. C. Kerr and Joseph A. Holmes, State geologists; Curtis, *Woody Plants*; *Handbook of North Carolina*, issued by the State Board of Agriculture; *Climatology of North Carolina, 1820–92*, issued by the State agricultural experiment station; State auditor's Report; State treasurer's Report; Reports of presidents of the State hospitals and other institutions; Constitutions of North Carolina (1776, 1835, 1868, 1876); Saunders, *Colonial Records* (10 vols. fol., with prefatory notes); Acts of the Assembly; Journals of the State Senate and House, and of the State conventions; U. S. Census Report of North Carolina; Hawkes, *History of North Carolina*; Wheeler, *History of North Carolina*; Moore, *History of North Carolina*.

KEMP P. BATTLE.

North Carolina, University of: See the Appendix.

North'cote, Sir STAFFORD HENRY, F. R. S.: statesman; b. in London, England, Oct. 27, 1818: educated at Eton and at Baliol College, Oxford, and graduated with honors 1839; was called to the bar at the Inner Temple 1847; was one of the secretaries of the Universal Exhibition of 1851; entered Parliament as a Conservative 1855; took an active part in all questions relating to art and education; was president of the Board of Trade in Lord Derby's third administration 1866; Secretary of State for India Mar., 1867–Dec., 1868; elected governor of the Hudson Bay Company Jan., 1869; was a member of the high joint commission which drew up the Treaty of Washington 1871; became Chancellor of the Exchequer in Disraeli's cabinet 1874; published *Twenty Years of Financial Policy* (1862); became Earl of Iddesleigh (1885). D. in London, Jan. 12, 1887.

North Dakota: one of the U. S. of North America (North Central group); the twenty-sixth admitted to the Union.

Location and Area.—It lies between lat. 46° and 49° N. and lon. 96° 25′ and 104° W. of Greenwich; is bounded on the N. by the Canadian provinces of Assiniboia and Manitoba, on the E. by Minnesota, on the S. by South Dakota, on the W. by Montana; and has an area of 70,795 sq. miles, of which 600 sq. miles are water surface; capital, Bismarck.

Physical Features.—The State is naturally divided into the Red river valley, the James river valley, the Devil's Lake and Turtle Mountain region, the Mouse river section, the coteau or Missouri slope country, and the West North Dakota division. The valley of the Red River of the North is a broad level plain from 50 to 60 miles wide, sufficiently elevated above the river to be free from overflows, and contains the richest of bottom-land mould. The James river valley is one of the most noted artesian-well districts in the world. Immediately N. of Devil's Lake, a veritable inland sea, is the Turtle Mountain and Big Coulee country. The mountains are a range of hills extending over a region 20 by 40 miles, the greater part in the State and the remainder in Manitoba. Bear and St. Paul's buttes are the highest points, and have an elevation of only a few hundred feet. The Mouse river enters the State from Assiniboia in the middle of Ward County, and after a long sweep in ox-bow shape passes out of the State at the northwest corner of Bottineau County into Manitoba. There are valuable deposits of coal along the river, and the territory it incloses is particularly adapted to stock-raising. The valley of this river shows a general depression of from 200 to 300 feet below the level of the surrounding plain. The Rivière de Lacs, a tributary of the Mouse, has a valley 75 miles long, with an abundance of wood and coal in the bluffs. The coteau or Missouri slope country lies W. of the divide between the James and the Missouri rivers, is full of small hills, and has large geological interests. The West North Dakota division lies W. of the Missouri river, is more undulating than the eastern section of the State, has widely separated hills, broad valleys, and conical buttes, is well watered, and has but little snow. Besides the rivers mentioned, good drainage is afforded by the Sheyenne, Goose, Pembina, Maple, Heart, Knife, Cannon Ball, Green, Sweetbriar, Curlew, Little Missouri, and other streams. The rainfall generally is sufficient to mature crops.

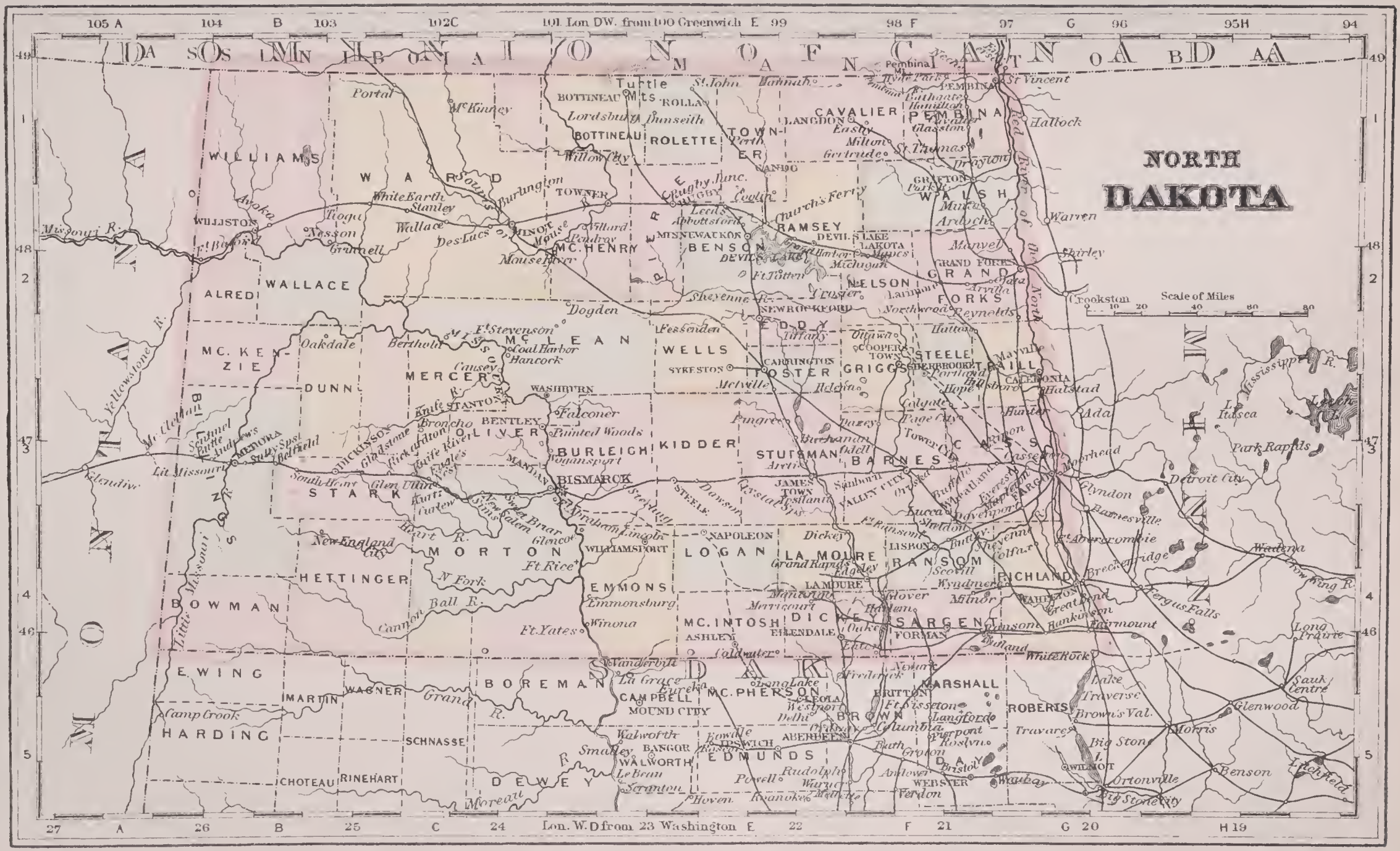
Seal of North Dakota.

Geology.—In the valley of the Red river a glacial drift is found beneath lake mud, and cuttings for railways in the territory between the valley proper and bordering lands disclosed lake shore lines with sand and gravel beds. These have been traced around the entire valley, proving it an ancient lake, which has been named Lake Agassiz. Lignite is the principal mineral. The whole of the country W. of the Missouri river and a large part of that E. of it are underlaid with deposits cropping out in veins from 4 to 20 feet in thickness, and in many localities farmers can dig their own supplies from the hillsides. The Turtle Mountain region contains a large variety of building and foundation stones; the Red river valley, salt, limestone, and hydraulic lime; and in other localities are iron, natural gas, and pottery and brick clays.

Soil and Productions.—Almost the entire soil is exceedingly fertile, and some parts are exceptionally so, especially in the Red river valley, which contains the great wheat farms. Much of the surface is underlaid by limestone and glacial drift. The Red river valley is well wooded in parts; the Devil's Lake region contains oak and other timber; the Turtle Mountains have poplar, balm of Gilead, ash, and oak; and along the Missouri river are cottonwoods of large size.

In 1890 North Dakota had 27,611 farms, containing 7,660,333 acres, valued at $75,310,305. The following table is for the calendar year 1900:

CROPS.	Acreage.	Yield.	Value.
Corn	23,824	381,184 bush.	$160,097
Wheat	2,689,023	13,176,213 "	7,642,204
Oats	611,581	6,299,284 "	2,015,771
Barley	243,761	1,998,840 "	699,594
Potatoes	29,555	1,536,860 "	753,061
Hay	268,834	247,327 tons	1,397,398
Totals	3,866,578		$12,668,125


NORTH
DAKOTA
Scale of Miles
0 10 20 40 60 80
101 Lon DW. from 100 Greenwich
Lon. W. D from 23 Washington
DOMINION OF CANADA
MONTANA
MINN
DAK
WILLIAMS
WARD
BOTTINEAU
ROLETTE
TOWNER
CAVALIER
PEMBINA
WALSH
RAMSEY
BENSON
PIERCE
MC. HENRY
NELSON
GRAND FORKS
ALRED
WALLACE
MC. KENZIE
DUNN
MERCER
MC LEAN
WELLS
EDDY
FOSTER
GRIGG
STEELE
TRAILL
STARK
OLIVER
BURLEIGH
KIDDER
STUTSMAN
BARNES
CASS
MORTON
HETTINGER
EMMONS
LOGAN
LA MOURE
RANSOM
RICHLAND
BOWMAN
MC. INTOSH
DICKEY
SARGENT
EWING
MARTIN
WAGNER
BOREMAN
CAMPBELL
MC. PHERSON
BROWN
MARSHALL
ROBERTS
HARDING
SCHNASSE
CHOTEAU
RINEHART
DEWEY
WALWORTH
EDMUNDS
DAY
BISMARCK
FARGO
GRAND FORKS
JAMESTOWN
DEVILS LAKE
MINOT
WILLISTON
MEDORA
MANDAN
ABERDEEN
Red River of the North
Missouri R.
Yellowstone R.
Little Missouri
Mouse River
Sheyenne R.
Heart R.
Cannon Ball R.
Grand R.
Moreau R.
Turtle Mts.
Mississippi R.

On Jan. 1, 1900, the farm animals comprised 180,391 horses, value $8,902,389; 6.895 mules, value $465,257; 170,205 milch cows, value $5,629,750; 255,166 oxen and other cattle, value $6,951,242; 374,110 sheep, value $1,183,683; and about 100,000 swine, value $675,000—total head, 986,767; total value, $23,807,321.

Climate.—The winters are cold and rainless and usually break in March. Farming begins early and plowing generally continues till about the middle of November. The dryness of the atmosphere renders the low temperature endurable by man and beast. Summers are warm by day and cool by night, with quite constant breezes. The autumnal weather is the most delightful of the year and frequently extends far into December. The mean annual temperature at the widely separated signal stations is: Bismarck, 39·4°; Fargo, 37°; Pembina, 34·4°; and Fort Buford, 38·7°; and the mean annual rainfall, Bismarck, 20·10 inches; Fargo, 27·17; Pembina, 21·91; and Fort Buford, 13·91.

Divisions.—For administrative purposes the State is divided into 39 counties, as follows:

COUNTIES AND COUNTY-TOWNS, WITH POPULATION.

COUNTIES.	* Ref.	Pop. 1890.	Pop. 1900.	COUNTY-TOWNS.	Pop. 1900.
Barnes	3-F	7,045	13,159	Valley City	2,446
Benson	2-E	2,460	8,320	Minnewankon.	432
Billings	3-B	170	975	Medora	.....
Bottineau	1-D	2,893	7,532	Bottineau	888
Burleigh	3-D	4,247	6,081	Bismarck	3,319
Cass	3-F	19,613	28,625	Fargo	9,589
Cavalier	1-F	6,471	12,580	Langdon	1,188
Dickey	4-E	5,573	6,061	Ellendale	750
Eddy	2-E	1,377	3,330	New Rockford	.....
Emmons	4-D	1,971	4,349	Williamsport	.....
Foster	2-E	1,210	3,770	Carrington	.....
Grand Forks	2-F	18,357	24,459	Grand Forks	7,652
Griggs	2-F	2,817	4,744	Cooperstown	648
Kidder	3-E	1,211	1,754	Steele	185
La Monre	4-E	3,187	6,048	La Monre	286
Logan	4-E	597	1,625	Napoleon	.....
McHenry	2-D	1,584	5,253	Towner	331
McIntosh	4-E	3,248	4,818	Ashley	.....
McLean	2-C	860	4,791	Washburn	.....
Mercer	3-C	428	1,778	Stanton	.....
Morton	4-C	4,728	8,069	Mandan	1,658
Nelson	2-F	4,293	7,316	Lakota	576
Oliver	3-C	464	990	Sanger	.....
Pembina	1-F	14,334	17,869	Pembina	929
Pierce	2-D	905	4,765	Rugby	487
Ramsey	2-E	4,418	9,198	Devil's Lake	1,729
Ransom	4-F	5,393	6,919	Lisbon	1,046
Richland	4-F	10,751	17,387	Wahpeton	2,228
Rolette	1-E	2,427	7,995	Rolla	400
Sargent	4-F	5,076	6,039	Forman	257
Stark	3-C	2,304	7,621	Dickinson	2,076
Steele	2-F	3,777	5,888	Sherbrooke	.....
Stutsman	3-E	5,266	9,143	Jamestown	2,853
Towner	1-E	1,450	6,491	Cando	1,061
Traill	2-F	10,217	13,107	Caledonia	.....
Walsh	1-F	16,587	20,288	Grafton	2,378
Ward	1-C	1,681	7,961	Minot	1,277
Wells	2-E	1,212	8,310	Sykeston	.....
Williams	2-B	1,530	1,530	Williston	763
Standing Rock Indian reservation †	.....	511	2,208		.....
Totals	.....	‡ 182,719	319,146		

* Reference for location of counties, see map of North Dakota.

† Formerly part of Boreman County, Dakota Territory.

‡ This footing includes population of the following counties not existing in 1900, viz.: Bowman (6), Buford (803), Church (74), Dunn (159), Flannery (72), Garfield (33), Hettinger (81), McKenzie (3), Mountraille (122), Renville (99), Sheridan (5), Stevens (16), Wallace (24), Williams (14).

Principal Cities and Towns, with Population for 1900.—Fargo, 9,589; Grand Forks, 7,652; Bismarck, 3,319; Jamestown, 2,853; Valley City, 2,446; Grafton, 2,378; Wahpeton, 2,228; Dickinson, 2,076; Devil's Lake, 1,729; Mandan, 1,658; Minot, 1,277; Larimore, 1,235; Casselton, 1,207; Langdon, 1,188; Hillsboro, 1,172; Park River, 1,088; Cando, 1,061; Lisbon, 1,046.

Population and Races.—(1890) 182,719 (natives, 101,258; foreign, 81,461; males, 101,590; females, 81,129; white, 182,123; colored, 596, comprising 373 persons of African descent, 28 Chinese, 1 Japanese, and 194 civilized Indians).

Industries and Business Interests.—The census reports of 1900 showed that 1,130 manufacturing establishments reported. These had a combined capital of $5,396,490 compared with 382 establishments and $2,894,553 capital in 1890. The value of products increased from $5,028,107 in 1890 to $9,183,114 in 1900—82·6 per cent. The principal manufactures are flour, lumber, butter, leather, cigars, bricks, and woolen goods, and the most important industries are farming and stock-raising. The various grain elevators and warehouses along the lines of the principal railways have a capacity of more than 125,000,000 bush.

Finance and Banking.—In 1900 the assessed valuations of taxable property aggregated $117,789,615, and the State debt was $600,000, of which $200,000 is bonded. On Sept. 5, 1900, there were 27 national banks with combined capital of $1,525,000, surplus and profits of $528,701.79, and deposits of $5,015,981; there were 129 State banks, capital $1,473,650, surplus and profits $558,369, and deposits $5,741,792.

Post-offices and Periodicals.—On Jan. 1, 1901, there were 656 post-offices, of which 37 were presidential (1 first-class, 4 second-class, 32 third-class) and 619 fourth-class, and 244 were money-order offices. Of newspapers and periodicals there were 7 daily publications, 1 semi-weekly, 142 weekly, and 8 monthly—total, 158.

Means of Communication.—The State is crossed from E. to W. by the Northern Pacific and the Great Northern railways, while three other large systems enter it from the S., E., and S. E.—the Minneapolis, St. Paul and Sault Ste. Marie, the Chicago, Milwaukee and St. Paul, and the Chicago and Northwestern. The mileage of these within the State and of several minor local lines on June 30, 1899, aggregated 2,663·85. The construction of the Northern Pacific line through the State was promoted by a Government grant of 10,000,000 acres of land, and aided materially the development of the central part of the State.

Churches.—The constitution guarantees perfect toleration of religious sentiment, declares that no inhabitant of the State shall ever be molested in person or property on account of his or her mode of religious worship, and makes these provisions irrevocable without the consent of the U. S. and the people of the State. The State constitutes a missionary district of the Protestant Episcopal Church with a bishop, and Jamestown is the seat of a bishopric of the Roman Catholic Church. 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	115	115	26,427	$171,550
Lutheran, United Norwegian	162	144	10,283	77,550
Methodist Episcopal	131	132	4,804	139,985
Presb. in the U. S. of America	99	91	3,036	126,425
Lutheran, Norwegian Evangelical	53	52	2,784	22,975
Baptist	54	53	2,298	90,300

Other leading denominations were the Congregational, with 1,616 members; the Lutheran, General Council, 1,582 members; and the Lutheran, Synodical Conference, 1,136.

Schools.—The constitution made it the duty of the Legislature to provide and maintain a system of public schools which should be open to all children of the State and be free from sectarian control. It also provides that this requirement shall be irrevocable without the consent of the U. S. and the people of the State, and that no money raised for the support of the public schools shall be appropriated to or used for the support of any sectarian school. All proceeds of the public lands granted by the U. S. for the support of the common schools, all per centum that may be granted by the U. S. on the sale of public lands, the proceeds of property that shall fall to the State by escheat, the proceeds of all gifts and donations to the State for common schools unless otherwise specified, and all other property otherwise acquired for common schools, are constituted a perpetual trust fund for the support of public schools, and the State is pledged to make good all losses the fund may sustain. The U. S. granted the State for educational purposes 2,000,000 acres of land. Prior to the creation of North and South Dakota the Territory had expended for public education $10,000,000 in five years, and North Dakota entered the Union with 1,362 public schools and with high and graded schools in its principal cities and towns. State institutions include a university and school of mines at Grand Forks, an agricultural college at Fargo, and normal schools at Valley City and Mayville, and the constitution provided for the establishment of a school of forestry to be located in one of four specified counties as the electors might decide, and for a scientific school or other educational or charitable institution at Wahpeton. Denominational colleges are maintained at Fargo and Wahpeton.

Charitable, Reformatory, and Penal Institutions.—These include a school for the deaf at Devil's Lake, State Hospital for the Insane and Home for the Feeble-minded at James-

town. Soldiers' Home at Lisbon, and State penitentiary at Bismarck.

Political Organization.—The constitution provides that every man may freely write, speak, and publish his opinions on all subjects, being responsible for the abuse of that privilege, and in all trials for libel the truth may be given in evidence. Every citizen is free to obtain employment wherever possible, and any person, corporation, or agent thereof maliciously interfering or hindering in any way any citizen from obtaining or enjoying employment already obtained from any other corporation or person is deemed guilty of misdemeanor. Women qualified by age, residence, and citizenship may vote for public-school officers and on all questions pertaining solely to school matters, and are eligible to any school office. All elections are by secret ballot. The executive authority is vested in a Governor, a Lieutenant-Governor, secretary of State, auditor, treasurer, superintendent of public instruction, commissioner of insurance, three commissioners of railways, attorney-general, and a commissioner of agriculture and labor—all elected for terms of two years. The Governor may disapprove of separate items in a bill. The Legislative Assembly holds biennial sessions limited to sixty days, and comprises a Senate, limited to from 30 to 50 members, and a House of Representatives, limited to from 50 to 140 members; Senators elected for four years, Representatives for two. The judicial authority is vested in a Supreme Court of three justices having appellate jurisdiction only, in district and county courts, in courts that may be created in special districts, cities, and towns, and in justices of the peace. The number of Supreme Court justices may be increased to five when the population of the State reaches 600,000.

History.—Capt. Lewis and Capt. Clarke, U. S. A., in their expedition of 1804–06, spent their first winter in camp among the Mandan Indians near the present town of Mandan. Lord Selkirk built a fort at Pembina, on the Red river, in 1810; the first steamer ascended the upper Missouri river in 1830; and John C. Frémont crossed the country from the Missouri river to the James and penetrated as far N. as Devil's Lake in 1839. George Catlin made many sketches of Indian life here in 1841, and Lieut. Warner explored the region for the U. S. Government in 1855. The region was a part of the Louisiana purchase. In 1851 the first land was obtained of the Sioux Indians, and in 1857 the first settlement was made at Sioux Falls, now in South Dakota. The eastern part of the Dakotas was included in the region allotted to Minnesota on its creation as a Territory in 1849. In 1861 the Territory of Dakota was created, extending from lat. 42° 28′ to 49° N., and from Minnesota to the Rocky Mountains. From this tract Idaho, Montana, and Wyoming were set off as Territories. A long agitation for statehood led to a division of the Territory and the creation of the States of North Dakota and South Dakota, both of which were admitted to the Union Nov. 2, 1889.

GOVERNORS OF NORTH DAKOTA.

John Miller	1889–91	Frank A. Briggs	1897–99
Andrew H. Burke	1891–93	F. B. Fancher	1899–1901
Elmer C. D. Shortridge	1893–95	Frank White	1901–
Roger Allin	1895–97		

Revised by W. H. H. Beadle.

North East: borough; Erie co., Pa.; on the Lake Shore and Mich. S. and the Nickel Plate railways; 15 miles N. E. of Erie, the county-seat (see map of Pennsylvania, ref. 1–A). It is in the heart of a rich agricultural region; has a fine park, electric lights, and gravity water-works; a furnace, 2 woodenware and 2 grape-basket factories; a tannery, a winery, tempered-copper works, and a wire-goods factory, and 3 banks. Many stores and residences are lighted and heated with natural gas. The borough has a Roman Catholic college, a graded public school, an opera-house, and 3 newspapers. Pop. (1890) 1,538; (1900) 2,068. Editor of "The Sun."

Norther: a cold, piercing northerly wind occurring in Mexico and Texas, coming on with great suddenness and following warm and moist weather. It usually advances with a bar of stratus cloud, and strikes the observer when this cloud is about 45° above his horizon. There is often a fall of 35° in temperature in two hours, and this fall is said to amount sometimes to 70°. Northers may be either wet or dry, the latter being more frequent. They occur forty or fifty times a year, generally in the months between September and May.

Northers are simply "cold waves" which flow southward instead of eastward, or southeastward, as in the better known types of such waves. They occur in the rear of well-marked "lows" or cyclones, when the cold northern air is drawn bodily into lower latitudes. The cold current of air is shallow, but may be of great horizontal extent. They frequently extend over the Western Gulf, causing very cold weather and dangerous seas, and occasionally they extend to Guatemala, causing frost on the higher lands, and to the Pacific Ocean to the southward. M. W. Harrington.

Northern Crown: See Corona Borealis.

Northern Lights: See Aurora.

Northfield: town; Franklin co., Mass.; on the Connecticut river, at the point where the States of Massachusetts, New Hampshire, and Vermont meet (see map of Massachusetts, ref. 1–E). It is 50 miles N. of Springfield, Mass., and 12 miles S. of Brattleboro, Vt., on the Vermont Central Railroad. It is a beautiful town, the birthplace of Dwight L. Moody, who made it a center of Christian work and influence by founding (1879) a seminary for young women of ability and earnest purpose. The seminary offers general, college preparatory and English courses, has large grounds, nine buildings, and is attended by about 350 students annually. At Gill, 4 miles from Northfield, is Mt. Hermon School, for boys, founded in 1881 by Mr. Moody and friends. There are two Protestant and one Roman Catholic churches, and two hotels. The larger and newer one (the Northfield) is used from October to April as a training-school for Christian workers. There are also a corn-canning factory and a creamery. The business interests are chiefly agricultural. Pop. (1890) 1,869; (1900) 1,966. Evelyn S. Hall.

Northfield: city; Rice co., Minn. (for location, see map of Minnesota, ref. 10–E); on the Chi., Mil. and St. P. and the Minn. and St. L. railways; 37 miles S. of St. Paul. It is in an agricultural region, and contains Carleton College (Congregational, chartered in 1866), St. Olaf College (Lutheran, chartered in 1874), a national bank with capital of $75,000, a State bank with capital of $50,000, and 2 weekly, a bi-weekly, and 2 monthly periodicals. Pop. (1880) 2,296; (1890) 2,659; (1900) 3,210.

Northfield: village; Washington co., Vt. (for location of county, see map of Vermont, ref. 5–C); on the Central Vt. Railroad; 10 miles S. S. W. of Montpelier, 40 miles S. E. of Burlington. It is in a highly productive granite and slate region, is the seat of Maverick University (chartered in 1834), and has a national bank with capital of $100,000, a savings-bank, and a weekly and a monthly periodical. Pop. (1880) 1,313; (1890) 1,222; (1900) 1,508.

North Holland Canal: a waterway extending from Buiksluyt, opposite Amsterdam, to the Helder, a distance of 51 miles. In the sixteenth century Amsterdam was one of the first commercial ports of Europe. The gradual advancement of the art of navigation, together with the increase in draught of vessels, demanded an access more favorable than was afforded by the difficult and shoal channels through the Zuyder Zee. To supply such an access the North Holland Canal was cut. It is 124 feet broad at the surface and 31 feet at the bottom, and is available for vessels drawing 18 feet of water. See also North Sea Canal.

North Platte: city; capital of Lincoln co., Neb. (for location, see map of Nebraska, ref. 10–D); near the confluence of the North and South Platte rivers; on the Union Pacific Railway; 291 miles W. of Omaha. It is in an agricultural and stock-raising region, and contains railway shops, 2 national banks with combined capital of $125,000, and 3 weekly newspapers. Pop. (1880) 363; (1890) 3,055; (1900) 3,640.

North River: See Hudson River.

Northrop, Cyrus, LL. D.: educator; b. at Ridgefield, Conn., Sept. 30, 1834; graduated at Yale College in 1857, and at the Yale Law School in 1859; practiced law at Norwalk, Conn.; was clerk of the State House of Representatives in 1861; of the State Senate in 1862; editor-in-chief of *The New Haven Daily Palladium* 1862–63; Professor of Rhetoric and English Literature in Yale College 1863–84; collector of customs under Presidents Grant and Hayes; president of the University of Minnesota since 1884.

Northrup, Birdsey Grant: See the Appendix.

North Sea, or **German Ocean** (anc. *Ma're Germa'nicum*): a body of water lying between Great Britain and the continent of Europe, having the former and the Orkney and Shetland isles on the W., and Norway, Denmark, Germany, Holland, Belgium, and part of France on the E. and S. Its extreme length from Dover Straits to the most northern of

the Shetland isles, between which and the coast of Norway it merges into the North Atlantic, is about 700 miles; greatest breadth about 420 miles. By the Skager Rack Inlet and its extension, the Kattegat, between the coasts of Denmark and of Norway and Sweden, it communicates with the Baltic Sea. By the Straits of Dover and English Channel (*q. v.*) it has its southern communication with the Atlantic. The depth varies from 66 to 500 feet, the greatest depths being in the northern portions between the north of Scotland and Norway. (See *Johnston's Physical Geography.*) If a line be drawn from the northern point of Denmark to the mouth of the Humber, all S. has 30 fathoms or less, which is said to be the average depth. A line from the same point to Edinburgh will leave S. of it nearly all the 50-fathom depths. Farther N. the depth increases rapidly, and is said to attain 190 fathoms near the Norway coast. The bed of the sea is traversed by several vast shoals, the greatest of which, the Dogger Bank, occupies the center of the sea from lat. 54° 10′ to 57° 24′ N., lon. 1° to 6° 7′ E.; another extends from the Firth of Forth, Scotland, in a northeasterly direction, a distance of 110 miles, while others run from Holstein and Jutland more than 100 miles to the N. W. The great oceanic tidal wave, deflected around the British isles, enters this sea from the N. Pursuing its course southward, it rules the tides as far S. as the Thames and opposite coast, sensibly affects the tides of the Continent through the Channel, but, encountering the tide wave from the English Channel in the southern portions, the tidal phenomena are there the result of the conflict, or rather the union, of the two distinct waves, each exaggerated by a shelving bottom and the contraction between converging shores. At the Orkneys the rise is but 12 feet, at the mouth of the Humber and Thames 18 to 20 feet. The North Sea, notwithstanding the manifest dangers due to its currents, fogs, banks, and contracted area, teems with shipping, and is to the northern nations what the Mediterranean was to the ancients. Its fisheries of cod, mackerel, herring, etc., are important, and contribute in no small degree to the wealth and characteristic development of its marginal population. The island of Heligoland (*q. v.*) is the only one which properly belongs to the North Sea. The numerous islands along the coast of Norway, Denmark, and Holland are rather fragments of a broken coast-line than islands in the sea. One-ninth of the total river discharge of Europe is received by the North Sea from the Humber, Thames, the Rhine and Scheldt, Eider, Elbe, Weser, etc., and from the firths and fiords of the Scotch and Norway coasts. The Zuyder Zee (*q. v.*), which is entered from the North Sea at the Helder, is separated by the chain of sand islands, Texel, Terschelling, etc., which are the existing fragments of the ancient coast-line. The North Sea Canal (*q. v.*) makes Amsterdam virtually a seaport of the North Sea. See *Zur Physik des Meeres*, by Dr. Meyer, from the second annual report of the Kiel commission for investigation of the German seas (Berlin, 1874).

Revised by Mark W. Harrington.

North Sea Canal of Holland (called in Holland **The Amsterdam Canal**): a waterway connecting Amsterdam with the North Sea. Such a canal had been proposed even before making the North Holland Canal (*q. v.*). That work answered the existing exigencies, but was found not equal to those arising from the modern developments of commerce. The bold project of a *direct* water communication with the North Sea was revived in 1854. Nine different "commissions" of engineers and other experts successively studied and reported upon the subject; and it was not until Jan., 1863, that the law authorizing the construction was perfected and the work undertaken. The project involved the shutting off of Lake Y at its eastern end from the Zuyder Zee by a dam one mile in length with locks adequate to the purposes of all the coasting trade of the Zuyder, and of the lighter draught vessels for the North Sea, which still may enter by the Helder. The formation of this dam and the construction of its triple locks, founded by means of a coffer-dam 550 feet in diameter in 18 feet of water on 9,000 piles, are among the most remarkable works of modern hydraulic engineering.

The canal is 23 feet deep and 14½ miles long. In passing through the Y and Wijkermeer Lakes, the depth of which averages about 6 feet, the channel is limited by two embankments 443 feet apart, formed of material mostly dredged from the bottom. There are 38½ miles of these embankments. Through the sand downs of the isthmus separating the Wijkermeer from the North Sea, the channel is formed for about 4 miles by a cut 90 feet wide at the bottom. The great sea-lock called the Ymuiden is situated two-thirds of a mile from the shore-line. It has a double (in length) lock-pond nearly 400 feet long, 60 feet wide, with 25 feet depth on the lock-sills. An artificial harbor was constructed at the sea entrance (for which see Harbors). The canal was opened for traffic on Nov. 1, 1876. The waters of the Y and Wijkermeer are drained into the canal, reclaiming 13,142 acres of arable land. To keep the level of the canal down to 1·6 feet below high water at Amsterdam, and thus permit the adjacent lands to be drained, centrifugal pumps driven by steam-power are placed at the Zuyder Zee locks, pumping from the canal into the Zuyder Zee, and also at eight points along the reclaimed land. At low water natural drainage can be effected through the North Sea through the sea-lock. The works cost about $15,000,000. The traffic on the canal is large and constantly increasing. For further particulars see *Professional Papers* No. 22, Corps of Engineers, U. S. army, by J. G. Barnard, and the work of Croizette Desnoyers; also a full description of the works in *Proc. Inst. C. E.*, vol. lxii., 1880.

Revised by J. J. R. Croes.

North Tonawanda, N. Y.: See Tonawanda.

Northumberland: the northernmost county of England; bounded E. by the North Sea, separated from Scotland by the Tweed and from the county of Durham by the Tyne and Derwent. Area, 2,016 sq. miles. The western part of the county consists of the bare Cheviot Hills and wild moorlands, which, however, afford sustenance to numerous flocks of hardy sheep. Toward the east coast are large fertile valleys with good pasturage and soil fitted for tillage. The principal source of wealth is in the rich mines of lead, copper, and coal, especially the latter, in the Cheviot Hills, and the manufactures which depend upon coal. The number of collieries is about 115. The county returns four members to Parliament. Pop. (1901) 387,728.

Northumberland: borough; Northumberland co., Pa. (for location, see map of Pennsylvania, ref. 4–G); at the junction of the two branches of the Susquehanna river; on the Del., Lack. and W., the Penn., and the Phila. and Reading railways; 2 miles N. of Sunbury, the county-seat, 60 miles N. of Harrisburg. It contains rolling, flour, and saw mills, nail-factories, agricultural-implement works, and other manufactories, and a weekly newspaper. Pop. (1880) 2,293; (1890) 2,744; (1900) 2,748.

Northumberland, Algernon Percy, Fourth Duke of, F. R. S., F. S. A., D. C. L.: second son of the second duke; b. in England, Dec. 15, 1792; educated at Eton; entered the navy in childhood; retired in 1815; was created Baron Prudhoe 1816; spent many years in travel, especially in Egypt and other Eastern countries; collected a magnificent Oriental museum; founded churches, schools, and charitable institutions, and promoted historical, philological, and archæological research; married Lady Eleanor Grosvenor, daughter of the Marquis of Westminister, 1842; succeeded his brother Hugh in the dukedom 1847; restored and decorated upon a splendid scale the ancient seat of the family, Alnwick Castle; was first lord of the Admiralty 1853; made a Knight of the Garter 1858; was president of the Royal Institution. D. at Alnwick Castle, Feb. 12, 1865.

Northumberland, John Dudley, Duke of: statesman; b. in England in 1502; son of Edmund Dudley, the minister of Henry VII.; commanded the English squadron during the war with France 1544–45; was an executor of the king's will 1547; intrigued against the protector Somerset 1549; acquired chief power in the council 1550; was created Duke of Northumberland, lord high steward, and earl marshal 1551; married his fourth son, Lord Guilford Dudley, to Lady Jane Grey, May, 1553; prevailed on Edward to adopt Lady Jane as his successor, June; placed her on the throne July 10, and was executed as a traitor Aug. 22, 1553.

Northum'bria: the largest kingdom of the Saxon Heptarchy, embracing, as its name imports, the region N. of the Humber, and at one time extending to the Forth in Scotland. It was formed into a kingdom by Ida about 547 by the union of Bernicia and Deira. The kingdom was divided at the death of Ida, but reunited under Ethelfrith 593, became the leading British power under Oswald 634–42, and was extinguished by Egbert 827, when the name of England was first applied to the kingdom resulting from the aggregation of the minor states to Wessex and Northumbria. The present county of Northumberland shows a survival of the name of a kingdom many times greater in extent.

Northwestern University: an institution established at Evanston, Ill.; one of the largest universities in the U. S., having nearly 3,000 students and more than 275 professors. It maintains the following degree-conferring departments: A college of liberal arts, a medical school, a woman's medical school, a law school, a school of pharmacy, and a dental school. The Garrett Biblical Institute is the theological department of the university. The charter of the university requires a majority of its board of trustees to be members of the Methodist Episcopal Church, and the university is the largest and richest of the educational institutions in affiliation with that church. The college of liberal arts and the Garrett Biblical Institute are at Evanston, the other professional schools are in the city of Chicago. The campus at Evanston lies along the shore of Lake Michigan, N. of Chicago, and includes 50 acres of ground. The charter of the university prohibits the sale of liquor within 4 miles of the university. Provision is made in the college of liberal arts for graduate and undergraduate work. Its medical school, formerly known as the Chicago Medical College, was the first school of medicine in the U. S. to insist on an examination preliminary to admission, on a graded course of instruction, as well as on a lengthened period of study, and is one of the few medical schools of the country requiring a *bona fide* four years' course. Its law school, formerly known as the Union College of Law, is now one of the most thorough in the U. S. It prescribes fifteen hours of class-room work a week, and requires its law professors, with one or two exceptions, to devote their whole time to the work of the school, withdrawing them from active practice for that purpose. Its school of pharmacy is one of the largest of the kind in the U. S. The university holds property amounting in 1900 to more than $4,000,000, and its ordinary income is $350,000. HENRY WADE ROGERS.

Northwest Passage: a communication by sea between the Atlantic and Pacific Oceans, which was long vainly sought by navigators. See POLAR RESEARCH.

Northwest Provinces, or **Agra**: a great political division of British India, situated around the upper and middle course of the Ganges. It consists of the provinces of Delhi, Merut, Rohilkhand, Agra, Allahabad, and Benares, and comprises an area of 83,286 sq. miles, and with Oudh (1901) 47,696,354 inhabitants. Capital, Allahabad.

Northwest Territories: a portion of the Dominion of Canada, comprising the provisional districts of ALBERTA, ASSINIBOIA, ATHABASCA, and SASKATCHEWAN (*qq. v.*), besides unorganized territory with an area of 906,000 sq. miles. This vast region is bounded S. by the 49th parallel, which divides it from the U. S. and touches the base of the Rocky Mountains at nearly 115° W. lon., thence the boundary runs N. W. along the summit of the Rocky Mountains until it reaches Alaska, and thence due N. to the Arctic Ocean. A marked feature of the region is its division into two plateaus, running generally N. W. and S. E., the more easterly one, with an average altitude of 1,600 feet, being adapted for agriculture, and that toward the W., reaching to the Rocky Mountains, with an average altitude of 3,000 feet, being adapted for grazing. The principal rivers are the Mackenzie, emptying into the Arctic Ocean, the Saskatchewan or Nelson, emptying into Hudson Bay, and the Athabasca, flowing into the lake of the same name. The most important timber is spruce; coal exists in a vast region E. of the Rocky Mountains extending from the frontier, with a width of from 150 to 200 miles, 1,000 miles N.; large coal deposits, as well as lignite and petroleum, exist also elsewhere throughout the territories. Iron, gold, silver, galena, and copper also occur. The product of the fisheries of the Northwest Territories for 1893 amounted to 19,836,000 lb., valued at $793,549. The government of the Northwest Territories is administered by a lieutenant-governor and Legislative Assembly, the seat of government being at Regina. An executive committee, appointed by the Assembly, acts as an advisory body with the lieutenant-governor in the expenditure of territorial funds and money appropriated by the Parliament of Canada. Justice is administered by a stipendiary magistrate, with jurisdiction over all cases, civil and criminal, and by justices of the peace appointed by the lieutenant-governor. For the maintenance of order among the Indians and settlers there is a body of mounted police numbering 1,000. Pop. (1896) about 100,000, including Indians. NEIL MACDONALD.

Northwest Territory: the name formerly applied in the U. S. to the tract of land included between the Mississippi and Ohio rivers and the Great Lakes, comprising the present States of Ohio, Illinois, Indiana, Michigan, and Wisconsin. The original States had ceded it to the national Government, which provided for its administration by the ordinance of 1787. See TERRITORY.

Norton, CHARLES ELIOT: son of Rev. Andrews Norton (1786–1852); b. at Cambridge, Mass., Nov. 16, 1827; graduated at Harvard College 1846; engaged in commerce in Boston; went to India as supercargo 1849; returned home through Europe 1850; wrote *Considerations on some Recent Social Theories* (1853); edited, with Dr. Ezra Abbot, his father's posthumous writings (1855); resided in Europe 1855–57; published *Notes of Travel and Study in Italy* (1860); edited the papers of the Loyal Publication Society 1861–65; was associate editor of *The North American Review* (1864–68); issued a translation of Dante's *Vita Nuova* (1867); lived in Europe 1868–73; published *Historical Studies of Church-building in the Middle Ages* (1880), and a translation of Dante's *Divina Commedia* (3 vols., 1891–92); edited *Correspondence of Carlyle and Emerson* (1883); *Correspondence between Goethe and Carlyle* (1887); *Reminiscences and Letters of Carlyle* (5 vols., 1886–88); *Letters of James Russell Lowell* (2 vols., 1894). He was made Lit. D. by Cambridge University 1884 and LL. D. by Harvard 1887, and was president of the Archæological Institute of America 1879–90. He was Professor of History of Art, Harvard, 1874–97.

Norton, CHARLES LEDYARD: See the Appendix.

Norton, FRANK HENRY: See the Appendix.

Norumbega: the name given by early French explorers to a country, river, and city supposed to be somewhere in the eastern part of the U. S. or Canada, and said to have been discovered by Verrazano in 1524. The site of the city was given on a map published at Antwerp in 1570. In 1604 Champlain ascended the Penobscot, supposing it to be the Norumbega, but after going 22 leagues discovered no indications of a city or of civilization, except a cross in the woods.

According to B. F. De Costa, in his *Norumbega and its English Explorers*, published in Justin Winsor's *Narrative and Critical History*, vol. iii., the name is found in the map of Hieronimus da Verrazano of 1529 as "Aranbega," the initial "N" being omitted, and De Costa says it is there restricted to a definite and apparently unimportant locality. The name, with a variety of spellings (*Norumbegue*, *Norumbergue*, *Anorabegra*, *Anorumbega*, etc.), occurs on many old maps and in the works of various French and English explorers of North America. Norumbega was by some writers thought to embrace all New England, while Lok, in 1582, according to De Costa, seems to have believed that the Penobscot formed its southern boundary. In his *Norumbega and its English Explorers* De Costa expresses himself with great caution in regard to the location of Norumbega, but in his *Lost City of New England* he is of the opinion that if the ruins of the city are ever found they will be found on the Penobscot.

Arthur James Weise, of Troy, N. Y., in his work *The Discovery of America to the Year 1525*, arrives at the conclusion that the name is a contraction of the Old French *L'Anormée Berge* (The Grand Scarp), and claims that the adjective *anormée* and the noun *berge* definitely describe the wall of rocks known as the Palisades on the Hudson river above New York city. Weise has no doubt that by the term Norumbega river the Hudson is meant, and that the country around the Palisades was called by the French explorers *La terre d'anormée berge*, afterward contracted and corrupted into Norumbega and its numerous variations. Weise, in identifying the river called by the French writer "Norombègue" with the present Hudson, lays great stress upon the statement by the same writer that the water of the river was salty to the height of 40 leagues, and shows that the Hudson is brackish beyond the city of Poughkeepsie.

Finally, in 1890, Prof. Eben N. Horsford, of Cambridge, Mass., presented an entirely new theory. In this year appeared his *Discovery of the Ancient City of Norumbega*. In it he claims to have found the precise site of the ancient city, and locates it with absolute confidence on the Charles river in Massachusetts, at its junction with Stony Brook near Waltham. He makes Norumbega identical with the Vinland of the Norsemen (see VINLAND), claiming that Norumbega is an Indian corruption of *Norvegr* (Norway), and that it has borne that name among the aborigines ever since the Norse explorers in the tenth and following centuries made their headquarters there. He takes Norumbega to be the name the explorers did not bestow, but found. So


NORWAY, SWEDEN
AND THE BALTIC.
BY J. BARTHOLOMEW, F.R.G.S
English Miles
Kilometres
ARCTIC OCEAN
ATLANTIC OCEAN
GULF OF BOTHNIA
Arctic Circle
Lofoden Islands
Vest Fiord
Folden Fiord
Trondhjem
N. Trondhjem
S. Trondhjem
Jemtland
Romsdal
Nordland
Norrbotten
Westerbotten
NORRLAND
LAPPLAND
FINLAND
Finmark
TROMSÖ
Sulitelma 6154
Christiansund
Levanger
Molde
Aalesund
Stadtland
Hitteren
Smölen
Proven
Vigten
Bodö
Lulea
Tornea
Kalix
Umea
Pitea
Skellefteå
Piteå
Torneå
Haparanda
Gellivara
Kengis
Jukkasjärvi
Silbojocka
Vuollerim
Jokkmokk
Arjeplog
Stor Avan
Sorsele
Tärna
Storuman
Vilhelmina
Strömsund
Wattudal
Ostersund
Sollefteå
Hernösand
Gefle
Ange
Jakobstad
Gamla Karleby
Uleaborg
Brahestad
Karlö
Kajana
Kuopio
Pielis L.
Kutuno L.
Topozero L.
Pavosero L.
Kandalakscha
G. of Kandalakscha
Kola
Enara L.
Nuot L.
Gruolle L.
Varanger Fiord
Varjag Njarg
Vardö
Vadsö
Vesteraalen
Lango
Andö
Ulfö
Hindö
Moskenesö
Vaagen
Ost Vaagen
Vest Vaagen
Stamsund
Svolvaer
Ringvatso
N. Kvalö
S. Kvalö
Alten Fd.
Hasvik
Sorö
Seiland
Kistrand
North Cape
Nordkyn
Lopphavet
Lyngen
Kaafiord
Alten Elf
Tana Elf
Karasjok
Kautokeino
Muonio Elf
Torneo Elf
Lulea Elf
Kalix Elf
Pitea Elf
Skellefteå Elf
Ume Elf
Angerman Elf
Indals Elf
Ljungan
Dal Elf
Klar Elf
Glommen
Rauma Elf
Gula Elf
Nea Elf
Stor Sjön
Kall Sjön
Landö Sjön
Hall Sjön
Storsjön
Oster Dal
Jemtland
Helgeland
Saltdalen
Ranen Fd.
Ranen
Lule Elf
Stor Uman
Vindel Elf
Sase Elf
Byske Elf
Bjurö C.
Ost Quarken
Walgrund
Nya Skelaistad
Wasa
Gefle
Ange
Jakobstad
Gamla Karleby
Uleaborg
Brahestad
Karlö
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Stor Sjön
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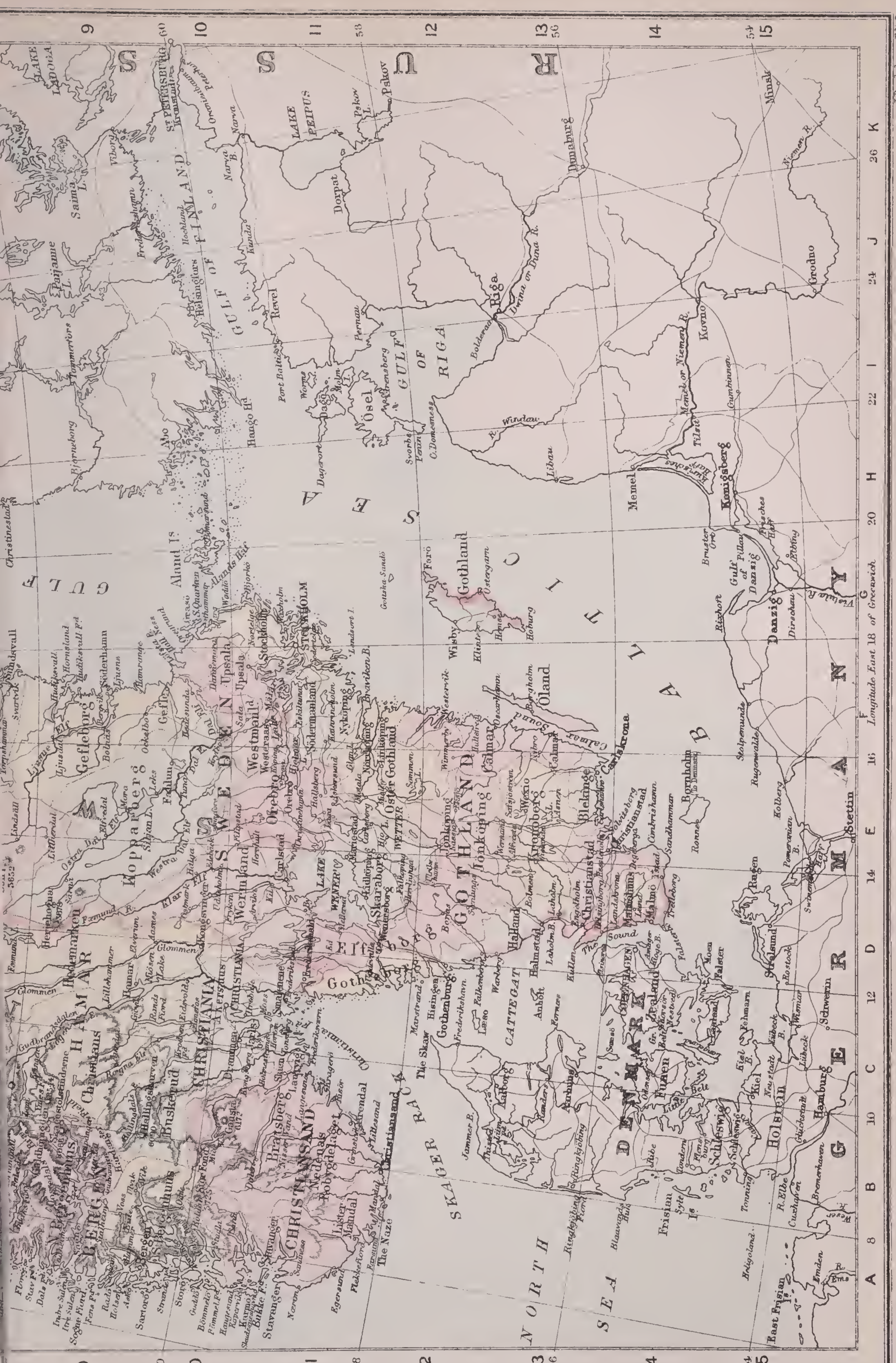
Sase Elf
Byske Elf
Bjurö C.
Ost Quarken
Walgrund
Nya Skelaistad
Wasa



J. Bartholomew, Edin.

thoroughly convinced was Prof. Horsford of the correctness of his theory that he built on the site which he identified as Norumbega a tower in commemoration of the Norse discoverers and colonists. Prof. Horsford's discoveries have not received much recognition among scholars. The origin of the name Norumbega and its site are still a matter of doubt. See VINLAND.

In addition to works already cited, see Horsford's *John Cabot's Landfall in 1497 and the Site of Norumbega* and *The Defenses of Norumbega*. RASMUS B. ANDERSON.

Norwalk: town (site purchased from the Indians in 1640, permanently settled in 1651, incorporated as a town in 1653, burned by the Hessians during the Revolutionary war, incorporated as a borough in 1836); Fairfield co., Conn. (for location, see map of Connecticut, ref. 12–D); on Norwalk river, about 2 miles from Long Island Sound, and on the N. Y., N. H. and Hart. Railroad; 42 miles N. E. of New York city, 60 miles S. W. of Hartford. It has an excellent harbor, regular steamboat communication with New York city, large coasting trade, and extensive oyster and flower interests. There are over 16 churches, 4 public halls, 2 public libraries, public park, public high school, institute, school for girls and young ladies, public-school property valued at over $150,000, 3 national banks with combined capital of $540,000, 2 savings-banks, and a daily and 2 weekly newspapers. The principal manufactures are felt, iron, and woolen goods, locks, flour, bolts, screws, fur hats, straw hats, shoes, machinery, and paper. The town contains the cities of Norwalk and of SOUTH NORWALK (*q. v.*). Pop. (1880) 13,956; (1890) 17,747; (1900) 19,932. EDITOR OF "GAZETTE."

Norwalk: city; capital of Huron co., O. (for location of county, see map of Ohio, ref. 2–F); on the Wheeling and Lake E. and the Lake Shore and Mich. S. railways; 56 miles W. S. W. of Cleveland. It is in a farming, dairying, and stock-raising region; has manufactories of organs, sewing and knitting machines, agricultural implements, tobacco, flour, and lumber; and contains 2 national banks with combined capital of $150,000, 2 State banks with capital of $88,000, a public library with over 6,000 volumes, and a daily, a monthly, and 5 weekly periodicals. Pop. (1880) 5,704; (1890) 7,195; (1900) 7,074.

Norway [Old Norse, *Norvegr*, the northern way; Norw. *Norge*]: the western part of the Scandinavian peninsula; situated between 57° 59′ and 71° 11′ N. lat., and 4° 59′ and 31° 11′ E. lon., bordering on Russia and Sweden on the E., and surrounded on all other sides by the sea (see map of Norway and Sweden). Its length from S. W. to N. E. is 1,118 miles, its breadth 264 miles in its widest part. It has a coast-line of 1,700 miles; including the fjords there is a continental coast-line of 10,500 miles. The area is 124,445 sq. miles, three-fourths of which is uninhabitable.

Geology.—The mountains of Norway are of Archæan formation, with superincumbent strata of gneiss, hornblende, and quartz, in many places penetrated by masses of granite and gabbro. Above this foundation are strata of conglomerate and sparagmite, or of Silurian and Devonian formations, containing the oldest fossil remains. The general configuration of the country presents a grand display of ice action, and extensive glaciers are still to be seen. The largest is the Jostedalsbræ, with an area of 350 sq. miles, six times the size of the largest Swiss glacier.

Mountains.—The mountain system practically covers the whole kingdom. It presents no well-defined chains, but has numerous table-lands, among which individual peaks are very irregularly scattered. The Jotun-fjeldene (Giant Mountains) are the highest in Europe N. of the Alps, with Galdhöpiggen (8,528 feet), Glittertind (8,495 feet), and others of but slightly less altitude.

Fjords and Rivers.—The fjords are the most characteristic natural features. Unlike the Scotch firths, they are long and narrow arms of the sea, filling the deep excavations made by glacial ice. The two most famous, both for size and grandeur of scenery, are the Sogne and Hardanger fjords. The thirty larger ones have an average length of 60 miles. The rivers are numerous, but owing to falls and rapids only a few are navigable. Glommen, in the S. E., is the principal one. The lakes, in reality expansions of river-beds, are also numerous.

Islands.—With the exception of two short stretches, the whole coast has a chain of islands, called Skjærgaarden (the island belt). Between this rock rampart and the mainland there is a deep channel which affords shelter from the ocean storms, and makes coast and fjord navigation comparatively safe. Of the 50,000 islands 1,160 are inhabited, 195 being of considerable size. The most important are the Lofoten (Loffoden) islands, within the Arctic Circle.

Climate.—On account of the Gulf Stream the climate is milder than that of any other country in the same latitude. Those parts that are removed from the influence of the sea have a cold winter and hot summer; the coast regions have a mild winter and cool summer. Only the more interior fjords freeze. Barley ripens as far north as 70° N. lat., and potatoes can be raised in the most northerly regions. The mean annual temperature of the southern part of the country and the coast is 44° F. At North Cape it is 35°, but in some parts of the interior it is below 32°, as at Karasjok (Finmark), where it is 26°. The rainfall is greatest on the western coast, where it is 77 inches; on the southwest coast it is 40 inches, in the Lofoten islands 45 inches, while in the most northerly and the southeastern parts it is only 12 inches.

Products.—The soil is not very fertile, except in a few of the valleys. Only about 1,000 sq. miles are under cultivation, but the arable area is much larger. The mineral products are silver, iron, copper, and some gold, nickel and zinc, but none are of much importance. The flora is not rich in species, except in arctic plants, but is quite luxuriant, the profusion of wild flowers being particularly distinguished by their large size and brilliancy of coloring. The principal forests (covering an area of 25,000 sq. miles) are of fir, pine, and birch. Wild fruits are not abundant, although some berries are exported, but the grasses are numerous and afford excellent pasturage. The fauna is varied. The elk, the largest terrestrial animal of Europe, is found in the southern part. The reindeer is the most important wild animal, large herds of which have been semi-domesticated by the Lapps. The bear and fox are numerous. Of marine animals, whales and seals have been abundant, but are rapidly disappearing. The eider duck is the most important bird, and is carefully protected by law. Fish abound along the coast and in nearly all the rivers and lakes. The cod, herring, and mackerel are the most valuable, and are exported in large quantities. Salmon, trout, and lobsters are also plentiful.

Population.—The Norwegians, with the Swedes, Danes, and Icelanders, belong to the Scandinavian branch of the Teutonic race. They are hardy, of great endurance, and usually of large stature. According to the census of 1891 the population was 2,000,917 (965,911 males and 1,035,006 females); of these, 474,129 lived in cities and towns. One and a half per cent. are of Ugro-Finnic race, engaged in herding reindeer and in fishing. Only 2 per cent. are immigrants, mostly Swedes.

Principal Towns.—The six largest cities, with population in 1891, are Christiania, the capital (151,239); Bergen (53,684); Trondhjem (29,162); Stavanger (23,899); Drammen (20,687); and Christiansand (12,813). Hammerfest, the most northerly city in the world (70° 39′), has 2,160 inhabitants.

Divisions.—The chief administrative divisions are the towns of Christiania and Bergen and 18 amts. These are subdivided for local government into over 560 communes. The amts, with area in square miles and population Dec. 3, 1900, according to provisional census results, are as follows:

AMTS.	Sq. miles.	Population.
Christiania (town)	6	225,686
Akershus (or Aggerhuus)	2,055	115,113
Smaalenene (Smalenene)	1,600	136,298
Hedemarken	10,621	125,858
Christians	9,793	115,615
Buskerud	5,790	112,608
Jarlsberg og Larvik (Laurvig)	896	103,772
Bratsberg	5,865	98,788
Nedenes (Nedenas Robygdelaget)	3,609	78,605
Lister og Mandal	2,805	81,454
Stavanger	3,532	127,192
Söndre Bergenhus (-huus)	6,026	135,337
Bergen (town)	5	72,159
Nordre Bergenhus	7,132	88,454
Romsdal	5,788	135,899
Söndre Trondhjem (Throndhjem)	7,184	135,133
Nordre Trondhjem	8,791	83,948
Nordland	14,517	151,537
Tromsö	10,134	74,296
Finmarken (Finmark)	18,296	32,735
Totals	124,445	2,231,395

Industries.—The principal pursuits are agriculture, fishing, navigation, cattle-raising, dairying, and lumbering. Agriculture is mainly confined to Southern Norway, and is making rapid progress. The principal crops in 1900 were

wheat and rye, 1,159,000 bush.: barley, 3,801,000 bush.; oats, 9,222,000 bush.; potatoes, 22,216,000 bush. Fishing is carried on very extensively, engaging about 130,000 men, the annual proceeds (including the whale and seal fisheries) being about 24,000,000 kroner. The most important fisheries are along the Lofoten islands. Norway's shipping (80 per cent. of which is in the foreign carrying trade) is surpassed in tonnage only by Great Britain, the U. S., and France. In 1900 there were engaged 6,809 vessels, of 1,534,895 tons burden. In recent years there has been great progress in manufacturing, in which the enormous water-power furnished by the numerous streams and waterfalls has begun to be utilized.

Education.—Compulsory education obtains from the ages of eight to fifteen. Illiteracy does not exceed 2 per cent. In 1896 (the latest date for which there are statistics) there were 5,966 schools with 255,433 pupils in the country districts, and in cities and towns 2,165 schools with 69,466 pupils. There are six seminaries for the education of teachers. Higher education is promoted by high schools, Latin schools, various private and technical schools, and the university at Christiania (founded 1811), with about 50 professors and (1899) 1,350 students. The state religion is Lutheran, but all other creeds are tolerated.

Government.—According to its constitution Norway is a free and independent kingdom, united with Sweden. The two countries have a king and the foreign service in common; in all other respects they are independent of each other, each having its own parliament, ministry, army, etc. The cabinet consists of two ministers of state and not less than seven councilors of state, of which one minister and two councilors are stationed at the Swedish capital in attendance upon the king. Since 1884 the cabinet officers have had seats in parliament. The legislative branch of the Government is vested in a Storthing (parliament), which meets annually, consisting of 112 members, chosen indirectly by a college of electors. Elections to the Storthing occur triennially. Although in reality unicameral, the Storthing elects one-fourth of its number to form an upper house, the Lagthing, the remaining members constituting the Odelsthing. In case both branches fail to agree, a two-thirds vote in joint session is necessary to pass a measure. The king has the right of a suspensive veto, but a bill passed by three successive triennial Storthings becomes law without the royal sanction. The Norwegian constitution is the only one to which the Napoleonic wars gave rise that survived the succeeding reaction. The jury system, in which a majority can convict, but available only in criminal procedure, was introduced in 1890. Direct taxation was introduced in 1893. The state debt (June, 1899) was $53,211,171, mostly due to railway building, begun in 1854. In 1900 there were 1,223 miles of railway, and 8,832 kilometres of telegraph lines. The metric system is used, and the monetary standard is the krone ($.268), divided into 100 öre. The army, with reserves, numbers about 30,000 men and 900 officers; the navy has 51 vessels with about 150 guns.

History.—Norway has been inhabited by the ancestors of its present population since time immemorial. It was long supposed that the aborigines were Lapps, and that Teutonic tribes settled there shortly before the Christian era; but archæologists have shown that the implements representing the stone age were made by the ancestors of the present inhabitants, and that the country has been continuously occupied by the same race ever since. In line with this the contention has been made with considerable force that the Baltic country, especially Denmark and Southern Sweden, was the cradle of the Aryans, or at least that this was the center of Aryan diffusion, and that here the blond, blue-eyed, dolichocephalic Teutonic race was developed. The earliest history of Norway must be studied in its archæological remains. The oldest Runic inscriptions date from between the third and fifth centuries A. D., but they are only of philological importance. The historical period does not begin until the ninth century. The traditions of the centuries preceding are covered over with a mantle of mythology. In 872 the numerous petty kingdoms were united by Harald Fairhair after a long and desperate struggle. At this time viking expeditions were common, and it was through them that the Norsemen became Christians. Harald's son, Haakon the Good, made a fruitless attempt to introduce Christianity, and his efforts were successfully continued by Olaf Tryggveson and Olaf the Saint (1030). From the time of Harald Fairhair until 1319, with the exception of three short intervals, Norway was ruled by kings of the Fairhair line. Many of them were grand figures, and their lives are vividly portrayed in the sagas. The most important of them, after Harald, are: Olaf Tryggveson (995–1000), Olaf the Saint (1014–30), Sverre Sigurdson (1184–1202), and Haakon the Old (1217–63). Of these Sverre was the greatest. He was a soldier-statesman of a high order. Starting out with a handful of untrained men, he gathered an army with which he defeated the reigning king, and in the teeth of the opposition of the Church of Rome and the nobility he built up a democratic kingdom. During Haakon the Old's reign Norway was at the height of her power as a state. Foreign potentates sought Haakon's friendship "in view of his power and experience on the seas," and it is said that in 1256 the pope desired his election as Emperor of Germany. Haakon's successor was his son Magnus, known as the Lawmender. Of the four existing codes of law he compiled one for the whole kingdom that remained in force 400 years. His son Haakon (d. 1319) was the last independent Norwegian king, and with him the Fairhair kings in the male line became extinct. Haakon was succeeded by his grandson, Magnus Smek (the son of Duke Erik of Sweden), and he was King of both Norway and Sweden from 1332 to 1355, when Norway, under Magnus Smek's son, Haakon VI., again became independent, although only nominally. About this time (1349–50) the black death ravaged Norway, reducing the population one-third. Some of the valleys were entirely depopulated. This and the devastating wars of previous periods sapped the strength of the nation, and that proud spirit of independence characteristic of the old Norsemen seemed to have vanished. Haakon VI. married the Danish princess Margaret. Their son Olaf was in 1376 elected King of Denmark, and upon the death of the father, in 1380, he also became King of Norway. Olaf died in 1387, whereupon his mother, Queen Margaret, became ruler of the two countries. In 1397, by the Peace of Calmar, she effected a union with Sweden, thus bringing the whole Scandinavian race under one scepter. Sweden revolted in 1523, but Denmark and Norway remained united until 1814. During the long union with Denmark, Norway's interests were neglected by the Oldenburg kings, who considered the country a province of Denmark; but in the latter part of the eighteenth century the dormant national spirit was awakened. The condition of the Norwegian peasantry, due to their system of land tenure, gave them a feeling of personal independence, but the impulse that aroused the national spirit came from France. The new ideas of the times found expression in highly patriotic, though bombastic, verse, and when the opportunity for regaining their national liberty presented itself the people were prepared. Sweden had demanded Norway as remuneration for participation in the alliance against Napoleon, and after the battle of Leipzig Frederick VI. of Denmark was forced (Treaty of Kiel, Jan., 1814) to cede Norway to Sweden; but the Norwegians refused to be disposed of in this way, declared their independence (Apr. 10, 1814), and on May 17 adopted a free constitution. A Danish prince, Christian Frederick, was elected king. Bernadotte, who had been made Crown Prince of Sweden, invaded Norway to enforce submission, but met with indifferent success. Anxious to have peace before the Council of Vienna convened, Bernadotte offered an armistice, and at the convention of Moss pledged himself to accept the constitution of May 17 in case Norway would unite with Sweden under one king. As the Norwegian king had proved a failure, the proposition was accepted, but on the basis that Norway's equality in the union should be unconditionally recognized. The union was effected Nov. 4, 1814, the conditions of which are specified in an Act of Union (*Rigsakt*). Norway has made great progress industrially and intellectually; but she has had many a struggle with Sweden in defense of her constitutional rights. Especially since 1872 party spirit has run high on questions of national interest, particularly in relation to the consular and diplomatic service. The house of Bernadotte is still the ruling dynasty, the present (1894) representative of which is Oscar II. See NORWAY, HISTORY OF, in the Appendix.

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The Vikings in Western Christendom (New York, 1891) and *Norway and the Norwegians* (New York, 1892); Penka's *Die Herkunft der Arier* (Vienna, 1886); Rendall's *The Cradle of the Aryans* (London, 1889). JULIUS E. OLSON.

Norwegian Language: strictly the old written language in use in Norway down to the time of the Reformation, and the popular dialects that have succeeded it. The literary language since the Reformation is only Norwegian by virtue of local differentiation; in reality it is Danish, or more correctly Dano-Norwegian. Genetically, Norwegian proper forms with Icelandic the West Norse division of the Scandinavian branch of the Germanic languages. Chronologically, its history falls into two main periods, Old and New. Although minor dialectal differences are distinctly traceable even at the beginning of the Viking age in the eighth century, Old Norwegian first appears beside its offshoot, Old Icelandic, and the East Norse dialects, Old Swedish and Old Danish, as a separate dialect of Old Norse after the introduction of Christianity at the beginning of the eleventh century. Considered principally with reference to Icelandic, which, on account of its literature, is the far more important, Old Norwegian has had three periods of development. Of these the first extended from the year 1000 to 1200, down to which time there is but little difference in the forms of Iceland and Norway. In the second period, from 1200 to 1350, corresponding to the Classical period of Icelandic, the language becomes, however, differentiated in important points. (See ICELANDIC LANGUAGE.) In the third period, 1350 to 1530, or down to the Reformation, there were not only numerous phonetic changes within the language, but, more important still, there was brought to bear upon it, as the result of political conditions, the influence first of Swedish and then of Danish. At the end of the fourteenth century Danish influence became paramount. In the following century Norwegian was rapidly displaced by Danish in its last use in documentary writings, and at the time of the Reformation as a written language it had wholly disappeared. As a spoken language Norwegian still continues to exist in numerous popular dialects. Even in the oldest period a tendency toward dialectal division is noticeable, and doubtless this condition was afterward increased by the loss of the language from literature. A movement, headed by Ivar Aasen in 1848, has been made to rehabilitate popular Norwegian in a normalized form as the national language, but thus far without important result. The material for the history of Norwegian is contained in part in Runic inscriptions, which are, however, with few exceptions, subsequent to the first MSS. The oldest extant MSS. date from the end of the twelfth century. The ancient literature specifically Norwegian is neither large nor important.

The present linguistic condition of Norway owes its origin to the political connection with Denmark which followed the Calmar Union of 1397. Danish after this time not only quickly superseded native Norwegian as a written language, as has already been noticed, but presently became, besides, the official medium and the recognized language of culture, a condition that was still more deeply rooted by the advent of the Reformation by way of Denmark and the Danish translation of the Bible. The supremacy of the Danish language continues to-day with the difference that a Dano-Norwegian form has been developed that shows characteristic differentiations from the Danish of Denmark, both in vocabulary, which has incorporated from the dialects Norwegian words and idioms, and in the phonology of the spoken speech. It is, nevertheless, in all respects fundamentally Danish, and has followed, since the fifteenth century, Danish lines of development.

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WILLIAM H. CARPENTER.

Norwegian Literature: the written or printed expression of the thought of the people of Norway. It may with reason be said to have had its origin in the early Runic inscriptions, dating back as far as the sixth century A. D.; but a literature proper did not arise until with the introduction of Christianity (about 1000 A. D.) there came the knowledge of the Latin alphabet and a more suitable writing material than wooden sticks or stone slabs. Norwegian literature in its earliest period is related to that of Iceland (see ICELANDIC LITERATURE), but is of less extent and less importance. Scaldic poetry was cultivated in Norway before the Icelandic scalds obtained a monopoly of praising the Norwegian kings in their "drápas." Eyvind Finnsson (called *Scaldaspillir*, the "spoiler of the scalds," because no other scald could stand comparison with him) has in his *Hákonarmál* given a vivid and poetic expression to his grief at the death of King Haakon the Good. Of the poems of the *Elder Edda* (see ICELANDIC LITERATURE) at least one, and one of the most important of them all, the *Hávamál*, bears intrinsic evidence of having been produced in Norway. The saga-writing, on the other hand, always remained a truly Icelandic art, and the thorough knowledge we possess of Norwegian history in the Middle Ages is due to Icelandic historians; so even when the Norwegian kings wanted their history written to order they applied to Icelanders. Of Norwegian historic writers we may mention Theodoricus Monachus, whose *Historia de Antiquitate Rerum Norvagiensium* was written in Latin about 1175, and the unknown writer of the *Historia Norvegiæ*, written also in Latin about 1180 A. D. Of the historical sagas written in the Old Norse language hardly any can with certainty be attributed to Norwegian authors. The chief exponents of Norwegian prose literature in the Middle Ages, then, are the laws, *Frostapingslög*, *Gulapingslög*, *Bjarkeyjar Réttr*, *Hirskrá*, etc., all published in *Norges Gamle Love* (The Old Laws of Norway, 5 vols., Christiania, 1845–92); furthermore, translations of homilies, saints' lives, and romantic sagas. The *Konungs Skuggsjá*, or *Speculum Regale*, deserves particular attention. The anonymous author of this "King's Mirror" describes himself as a Norwegian, living in the far northern part of the country, Hálogaland. In the form of a dialogue between father and son, the book gives us a description of court customs and court morals as they ought to be. The author makes several interesting digressions on the physical history of Ireland, Iceland, Greenland, on whales, seals, etc. A little piece worth mentioning is the plea of King Sverri against the pope and clergy, who sided against him in the civil war, first edited by Werlauff under the title *Anecdoton Sverreri*, lately by G. Storm, of Christiania, under the title *En Tale mod Biskoperne*.

When Norway through the Calmar Union (1397) became united with Denmark the Norwegian language lost its prestige, and was gradually supplanted among the higher classes and in the cities by the Danish language, while the Norwegian language continued to live on the tongues of the country people. It was this same country people who, when the Norwegian literature fell into decay, harbored a treasure of national traditions embracing the popular ballads and tales which in recent times have been made an object of study, and served to strengthen national sentiments and inspire a national literature.

During the fourteenth and fifteenth centuries, as well as immediately after the Reformation, there was little literary activity in Norway, as was also the case in Denmark. Absalon Pedersön, a chaplain of Bergen, about the middle of the sixteenth century, wrote *Bergens Kapitelsbog* and a *Norges Beskrivelse* (Description of Norway), where he shows himself to be inspired by a high patriotic feeling. Another ecclesiastic, Peder Claussøn Friis (1545–1614), rector of the parish of Undal, besides writing about the natural history, topography, and history of Norway (*Om Diur, Fiske, Fugle og Træer udj Norrige*, *Norriges og omliggende Øers Beskrivelse*, and *Kort Extract af Norriges Krønike*), made a very good translation of Snorri Sturluson's *Lives of the Norwegian Kings* (see ICELANDIC LITERATURE) and of the old Norwegian law. Particularly the former of these two translations served to arouse the national spirit, and thus pave the way for a subsequent national development.

In the eighteenth century Norway contributes to the common "Danish-Norwegian literature" two of its most prominent names, Holberg and Wessel, who were both born in Norway, and spent their childhood and early youth there. Holberg (see HOLBERG, LUDVIG, and DANISH LITERATURE), although he has been called the father of Danish literature, bears in many instances witness of his Norwegian origin, and Johan Herman Wessel (1742–85), whose *Kjærlighed uden Strømper* (Love without Stockings), a travesty of the then usual high-

sounding tragedies in the French manner, is still an attraction on the Danish and Norwegian stage, was one of the founders and the chief figure of Det Norske Selskab, a kind of Norwegian club in Copenhagen, where Norwegian students and literati met and discussed the questions of the day, made verses, and cultivated patriotism. Among the lesser lights of the Selskab may be mentioned Johan Nordal Brun (afterward bishop in Bergen, and author of two patriotic songs that are sung by every Norwegian), Claus Fasting, the two brothers Friman. Edvard Storm, who kept aloof from the society, wrote some fine romances in the Gudbrandsdal dialect, and his *Sinclairs Vise*, celebrating the destruction of the troops of the Scotch Col. Sinclair by Norwegian peasants, is still very popular. Another Norwegian poet of great local prestige was Petter Dass, rector of Alstahang parish, in Northern Norway (d. 1708). His *Nordlands Trompet*, although written in the Danish language, interspersed with many dialect words, is still to be found in every home in that part of the kingdom, and is one of the most widely read books in Norway.

The last century of the union with Denmark had witnessed a gradual development of national spirit in Norway; so when the dissolution of the union with Denmark came in 1814 the Norwegians felt themselves, as a nation, ready to take their fate into their own hands; but the first decenniums after the separation were not particularly well adapted for the development and growth of a national literature. The nation was still too much engaged in building up its political fortunes and restoring its financial and economic resources. Naturally the first products of Norwegian literature after the war were national songs that were direct expressions of joy and pride at the new-born liberty, high sounding and bombastic in phraseology. Among the poets of this period we may mention Simon Olaus Wolff (d. 1859) and Henrik Anker Bjerregaard (d. 1842), both authors of national songs. The last mentioned also wrote a national drama, *Fjeldeventyret*, in which two of the characters are representatives of certain national types. Mauritz Christoffer Hansen (d. 1842) was a novelist of some note; in his earlier rather fantastic productions he was influenced by the German and Danish romanticists, but some of his later novels, describing everyday life, have merit.

A great step in the direction of a national Norwegian literature was made by the poets of the following generation, chief among which stand Henrik Arnold Wergeland (1808–45) and Johan Sebastian Cammermeyer Welhaven (1807–73). Wergeland's father was a Lutheran minister and member of the constitutional convention at Eidsvold in 1814, who was distinguished by his intense Norwegian patriotism and his hatred toward Denmark, to which feeling he gave vent in a book entitled *Danmarks politiske Forbrydelser imod Norge* (Denmark's Political Crimes against Norway). This patriotism was to the full extent inherited by his son Henrik, with whom it took a distinctly practical turn; he was very active in the advancement of the common people, writing popular essays, establishing parish libraries, and editing a newspaper, *For Arbeidsklassen* (For the Working Class), where by means of short stories and treatises he exhorted the common people to thrift, cleanliness, industry, and patriotism, showing himself to be influenced in this work by Benjamin Franklin. Wergeland was also to a certain extent cosmopolitan in his tastes and studies, a pupil of Voltaire and the other eighteenth century philosophers. He was, as a poet, very productive, one of his first works being the unwieldy poem *Skabelsen, Mennesket og Messias* (The Creation, Man, and Messias) in three volumes, afterward rewritten by the author on his deathbed, in one volume, *Mennesket*. Among the most beautiful of his poems are *Jøden* (The Jew), *Jødinden* (The Jewess), poetical pleas for the admission of the Jews into Norway, whence up to that time they were excluded by law; *Den engelske Lods* (The English Pilot); *Norges Storthing*; *Til min Gyldenlak*; *Jan van Huysums Blomstoerstykke*. Some of his stories and poems for children are also excellent. Wergeland's excess of patriotism and his democratic tendencies made him distasteful to the "intelligent" party, which was headed by his great antagonist Welhaven, who in his cycle of poems *Norges Dæmring* (The Dawn of Norway, 1834) treated this excessive Norwegianism with such severe irony that he was considered by many as a traitor to his native country. In opposition to Wergeland he advocated the connection of Norwegian literature and civilization with Danish intellectual life. Welhaven is, in contradistinction to Wergeland, characterized by a great critical ability (even exercised against himself). He has not written much; mostly romances, ballads, and other poems, all of exquisite poetical form and beauty, showing the influence of Goethe and the romanticists. In some of his poems Welhaven gives fine pictures of the natural scenery of Norway, as in *Bergens Stift*, and after Asbjørnsen and Moe had published their popular and fairy tales he took up national subjects in his romances (*Aasgaardsreien*, *Dyre fra Vaa*, *Eivind Boldt*, etc.); so the animosity that a large part of the people had borne against him gradually subsided, and when in 1867 he retired from his chair as professor of literature, Bjørnson, who may be said to be a pupil and successor of Wergeland, wrote one of his most beautiful poems in his honor, while the same Bjørnson in 1881 made the speech at the unveiling of the Henrik Wergeland monument in Christiania. Thus later times have acknowledged that these great antagonists, Wergeland and Welhaven, were equally important and necessary factors in the development of a Norwegian literature. Younger but less gifted contemporaries and partisans of Welhaven were P. A. Munch, the poet and dramatist (see Munch, Peter Andreas), and P. A. Jensen (d. 1867). Also Camilla Collett (b. 1813), a sister of Henriek Wergeland, was more closely allied to Welhaven's school than to her brother. Her chief work, the society novel *Amtmandens Dotre* (1857), where she raises the cry against the social oppression of woman, makes her a pioneer in the movement for the emancipation of woman, and also to a certain extent makes her a forerunner of the society novels of a recent day as represented by Lie and others.

We have seen how Welhaven's national romances were influenced by Asbjørnsen's and Moe's popular fairy tales. These two men were the earliest and most important representatives of the movement, started in the beginning of the forties, to study the national treasures of poetry, music, and language which for centuries had been neglected. As part of this movement must be considered M. B. Landstad's work in collecting and publishing national ballads, a work that was continued by the learned Sophus Bugge; at the same time Aasen (see Aasen, Ivar Andreas) wrote his grammar and dictionary of the Norwegian popular language. Lindemann collected national airs, while Eilert Sundt made the Norwegian gypsies and the condition of the working people the subjects of his particular study. At the same time the historical studies of Rudolph Keyser and P. A. Munch awakened or deepened the interest in the early history of the nation. This is a period of national romanticism: Tidemand and Gude made national scenery and home life a subject of their paintings; Kjerulf and Ole Bull produced a series of national compositions. The chief literary figure is still Welhaven, with P. A. Munch and some lesser lights (like H. H. Schulze, Nicolai Østgaard, Bernhard Herre, and Harald Meltzer) grouped around him.

In the year 1857 Bjørnson's novel (*Synnøve Solbakken*) appeared, opening a new era in Norwegian literature, the period of Bjørnson and Ibsen. Both these authors at first allied themselves with the romantic school of writers. Bjørnson (see Bjørnson, Bjørnstjerne) in his novels treated subjects borrowed from the peasant life, of which he gives a characteristic, even if somewhat idealized, description, while he devoted his earlier dramas to historical subjects, and Ibsen's (see Ibsen, Henrik) earlier productions are all of an historical nature. Since about 1870 both these authors, in their dramas and novels, have turned to reproducing Norwegian city and home life in a realistic manner, and their pictures of Norwegian social life have made them famous the world over. Around these two giants, as it were, of Norwegian literature are grouped other authors also of great talent, such as Jonas Lie, Alexander Kielland, Kristoffer Janson, and Arne Garborg. Janson and Garborg have partly been writing in the common literary language of the country, the Dano-Norwegian language, partly in the so-called *Landsmaal*, in which also Aasmund Olafsson Vinje wrote his poems. Of late years there has grown up in Norway a school of writers whose efforts have been directed toward naturalistic description and the study of individual psychology. These writers do not care about plots, but for minute psychological characterization. The above-mentioned Arne Garborg partly belongs to this school, although he does not participate in its vagaries, such as those indulged in by men like Hans Jæger in his *Kristiania Bohemen* (1885), a book that was confiscated by the police, its author being sentenced to prison. Another author belonging to this school is Knut Hamsun, whose name suddenly gained a cer-

tain notoriety by his book upon the intellectual life of modern America (*Fra det Moderne Amerikas Aandsliv*), and whose novels, *Sult* (Starving), *Mysterier*, *Ny Jord* (New Earth) show a marked resemblance to the style of Dostojevski and other Russians. Gunnar Heiberg has with his dramas (*Kong Midas*, *Balkonen*, *Kunstnere*) also gained a certain fame outside of Scandinavia, and Vilhelm Krag has shown himself to be a poet of considerable force.

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P. Groth.

Norwich, nor'rij: capital of the county of Norfolk, England; on the Wensum, immediately above its confluence with the Yare; 114 miles N. N. E. of London (see map of England, ref. 9–L). It is a large, old, and prosperous town, covering the slopes of a hill which rises gradually from the river. It is irregularly built, but full of specimens of early architecture. The cathedral was founded in 1096 by Bishop Herbert de Lozinga. It still retains its original Norman plan to a great extent, but the spire (fourteenth century), 315 feet in height, is mixed Decorated and Perpendicular, while the cloisters (1297–1430) are mainly Decorated in style; and there are remaining two fine arches of the Early English Lady chapel (demolished about 1580). The total length is 407 feet, the length of the nave 204 feet, and the length of the transepts 178 feet. The castle, situated at the highest point of the city, originally extended as far as the fine market-place, but the keep is now the only part remaining. It was long used as a prison, but is now a museum well known for its collection of raptorial birds. The Grammar School, a Decorated building dating from the fourteenth century, was formerly a chapel. St. Andrew's Hall, in which since 1824 the triennial musical festivals have been held, is the nave of the Black Friars' church, rebuilt in the fifteenth century. It is a fine example of Perpendicular work. Among forty-four churches, mostly dating from the fifteenth century, St. Peter Mancroft is perhaps the finest parish church in England. It has an ornamented tower with a peal of twelve bells. There are manufactures of worsted, silk, and cotton fabrics, especially crapes; also of mustard, starch, ornamental ironware, and shoes, while breweries and nursery-gardens in the outskirts of the town give employment to many.

Norwich was the *Caer Gwent* of the Britons, and the *Venta Icenorum* of the Romans. The name *Nord Vic* (North town) probably has reference to the large Roman camp of Caister, 3 miles to the S. It was often plundered by the Danes, and in 1216 it was sacked by the French dauphin Louis. In 1336 several thousand Flemish weavers settled at Norwich, and during the latter part of the sixteenth century there was a large influx of Dutch and Walloon refugees, who did much to foster manufactures. In 1602 nearly half of the inhabitants died of the plague. Norwich has been the seat of a bishopric since 1096, and is a municipal and parliamentary borough, the last returning two members to Parliament. Pop. (1901) 111,728.

Norwich: city (site purchased from the Indians in 1659, settled in 1660, received city charter in 1784, present charter granted in 1871); one of the capitals of New London co., Conn. (for location of county, see map of Connecticut, ref. 10–K); on the Thames river, and the Cent. Vt. and the N. Y. and N. E. railways; 16 miles N. of Long Island Sound, 35 miles S. E. of Hartford. It is in a valley surrounded by hills, has excellent water-power, and is noted for its manufactures. It contains a free academy with a normal training department, an art school, and kindergarten; public-school property valued at nearly $200,000; two libraries (Otis, founded 1848, and Norwich Circulating, founded 1871) containing over 23,000 volumes; 27 churches; 10 public halls; 5 national banks with combined capital of $2,000,000, 3 savings-banks with surplus of over $500,000, and a loan and trust company with capital of $100,000; an art museum; a free public hospital; 5 public squares; and 2 daily, 2 weekly, and 2 monthly periodicals. There are gas and electric light plants, electric street-railway, thorough sewerage system, and improved system of water-works. Prior to 1812 the city had large commercial interests; since then it has developed rapidly as a manufacturing center. Its principal manufactures are cotton, silk, and woolen goods, paper, firearms, wood-working and other machinery, printing-presses, envelope printing-presses, rolling-mill and foundry products, stoves and furnaces, leather-belting, rope, harness, hosiery, nickel goods, files and corks. Pop. (1880) 15,112; (1890) 16,156; (1900) 17,251.

Norwich: village; capital of Chenango co., N. Y. (for location of county, see map of New York, ref. 5–H); on the Chenango river, and the Del., Lack. and W. and the N. Y., Ont. and W. railways; 40 miles N. by E. of Binghamton, 90 miles W. of Albany. It is in an agricultural, dairying, and hop-growing region; contains 2 libraries (Academy and Union School, founded 1850, and the Norwich Circulating, founded 1875), 2 national banks with combined capital of $225,000, and a daily, a semi-weekly, and a weekly newspaper; and has several creameries, blast furnace, foundry, shops of the N. Y., Ont. and W. Railway, brewery, and manufactories of pharmaceutical preparations, silk goods, hammers, chairs, and sash, doors, and blinds. Pop. (1890) 5,212; (1900) 5,766.

Editor of "Chenango Telegraph."

Norwood's Tincture: an alcoholic preparation of American hellebore (*Veratrum viride*), which is supposed to be saturated.

Nosebleed: See Epistaxis.

Nosol'ogy [Gr. *νόσος*, sickness, disease + *λόγος*, discourse, reason]: the doctrine or science of diseases, more especially as regards their classification and nomenclature. The classification of diseases may be based upon theories as to methods of causation, upon the symptoms produced, upon the parts affected, or upon the final results observed. No complete and satisfactory classification of all forms of disease can be made with the present knowledge upon any single one of these plans, for of some diseases we do not know the cause; most symptoms may belong to several different diseases; the same disease may affect very different localities, and the final pathological results are often very obscure unless a *post-mortem* examination has been obtained, and they may even then be doubtful. It is impossible to devise a single nosological scheme of classification which will be well adapted to all the different purposes for which such schemes are needed—that which will best meet the wants of the vital statistician or health officer will not suit the pathological anatomist. A very important part of a nosological scheme is the nomenclature of the individual forms of disease or of lesions which are to be classified. It is essential that different men, in different countries, and at different periods, shall know what is meant by the name of a disease, such as smallpox, pneumonia, diarrhœa, Graves's disease, or amyotrophic lateral sclerosis.

With increase of knowledge, the use of new means of diagnosis and of instruments of precision, and of more minute examination of diseased tissues, comes the recognition of the fact that disorders of function or of structure, formerly classed together under a single name, may differ so greatly as to cause and result as to make it necessary to give them different names. In the eighteenth century the differences between typhus and typhoid fever were unknown, and hence it is impossible to compare the statistics of that period with those of the present day to ascertain the relative prevalence or fatality of these two very distinct diseases. It must be remembered that a disease is not a distinct separate entity, as is commonly supposed, and implied in the way it is mentioned, as, for instance, when cholera is said to enter a house or ravage a town. It is a condition of the body, and for purposes of nomenclature it is usually a group of conditions more or less unusual. Sometimes a name is devised for a group of symptoms, such as locomotor ataxy, sometimes for a pathological lesion, such as spinal sclerosis. A considerable number of different groups of morbid conditions are known by the names of the persons who first discovered them, as, for example, Addison's disease, Bright's disease, and such names for a time serve a good purpose. Jonathan Hutchinson prefers to give the new disease the name of the patient instead of the name of the doctor.

The older attempts at a systematic classification of diseases, including those of Sauvages, the first of which appeared in 1731, of Linnæus in 1763, of Vogel in 1764, of Cullen in 1772, of Pinel in 1813, and of Good in 1817, have long since passed into oblivion, and are now merely historical curiosities. The system devised by Dr. William Farr

for use in the statistical reports of the registrar-general of England has been the basis of most of the systems used by statisticians in Great Britain and America, its most complete development being the nomenclature of diseases issued by the Royal College of Physicians in 1884, as a large octavo volume of over 400 pages. It is proposed by the college to revise this every ten years, and the work of revision is now (1894) in progress.

The schemes of Dr. Farr and other vital statisticians include only those forms of disease which are reported as causes of death, for which between 200 and 400 terms are sufficient, while for the purposes of hospital registration and the needs of pathologists and systematic writers on the diagnosis and treatment of disease a much more extensive list is required. The classification of these into groups is a necessity due to the laws of mental action, since each one who studies and thinks about diseases must think of them in certain relations to each other and to the environment, but the groupings required for different purposes are very different. The nomenclature of the Royal College of Physicians divided all diseases into two great classes, viz., general and local diseases. The general diseases include those which affect the whole body, or which may be distributed in several parts at one time, and these are divided into several groups. Group A includes the diseases dependent on morbid poisons, or the specific febrile diseases, such as smallpox, measles, etc. Group B includes the diseases dependent on external agents other than morbid poisons, such as parasites, chemical poisons, effects of injuries, of climate, of errors of diet, etc. Group C includes the so-called developmental diseases, such as immaturity, malformation, and old age; and Group D includes a number of unclassified affections, such as gout, rheumatism, tubercle, scrofula, leprosy, cretinism, and diabetes. Recent discoveries in pathology and bacteriology make very extensive changes in this classification necessary. The list of parasitic diseases must be greatly extended, and this list can not form a homogeneous group. A nosology which groups together consumption, Asiatic cholera, typhoid fever, diphtheria, erysipelas, pyæmia, boils, glanders, gonorrhœa, pneumonia, and leprosy, all of which are probably due to vegetable micro-organisms, would be of very little use for any purpose except possibly to writers on bacteriology.

For the purposes of medical, sanitary, and vital statistics special forms of nosological classification are required, and in our present want of knowledge certain diseases must remain unclassed. It must be remembered that one of the most important means of advancing knowledge on these subjects is by comparing what is observed now with what was observed in times past, and hence the observations must be published in such a form that comparison is possible. If, for example, we are told that the number of deaths from zymotic diseases in New York in 1875 was 1,000, we can not compare it with the figures at a later period to much purpose, because the so-called zymotic diseases—which are Class I. in Farr's nosology—did not at that time include some diseases which would now be reckoned as belonging to it, as consumption, tetanus, and puerperal peritonitis.

The sanitarian wants a nosology based as far as possible upon causes of disease, yet he does not want all tubercular diseases reported together, but desires that the number of deaths due to consumption shall be stated apart from those due to tubercular meningitis or to tubercular disease of the bones, and he does not want a nosology which includes smallpox, typhoid fever, malarial fevers, and lobar-pneumonia in one group. For many purposes the simple arrangement of the diseases in alphabetical order is preferable to any nosological grouping, yet some grouping is absolutely necessary occasionally to save space. It is best applied to what are called local diseases, yet many of these would more properly be classed as manifestations of affections of the whole system, such as of gout or rheumatism. For most purposes cancer of the liver or of the breast should be classed under cancer, yet at times it must be considered in connection with diseases of the liver.

The majority of the cases of fatal disease are more or less complicated, and belong to several classes. The old idea that diseases can be divided into classes, orders, genera, and species, as is done for plants and animals, is now entirely abandoned, and it is evident that we must have not one nosological system, but several, adapted to different purposes; yet it is also extremely desirable that there should be more uniformity in the schemes used in reports of deaths than now exists.

J. S. Billings.

Nostoc [Fr.; cf. Germ. *nostoch*]: a genus of Algæ growing in fresh water or in damp places on the ground. All the species are composed of threads, consisting of small globular cells, between which are inserted, at intervals, larger cells called *heterocysts*. The threads are intricately wound round one another, and the whole surrounded by a mass of jelly. They reproduce asexually by division of their cells. Of the Nostocs proper there are twenty species in the U. S.

Nostoc threads.

Charles E. Bessey.

Nostrada'mus, whose true name was Michel de Notre-dame: physician and astrologer; b. Dec. 14, 1503, at St.-Rémi, in Provence, of Jewish parents; studied medicine at Avignon and Montpellier, and settled as a physician first at Agen, in the present department of Lot-et-Garonne, and afterward at Salon, near Aix. During the time of the plague, which at this period twice visited Southern France, he rendered great service. His immense fame, however, was built on his capacity as an astrologer. In 1555 he published his *Prophéties*, written in quatrains, and giving in an obscure and enigmatical manner prophecies concerning the coming centuries. Many royal persons—Catherine de' Medici, Henry II., Charles IX., and others—consulted him and loaded him with presents; the last-mentioned even made him his life-physician. In after times also the book found students and admirers; the latest is M. E. Bareste, whose *Nostradamus* appeared at Paris in 1842. In 1781 the book was forbidden by the pope, as it was found to contain a prophecy of the abolition of the papal authority. Nostradamus also published an almanac containing weather prophecies. D. at Salon, July 2, 1566.

Nostrils and their Diseases: The nostrils or nares are divided into the anterior nares, which can be seen by external inspection of the openings of the nose, and the posterior nares, to be seen only by aid of small circular mirrors placed in the back of the throat to reflect light, admitted through the mouth, to the nasal cavities above. The most common of their diseases is *catarrh*.

Nasal catarrh is produced by cold air, by insufflating dust, or by irritants. It is the beginning of many cases of laryngitis and bronchitis, and is an important local condition in a number of the infectious diseases, as in measles and influenza. Simple recent nasal catarrh produces a watery, alkaline serum. When more pronounced the catarrhal flow is less serous, contains mucous corpuscles, is viscid or even tenacious, and is yellowish in color and purulent. Chronic catarrh may result in constriction of the anterior nares, in the development of outgrowths of the mucous membrane, or even polypi. In the posterior nares, by extension to the throat, catarrh may result in permanent or obstinate nasopharyngeal catarrh. Such chronic catarrh may give rise only to habitual coughing and hawking of mucus, but it often impairs the hearing by tumefaction at the aperture of the Eustachian ducts or by extension to the middle ear. Nasal polypus is an attached tumor in the nostrils, originally a small projecting mass of granulations or enlarged glandular tissue. When chronic nasal catarrh has resulted in ulceration and death of the cartilages or bones of the nose, the discharge is often extremely offensive. This disease is known as ozæna. Close examination will discover particles of necrosed matter. Ozæna is more often the result of nasal catarrh in strumous, tubercular, and syphilitic persons. Epistaxis or nose-bleed is the result of local causes, as irritating or picking the nostrils; it is a frequent occurrence in persons having disease of the mitral valve of the heart; it is a symptom peculiar to typhoid fever; it is often due to excessive exercise and to excitement. The catarrhal diseases of the nostrils are treated by topical applications, inhalations, and sprays. Ozæna demands the insufflation or injection of antiseptic washes or the surgical removal of the dead bone. Polypus is removed by cutting or tearing. Nose-bleed is checked by cold applications on the nose, by plugging the nostril with lint, or the introduction of styptics, as tannic acid and persulphate of iron. In extensive bleeding from the nose the nostrils have to be plugged from behind as well as from before.

Revised by William Pepper.

Nota, Alberto, Baron: writer of comedies; b. at Turin, Italy, Nov. 15, 1775. His father had squandered his fortune, and the young man was obliged to toil for a livelihood. He studied law at Turin, and became an advocate at the age of eighteen. After struggling along in his profession for a time, he obtained official employment, and in 1811 he was made substitute for the procurator of the court at Vercelli. Somewhat later he became the secretary and librarian of the Prince of Carignano (later King Charles Albert). He was accused of liberalism, however, and had to give up his post. He removed to Milan, but had to return to Turin and resume his profession. In 1818 he once more entered the royal service, and was made undergeneral-intendant of the department of Nice. Thence he was transferred to Bobbio (1820), San Remo (1823), and finally became general-intendant at Casale (1833) and Coni (1840). D. at Turin, Apr. 18, 1847. During all his life he wrote comedies, the earlier and best of which show that his chief models were Molière and Goldoni. From the former he derived his fondness for general comic types, from the latter his method of depicting character. His defect, however, was a certain remoteness and generality of manner, markedly in contrast with the originality and *vis comica* of the greatest masters of the comic art. His first successful piece was *I Primi passi al mal costume* (acted in Turin, 1808). This was followed by *Il Progettista* (1809); *Il Nuovo Ricco* (1809); *L'Ospite francese* (1810); *I Litiganti* (1811); *Il Filosofo celibe* (1811); *L'Ammalato per immaginazione* (1813); *Il Benefattore e l'Orfana* (1814); *La Donna ambiziosa* (1817); *La Lusinghiera* (1818); *Alessina ossia la costanza rara* (1822); *La Fiera* (1826); *La Novella Sposa* (1826); *Il Torquato Tasso* (1826), etc. After the last date his comic style began to feel the sentimental influences of his time, and suffered greatly. Between 1816 and 1843 there were no less than twelve editions of his works, and many of the pieces were translated into the chief languages of Europe. The best Italian edition is *Commedie di Alberto Nota* (8 vols., Turin, 1842–43). A. R. Marsh.

Not'ables: in France, persons of noble birth or social distinction, from whom the members of the Assembly of the Notables were chosen. This body, which was first convened by the Valois king Charles V., owed its origin to the desire of the monarch to secure a more serviceable instrument of despotic power than the older States-General, which came into frequent collision with the royal will. As its members were dependent upon the crown, with which their interests were often identical, they generally consented to what the king proposed. The last Assembly of the Notables met in Nov., 1788. In the previous year it had accepted in part the reforms proposed by the Government, but now it refused to listen to the demand for the double representation of the Third Estate in the States-General. It opposed all innovations, and was dissolved Dec. 12, 1788.

Notacan'thidæ [Mod. Lat., named from *Notacan'thus*, the typical genus; Gr. νῶτον, back + ἄκανθα, spine, thorn]: a family of fishes of the order *Opisthomi*. The body is elongated (but not eel-like), and the tail tapers strongly backward; it is covered with very small cycloid scales; the lateral line is conspicuous; the head is conic, and the snout more or less produced; the mouth is inferior, the cleft moderate, and the lower jaw quite movable; the teeth are minute and pointed; the branchial apertures are normally extended; there are about eight branchiostegal rays; the dorsal fin is only represented by a number (7–30) of short disconnected spines about the middle of the length; the anal is elongated, and armed with numerous (12–15) spines in front; the caudal small and (typically at least) connected with the anal; the pectorals are well developed, and the ventrals are abdominal and composed of spinous (2–4) and articulated (7–8) rays. Several species are known chiefly from the oceanic abysses. Revised by F. A. Lucas.

Notary Public, or simply (as often called) **Notary**: a public officer existing among all civilized nations, and invested in almost every country in Europe and America with essentially the same functions and privileges accorded to notaries in ancient time—namely, the preparing and attesting of various instruments, the authenticating and certifying of examined copies of documents, the noting and protesting of bills of exchange, the administering of oaths and various other authenticating or solemnifying acts. The manner of appointment of notaries varies in different countries. In England they are appointed by the Archbishop of Canterbury, acting as the Court of Faculties; in Scotland they are admitted by the Lords of Session; in the States of the U. S. they are ordinarily appointed by the Governor. The particular functions and duties and the dignity attached to the office of notary vary in different countries; thus in England (where a notary must have served a clerkship) and many of the countries of Europe notaries are called upon to draw up papers, such as wills, which in the U. S. would be prepared by an attorney and simply acknowledged or sworn to before a notary. In England notaries have always exercised the right of administering oaths, but in the U. S. they can administer oaths only when given the power so to do by statute, which has been done by the U. S. and many of the individual States. In Great Britain and the U. S. a notary may refuse to act if he sees fit, but in some countries, as France, he can not refuse his services.

A notary is a ministerial officer, and is liable to a party injured by the negligent performance of any duty undertaken by him. Statutes also frequently declare his responsibility for misconduct, both civil and criminal. It is clear that in the absence of any statute his conduct is governed by that general rule of law which prescribes that any person who enters upon an undertaking requiring ordinary care and skill is liable to any one injured by this failure to exercise such care and skill. Still a notary is not liable to his employer if he commits an error acting under his employer's direction. Where a bill of exchange is given to an agent for collection, and the agent employs a notary to make protest of it (see Bill of Exchange), and the notary is negligent and thus discharges the drawer and indorsers, there is much divergence of judicial opinion as to the respective liabilities of the agent and notary to the principal—some decisions holding that when the act is strictly notarial (i. e. when the bill is a foreign one) the notary alone is liable to the principal, and that when the bill is an inland bill he is liable only to the agent who employed him; other cases holding that in either case the remedy of the principal is solely against the notary.

A notary can not transfer his official powers or authority to another, and therefore when called upon to perform a strictly notarial act he must in general perform it personally; but where there is a settled commercial usage in a place where a foreign bill is to be protested, that protest may be made by a notary's clerk, a protest so made will be held valid elsewhere, since the protesting of foreign bills is a matter of mercantile usage subject to local customs. In Great Britain and the U. S. courts will generally take judicial notice of the seal of a notary; but the notary's certificate of a certain fact generally has no more legal weight as evidence than the certificate of any other person, except his certificate that a foreign bill was duly protested.

For fuller information, see Brooke's *Office and Practice of a Notary of England* (5th ed. 1890), and the works of Proffatt and Rex on *Notaries*. F. Sturges Allen.

Notation [from Lat. *nota'tio*, deriv. of *notare*, to note]: in mathematics, a conventional method of representing quantities and operations by means of symbols. It explains the meaning of individual symbols, both of operation and of quantity, and shows how to combine them so as to express in the simplest manner every mathematical operation. A simple and comprehensive system of notation is essential to the progress of every science, but in no branch is a complete system more necessary than in mathematics, and in no branch has there been a greater diversity of systems proposed. Our present system is the result of the labors of many men, living in different ages, speaking different languages, and possessing different habits of thought; from these diverse sources a mathematical language has sprung up, defective in many respects, and yet sufficiently simple and copious for most of the purposes of analysis and investigation. Each department of mathematics has its own notation; in this article will only be considered the notation of arithmetic, or the method of writing numbers.

There are at present in general use only two systems of arithmetical notation, the *common* system and the Roman; in addition to these we shall also explain the method of the ancient Greeks.

(1) *The Common System.*—This is sometimes called the *Arabic*, because the figures which it employs were introduced into Europe by the Arabs. The following figures, expressing values regularly increasing by one from nothing to nine, are used in this system: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. These figures, taken separately, are called *digits*. The first one, named *naught*, is also called a *cipher* or *zero*; it stands for no number. The remaining ones are called *significant*

figures. All integral numbers are expressed by writing the proper digits in a line. The digit on the right is said to stand in the *first* place, the one preceding this in the *second* place, the next preceding in the *third* place, and so on. This order of arrangement is called the *scale* of the system. The same digit always indicates the same number of units, but the value of the unit indicated depends on the place it occupies in the scale. If a digit stands in the first place, it expresses simple units or *ones*; if in the second place, it expresses *tens*; if in the third place, it expresses *hundreds*; the value of the unit in any place is always ten times that of the unit in the next lower place. Thus the combination 376 stands for 3 *hundreds*, 7 *tens*, and 6 *ones*, or for the number *three hundred and seventy-six*. If we place a point—which we call the decimal point—on the right of the first place, we may continue the scale downward to any extent; in this case the digit on the right of the point is said to stand in the *first place of decimals*, the next stands in the *second place of decimals*, and so on. The unit of the first place of decimals is *one-tenth*; that of the second place, *one-hundredth*; that of the third place, *one-thousandth*, and so on. Thus the combination ·325 stands for 3 *tens*, 2 *hundredths*, and 5 *thousandths*, or for the number 325-*thousandths*. The scale thus completed is called the decimal scale; it will be noted that this scale is continuous throughout; that is, in proceeding from right to left the unit of each place is ten times that of the preceding place. If we place a cipher in each place, we may write the decimal scale as follows:

Period of billions.	Period of millions.	Period of thousands.	Period of units.		Period of thousandths.	Period of millionths.
etc., etc.						
hundreds of billions,						
tens of billions,						
billions,						
	hundreds of millions,					
	tens of millions,					
	millions,					
		hundreds of thousands,				
		tens of thousands,				
		thousands,				
			hundreds,			
			tens,			
			units,			
				Decimal point.		
					tenths,	
					hundredths,	
					thousandths,	
						ten-thousandths,
						hundred-thousandths,
						millionths,
						etc., etc.
0 0 0 ,	0 0 0 ,	0 0 0 ,	0 0 0	.	0 0 0 ,	0 0 0

For convenience of reading, the scale is separated into periods, each of which embraces three places, and is named as shown above. The denominations above billions are trillions, quadrillions, quintillions, etc., deriving their names from the Latin numerals. If a digit is written in the place of any cipher in the blank scale above given, it will express a corresponding number of units of the name indicated; thus the combination 326,812,435·278,812, expresses the number 326 *millions*, 812 *thousands*, 435 *units*, and 278 *thousandths*, 812 *millionths*. It will be observed that the unit of each place is some power of 10: thus the unit of the first place is 10^0, or 1; that of the second place is 10^1, or 10; that of the third place is 10^2, or 100, and so on. In like manner the unit of the first decimal place is 10^{-1}, or $\frac{1}{10}$; that of the second place of decimals is 10^{-2}, or $\frac{1}{100}$; that of the third place is 10^{-3}, or $\frac{1}{1000}$, and so on. It is from this law of relation that we name the scale a *decimal* scale; for like reason we call this system of indicating numbers the *decimal system*. In the system just explained the units corresponding to the different places are in geometrical progression, the *base* or *radix* of which is 10. Similar scales might be constructed having any other number as a *radix*, but such scales are not in common use.

There is an unfortunate ambiguity in the use of the terms billions, trillions, etc. In the French system, which is generally used in the U. S., each of these denominations is 1,000 times the preceding one; but in the English system it is 1,000,000 times, the billion being a million millions.

(2) *The Roman Method.*—In the Roman method of notation seven capital letters are used. These letters and the values they express are shown below:

Letters, I., V., X., L., C., D., M.
Values, 1, 5, 10, 50, 100, 500, 1000.

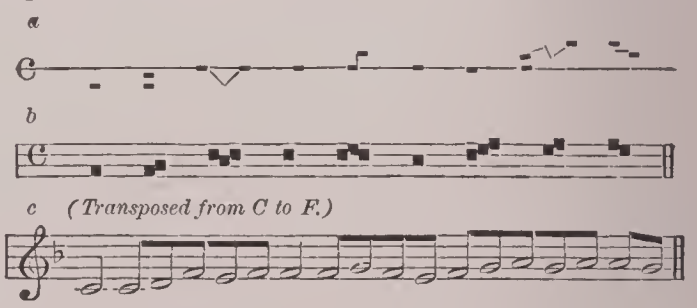
Any other number is expressed by a combination of these letters on the general principle that such a combination represents the sum of the values of its constituent letters, these being arranged from left to right in order of value, and the use of the same letter five times or more being avoided by using letters of greater value; but when, in accordance with the above, the same letter would occur four times, it is customary to employ the sub-principle that whenever a letter precedes one of greater value the value of the two is that of their difference instead of their sum. Thus III. denotes 3; VI., 6; LX., 60; XC., 90; XIV., 14; and MDCCLXXVI., 1776. This system is used only for dates, headings of chapters, and the like.

(3) *The Grecian Method.*—In representing numbers the ancient Greeks used either (1) the initial letter of the word denoting the number—e. g. Π (Pente) 5, Δ (Deka) 10, etc.; or (2) they used letters of their alphabet, to which they added the three obsolete characters ϛ′, ϙ′, and ϡ′. Thus the consecutive numbers from 1 to 9 were represented by the characters α′, β′, γ′, δ′, ϵ′, ϛ′, ζ′, η′, and θ′—*simple units*; the tens from 1 ten to 9 tens, or the numbers from 10 to 90, were represented by the characters ι′, κ′, λ′, μ′, ν′, ξ′, ο′, π′, and ϙ′—*tens*; and the hundreds up to nine hundred were represented by the characters ρ′, σ′, τ′, υ′, ϕ′, χ′, ψ′, ω′, and ϡ′—*hundreds*. Thousands were expressed by a subscript dash; thus the number 3,000 was written ,γ. The letter Μ written below any symbol increased its value ten thousand times; these conventional principles enabled them to write any number up to 1,000,000,000. The following examples show how numbers were expressed in this system:

,θ ϡ′ ϙ′ θ′, *nine thousand nine hundred and ninety-nine.*
,δ τ π β′, *four thousand three hundred and eighty-two.*
,γ α′, *three thousand and one.*

Other devices for expressing numbers were conceived by Archimedes, Apollonius, and others, but the entire system was, like that of the Romans, extremely unwieldy and ill fitted to practical computations. Revised by S. Newcomb.

Notation (in music): the mode or system by which musical thoughts are represented in writing, including all the signs, characters, figures, and arbitrary marks necessary to render such thoughts intelligible. The system now in use is mainly a product of the last three or four centuries, and in all civilized nations musical symbols are the same. In ancient times the recording of musical ideas was a subject of perplexity and uncertainty. To convey from one mind to another a clear idea merely of the pitch and the duration of several tones or sounds, though comprising only a very limited series, required of course certain signs or symbols which should possess a fixed meaning. The earliest signs adopted for this purpose seem to have been the letters of the alphabet, which were sometimes placed erect, sometimes inverted, mutilated, commingled, or cast into various fanciful forms, so that by degrees more than 100 of such characters came into use. After this greater simplicity was secured by the use of only a few Roman letters, the lower octave being represented by capitals, the second octave by small letters, and the third by small letters doubled. Besides the letter system another mode of representing musical sounds came into use, the leading feature of which was a single straight line, the various sounds being indicated chiefly by dots, either on the line or more or less distant from it. An illustration of this is given at *a* in the following example, taken from a work by Padre Martini, with its interpretation in black notes at *b* and in modern notes at *c*:



As late as the thirteenth and fourteenth centuries numberless crooked marks, loops, curves, hooks, wavy lines, and other signs, besides the dots, were used with the single straight line, forming a system not easy to be interpreted even by the most skillful of modern musicians. The introduction of several lines with their spaces, and notes of fixed form and duration, was the next important step. The lines were at first only four in number, though we sometimes find the staves belonging to two or three voices (with their proper clefs) so crowded together as to look like one stave of eight or twelve lines. The ancient notes belonging to the four-line stave are described in the article Large (*q. v.*). To indicate the pitch of the notes two clefs were used—

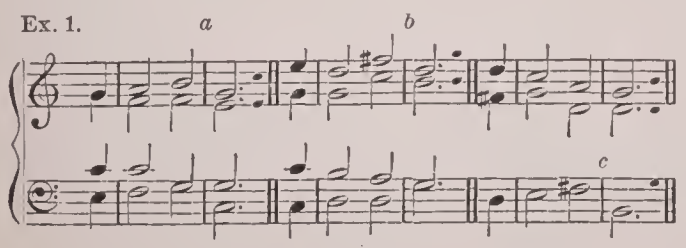
one to mark the place of middle C, and the other that of the F below. These clefs were not permanently fixed, but were placed on such a line as would serve most conveniently to keep the notes within the bounds of the stave and the spaces above and below. The stave now in universal use consists of five lines, and to each stave is prefixed a clef to designate, as from a starting-point, the various degrees of acuteness or gravity of the notes employed. Of these clefs that of F for the bass and that of G for the upper parts are of most frequent use in modern music, the C clef being reserved for certain orchestral parts, and also occasionally used for the tenor and alto in church music. The round-headed form of notes is now exclusively used, the old square breve seldom appearing except in the music of the church. The semibreve is now taken as the standard of unity or the note of longest duration, but the extent of that duration is determined by the will of the composer or performer. The actual speed of a piece of music is indicated by regulative terms or signs at the beginning, or is left to the discretion of the performer; but in all cases the time given to the semibreve determines the time of each minim, crotchet, quaver, etc., because these notes stand to it in the relation of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, etc. Intervals of silence also, corresponding in duration with the several kinds of notes, are indicated by characters called *rests*. To meet the want of notes bearing other ratios to the semibreve, as $\frac{3}{4}$, $\frac{3}{8}$, $\frac{3}{16}$, etc., the simple process of adding a dot to a note was adopted, whereby its duration became one-half longer—a dotted minim, for instance, being $\frac{3}{4}$ of a semibreve, a dotted crotchet $\frac{3}{8}$, etc. The dot is sometimes doubled; in this case the time expressed by the first dot is increased one-half. These dots are equally applicable to the rests. The use of bars was not general till about the middle of the seventeenth century, and to the same period is to be referred the grouping of quavers, semiquavers, etc., by ties or ligatures connecting their stems. Under the head of notation are also comprised the numerous signs of expression, emphasis, loudness and softness, retardation and acceleration of speed, various kinds of ornament, and all the marks belonging to the province of harmony. See Grove's *Dictionary of Music and Musicians*.

Revised by Dudley Buck.

Note [from O. Fr. *note* < Lat. *no'ta*, mark, sign, note; cf. *nos'cere*, *no'tum*, know, recognize]: in music, the character by which a tone is recorded and represented to the eye. (See Notation.) In a less accurate sense, the term "note" is often used for the sound of which it is the representative, as when we say a high note or a low note, meaning a high or low sound. Though not strictly correct, this usage of the word is common even in scientific works and in ordinary converse.

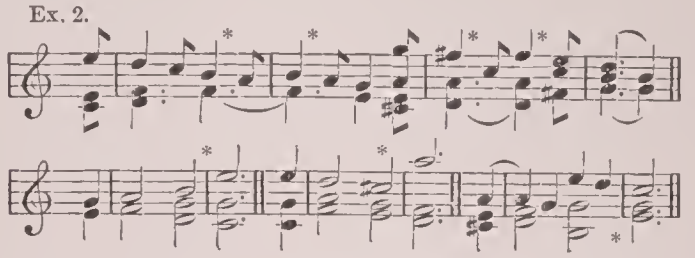
Leading Note.—The leading note is the seventh degree of the major scale, or the semitone next below the octave. In the scale of C the leading note will thus be B; in that of B♭, it will be A, and so in the other keys. In major keys with sharps the last sharp of the signature is always on the leading note. From a certain natural tendency to resolve itself upward into the octave, the major seventh of the scale is said to lead the ear in that direction, or cause it to expect that the next progression will be to the octave, and hence its name of leading note. In minor scales the seventh in its natural form is not properly a leading note, being a minor seventh above the tonic. It is thus a whole tone below the octave, and does not possess any special upward or leading tendency. This defect, however, is removed by the use of an accidental sharp, which brings the seventh into the same relation to the octave as in the major mode, and makes it equally characteristic. The leading note is considered as the most sensitive interval of the scale, because it creates in the mind of the hearer a peculiar longing or desire for an ascent into the octave above, which it already seems almost to touch. Instances of this are given at *a*, *b*, and *c* in Ex. 1, and these may be compared with the true progression as represented in each case by the black dots:

Ex. 1.



Exceptions to this general rule, however, occur in good compositions when special effects are to be produced, or in flowing melodies where the leading note is not prominent *as such*, or when by an upward spring the leading note in its resolution passes over the octave and takes the third or fifth above. Some cases of this kind will be seen in Ex. 2 under the asterisks:

Ex. 2.



The leading note, as third in the chord of the seventh on the dominant, is subject also to the rules relating to the resolution of sevenths; but in this case the rule of the leading note as such, and that affecting it as third in the chord of the seventh, are coincident in requiring that the progression should be one semitone upward—i. e. into the tonic.

Revised by Dudley Buck.

Nothnagel, Hermann, Hofrath: physiologist and neurologist; b. in Alt Lietzegoericke, Brandenburg, Sept. 28, 1841; was educated in Berlin; was privat docent in Berlin and Breslau; became Professor of Medicine in Freiberg (Baden) in 1872, in Jena in 1874, in Vienna in 1882. His principal works are *Topische Diagnostik der Gehirnkrankheiten* (Berlin); *Arzneimittellehre* (seven editions, Berlin); *Beiträge zur Physiologie und Pathologie des Darmes* (in *Zeitschrift für klin. Medicin*); *Bearbeitung einzelner Kapitel der Gehirnkrankheiten* (in Ziemssen's *Pathologie und Therapie*); also a large number of special researches on medical and physiological topics. J. M. Baldwin.

Notice [Fr. *notice*, from Lat. *notitia*, knowledge, acquaintance, a being known, deriv. of *noscere*, *notus*, know]: a legal term used with varying significations. At times it is synonymous with knowledge, as when a court is said to take "judicial notice" of matters of general knowledge. (See Evidence.) Again, it designates the act, means, or instrument by which information is conveyed, e. g. notice to quit (see Landlord and Tenant), notice of dishonor (see Bill of Exchange), notice of acceptance of proposals (see Contract, Assignment, Guaranty), notice in legal proceedings (see Procedure). It is also employed as a technical term to denote information concerning a fact, which "is regarded as equivalent in its legal effect to full knowledge of the fact, and to which the law attributes the same consequences as would be imputed to knowledge." To illustrate: If a person buys and receives property on credit by false representations concerning his financial ability, the vendor upon discovering the fraud may rescind the sale and retake the property from the vendee, or from any purchaser from the vendee having knowledge of the fraud. This right is equally available against a second purchaser, who had notice merely of the fraud and not knowledge.

Actual and Constructive Notice.—While technical notice is divided commonly into actual and constructive, both text writers and judges differ in their definitions of these terms. It is agreed that actual notice is properly applied to authentic information concerning a fact which is directly communicated to the party to be charged by notice. It also applies where a person has the means of knowledge to which he dishonestly shuts his eyes. Beyond this all is debatable ground. It is believed, however, that the weight of authority supports the following views: Notice concerning a fact is to be deemed actual when it consists of information that would put a prudent man upon inquiry, which if followed up would result in acquainting him with the fact, provided that the circumstances authorize the finding, without the aid of any legal presumption, that the fact, or some aspect of it, was brought home to the consciousness of the party. The following is an example: A person who was negotiating for the purchase of certain lands with the one who held the record title was told by their prior owner, who was still in possession, that the latter had a claim on them, and that the former had better let them alone or he would get himself into trouble. He nevertheless concluded the purchase without making any inquiries concerning the nature of the claim. Had he inquired he would have learned that the party in possession was a mortgagor of the prem-

ises. It was held to be a question for the jury whether the purchaser had actual notice of the mortgagor's interest. (*Brinkham* vs. *Jones*, 44 Wis. 498; but see *Lamb* vs. *Pierce*, 113 Mass. 72.) If in the above case the only information acquired by the purchaser concerning the former owner's interest in the land had been that he was still in possession of it, we should have had at most an example of constructive notice. The law casts upon him who purchases property from one not in possession the duty of inquiring as to the possessor's interest, and if he fails to perform that duty it charges him with notice of all the facts that reasonable inquiry would have discovered. The inference of notice, however, in this case is not one of fact, but results from a presumption of law. That presumption may be rebutted. The purchaser may show that he made due inquiry and yet failed to discover any defect in his vendor's title.

In many cases constructive notice is absolute, or, as is often said, the legal presumption that the party chargeable with notice has acquired information concerning the fact in question is conclusive. He will not be allowed to dispute it. This kind of constructive notice is frequently the creature of statute. Under recording acts (see RECORD OF CONVEYANCES) a duly executed and registered deed is absolute notice to subsequent purchasers and incumbrancers not only of its existence, but of all interests in the property thereby conveyed. Constructive notice has a prominent place in the law of negotiable paper. A purchaser of such paper is conclusively taken to have read it, and therefore is never allowed to dispute that he had notice of anything apparent on its face, as, for example, a restrictive indorsement or notarial marks of dishonor for non-acceptance. If he acquires it after maturity he is also charged absolutely with notice of all equities available against his transferrer. So a purchaser of real estate is conclusively deemed to have read every instrument which forms a part of his chain of title and to be notified of every interest therein referred to. This doctrine is necessary to the security of titles.

Whenever notice of a fact is established, whether by direct evidence, by an inference of fact, or by an inference of law, its legal consequences to the one chargeable with it are the same as those that would flow from his knowledge of the fact.

What Constitutes Notice.—This is often determined by statute, as in the case of the recording acts, or by an equally positive rule of unwritten law, as in the case of negotiable paper. Where no such rule exists, it is a question of fact in each case whether the evidence shows (1) that the party to be charged with notice received information of a character that subjected him to the duty to inquire further, and (2) that such further inquiry would have resulted in knowledge of the requisite fact. A mere rumor or a vague report, or a general statement by one having no interest in the subject-matter of the transaction, will not impose on one the duty of inquiry. Such information ordinarily furnishes no clew to the truth. "To set on foot an inquiry into the foundations of mere rumors would in most cases be a vain and impracticable pursuit." If the information, though given by a stranger to the transaction, is definite and apparently credible, and especially if it refers to an authentic source of knowledge, it will impose upon the recipient the duty of further inquiry. Acts may constitute notice. One who fences and cultivates a piece of land thereby gives notice that he claims an interest therein. Visible structures may give notice. The purchaser of a house showing fourteen chimney tops and but twelve flues is notified of an easement in two chimneys on the part of the adjoining house. See Wade on the *Law of Notice*; Pomeroy's *Equity Jurisprudence*, ch. ii., § 5. FRANCIS M. BURDICK.

Notidan'idæ [Mod. Lat., named from *Notidanus*, the typical genus; Gr. *νῶτον*, back + *ἰδανός*, sightly, comely]: a family of selachians of the order *Squali* or sharks, distinguished from all others by the increased number of branchial apertures. In the form of the body they resemble the typical sharks. The skin is shagreen-like; the head depressed, oval, with the snout protuberant; the eye has no nictitant membrane; the nostrils are inferior and distant from the mouth; the mouth has a crescent-like cleft; the teeth are very unlike in the opposite jaws, those in the upper jaw being broad and armed with several cusps, one of which extends beyond the others, but in the lower jaw are six pectinated teeth on each side forward and several smaller posterior ones; the branchial apertures are six or seven in number; small spiracles are persistent on each side of the neck; the dorsal fin is single and inserted far backward behind the ventrals; the anal is well developed and behind the dorsal; the pectorals have an anterior edge straight from the base; the ventrals normal. The family is distinguished, in addition to these peculiarities, by a number of others, and is composed of two genera, *Hexanchus* and *Heptanchus*, represented in most warm seas. T. GILL.

Notion: a concept or general idea. The word is used mainly in logic, and is generally made to include the name given to the class of objects to which a concept or idea has reference. Thus "horse," considered as a "concept" or "idea," is the mental state or inner meaning of the thinker, while "notion" includes the name horse by which this "concept" or "idea" is expressed in reference to the object of thought. J. M. B.

No'to: town of Sicily; 16 miles S. W. of Syracuse (see map of Italy, ref. 10–G). It stands on a hill not far from the sea and commands a charming valley. The old town (Neëtum or Netum), built about 450 B. C. on the ruins of one still more ancient, was utterly destroyed by earthquake in 1693. The modern town was founded in 1703. It carries on trade in grain, wine, oil, and fruits. Pop. 15,925.

No'tochord, or Chorda Dorsalis [*notochord* is from Gr. *νῶτον*, back + *χορδή*, cord; *chor'da dorsa'lis* is Mod. Lat., from Lat. *chor'da*, cord + *dorsa'lis*, pertaining to the back, deriv. of *dor'sum*, back]: a rod of tissue of cartilaginous or softer nature which occurs in Vertebrates, Tunicates, and some other forms between the alimentary tract and the nervous system. In the early stages of the embryo the notochord arises from the dorsal wall of the digestive canal and becomes cut off from it to take its permanent position. In some forms (Amphioxus) it persists throughout life as the sole skeletal structure, and extends from one end of the body to the other. In the ENTEROPNEUSTA (*q. v.*) it occurs only at the anterior end, and in the TUNICATA (*q. v.*) it is developed only in the tail of the larvæ. In the Vertebrates it never quite reaches the anterior end, and in most it usually undergoes more or less complete degeneration. Around it is a sheath of connective tissue, the notochordal sheath, and from thickenings and ossifications in this the bodies of the vertebræ are developed, and with their growth the notochord loses its supportive value and becomes more or less completely obliterated. In adult man the only remnant of it is the so-called "nucleus of the intervertebral disk." To the naturalist, one of the most interesting features connected with the notochord is that it, a skeletal structure, is derived from the alimentary tract, and hence is entodermal in origin. See EMBRYOLOGY. J. S. KINGSLEY.

Notopter'idæ [Mod. Lat., named from *Notop'terus*, the typical genus; Gr. *νῶτον*, back + *πτερόν*, fin]: a family of teleocephalous fishes of the sub-order *Physostomi*, distinguished by many peculiar characters. The family is composed of fresh-water fishes, attaining considerable size, and peculiar to the fresh waters of India and Africa.

Notornis: See the Appendix.

Notoryctes: See the Appendix.

Notothen'idæ [Mod. Lat., named from *Notothe'nia*, the typical genus; from Gr. **νότοθεν*, from the south; *νότος*, south + *-θεν*, from]: a family of teleocephalous fishes, of the sub-order *Acanthopteri*, representing in the southern seas to some extent the codfishes of the northern. The greatest number belong to the typical genus (*Notothenia*), and some of them are abundant on the south coasts of South America and contiguous islands, as well as Kerguelen's Land, Australia, etc.

Notre Dame, University of: See the Appendix.

Nott, ELIPHALET, D. D., LL. D.: educator; b. at Ashford, Conn., June 25, 1773; graduated at Brown University 1795; was licensed to preach in that year and settled at Cherry Valley, N. Y., uniting the duties of pastor of a Presbyterian church with those of principal of an academy; was pastor of a church at Albany 1798–1804, acquiring celebrity as a pulpit orator, especially by a sermon on the death of Alexander Hamilton; was elected president of Union College, Schenectady, N. Y., 1804, and retained that post until his death Jan. 29, 1866. Dr. Nott acquired a considerable fortune by several inventions in stoves and other apparatus for warming buildings, and gave large sums for the endowment of Union College and the foundation of scholarships for poor students. Under his management Union College became one of the strongest literary institutions in the U. S., and 3,700 students were graduated from it during his presi-

dency. Among his publications were *Counsels to Young Men* (1810) and *Lectures on Temperance* (1847).

Not'tingham, or **Nottinghamshire**, or **Notts**: an inland county of England; bounded N. by Yorkshire, E. by Lincolnshire, S. by Leicestershire, and W. by Derbyshire. Area, 824 sq. miles. The eastern part, the vale of the Trent, is level and low; the rest is hilly, partly consisting of moorland, partly covered with remnants of the famous old Forest of Sherwood, the haunt of Robin Hood. In the south are the wolds, consisting of upland moors and pasture lands, broken at intervals by fertile hollows. The principal industry of the inhabitants is the manufacture of lace and of cotton hosiery, and those branches are developed more extensively and to a higher degree of perfection than in any other part of England. Much of the surface is laid out for gardening purposes. Coal, inferior to that of Newcastle, iron ore, marl, and good building-stone are found. Pop. (1901) 274,683.

Nottingham: capital of the county of Notts, England; on the Leen, near its junction with the Trent; 38 miles S. by E. of Sheffield and 126 miles N. N. W. of London (see map of England, ref. 8–I). It was formerly irregularly built, but its appearance has undergone a great change, owing to the widening of the streets and other improvements. On the summit of a rock rising abruptly from the river stands the castle (1674–83), built on the site of a Norman fortress. It was restored in 1878, and is now an art museum. Close by is St. Mary's church, a cruciform structure in the Perpendicular style with a fine tower, and a handsome market-place, 5½ acres in extent, at one end of which is the Exchange, rebuilt in 1814. Among modern erections are the Guildhall (1888) and the University College, with its splendid range of buildings. The latter is chiefly for science teaching, and accommodates in its wings a free library and a natural history museum. The High School (1868) has a large income from endowments. Among modern churches may be mentioned the Roman Catholic Cathedral of St. Barnabas, designed by Pugin, in the Early English style. There is a public park of 150 acres, and a common, called Bulwell Forest, of 135 acres, besides a picturesque arboretum of 17 acres. The Trent is crossed by an iron and granite bridge (1871), and the Trent Bridge cricket-ground is the scene of the home matches of the county, which for many years has been the *berceau* of first-class cricketers.

Nottingham's manufactures of cotton and silk hosiery and of bobbinet and lace are most important; bicycles, baskets, cigars, and needles are also made, and iron and brass works, malting business, and trade in grain and cattle are extensively carried on.

After having been occupied for some time by the Danes, when it constituted one of their five boroughs, it was restored and repeopled by Edward the Elder, who rebuilt the fortress and threw a bridge over the Trent. Parliaments met at Nottingham in 1334, 1337, and 1357. In 1642 Charles I. began the Parliamentary war by setting up his standard here. Nottingham is the seat of a suffragan bishop in the diocese of Lincoln, and a municipal, county, and parliamentary borough, the last returning three members to Parliament. Pop. (1901) 239,753. R. A. Roberts.

Nottingham, Heneage Finch, D. C. L., First Earl of: statesman; son of Sir Heneage Finch, recorder of London; b. in Kent, Dec. 23, 1621; educated at Westminster School and at Christ Church, Oxford; studied law and was called to the bar at the Inner Temple 1645; was a member of the Convention Parliament Apr., 1660; made knight, baronet, and solicitor-general by Charles II. June, 1660; was returned to Parliament for the University of Oxford 1661; became Attorney-General May, 1670; Lord Keeper of the Privy Seal, with the title of Baron Finch of Daventry, Nov., 1673; Lord High Chancellor of England Dec. 19, 1675; presided at the trial of Lord Stafford 1680; was created Earl of Nottingham May 12, 1681, and died in London, Dec. 18, 1682. Famed in his own time for powers of oratory, his portrait was given by Dryden under the character of Amri in his *Absalom and Achitophel*.—His son and successor in the earldom, Daniel Finch, b. about 1647; educated at Christ Church, Oxford; became a privy councilor and First Commissioner of the Admiralty 1679; was one of the commissioners to treat with William, Prince of Orange, 1688; was Secretary of State under William and Mary 1689–93; attended William to the congress at The Hague 1690; was again Secretary of State under Anne 1702–04; became one of the lords justices for the administration of affairs 1714; was Lord President of the Council Sept., 1714–Feb., 1715; wrote an answer to Whiston on the Trinity (1721), for which he was thanked by the University of Oxford; succeeded to the earldom of Winchelsea 1729, and died Jan., 1730.

Noumea: capital of New Caledonia (*q. v.*).

Noun [from O. Fr. *noun*, *nom* > Fr. *nom*: Ital. *nome*, Span. *nombre* < O. Span. *nomme*: Portug. *nome* < Lat. *nō'men*, name]: in grammar, a name or appellation of something, whether it be a substance, creature, quality, action, phenomenon, or any other entity, concerning which name a statement may be made in a sentence. A verb is the name of something as truly as is a noun. The word *talk* is the name of an action. In the sentence, *Talk is cheap*, it is a name concerning which a statement is made; so in the sentence, *It is all for talk*, it is a noun by virtue of its function. In the sentence, *They talk*, a word of like form, if not identically the same word, is also the name of an action, but with different function. The adjective is a name of an attribute; so is a noun. In the sentence, *White is a color*, we call *white* a noun by reason of its function, while in *iron chain*, *stone wall*, names which commonly appear as nouns serve in the *rôle* of adjectives. In the sentence, *There are too many ifs and ands*, the conjunctions *if* and *and* are nouns by virtue of their function. The distinguishing characteristic of a noun therefore is not the fact that it is a name, but its function as furnishing subject-matter for statement in the sentence. From the side of form it is the distinctive mark of the noun as contrasted with the verb that the former has cases, the latter persons. This distinction is developed most finely in the highly inflected languages like Greek and Latin.

Nouns are either concrete, as names for substance, or abstract, as names of attributes, actions, or phenomena. Concrete nouns are either common or proper. A common noun is an appellation which may be shared by all the individuals of a class or applied to the entirety of a material, as *man*, *tree*, or *water*, *wood*. A proper noun is permanently and definitely appropriated to mark an individual person or thing. The name *city* may be applied to any individual of a class, but *Chicago* has been appropriated like a tag or a trade-mark to designate one certain individual. Proper names may generally be traced historically to common names which from persistent connection with individuals have lost their meaning and become purely symbolic instead of representative; thus *Newcastle*, *Neuburg*, *Neuchâtel* were originally common names, *a new castle*, and the name *Smith*, a class name, *smith*. Proper nouns may in their turn become common when extended to a class of individuals sharing the prominent characteristic of the original holder of the name; thus *academy*, *czar* (Cæsar), *palace*, *a Napoleon*, i. e. an autocrat, *a Judas*, i. e. a traitor.

Common nouns may be divided into material nouns, as *water*, *iron*, and class-nouns, and these into individual nouns, as *man*, *house*, and collective nouns, as *people*, *crowd*, *army*. Benj. Ide Wheeler.

Novac'ulite [Lat. *novacula*, razor + suffix *-ite*]: a fine-grained, gritty, homogeneous, siliceous rock, translucent on thin edges and having a conchoidal fracture. It is known to occur at several localities in Europe, in China, and in Georgia and the Carolinas; and it constitutes an important Silurian formation in Arkansas, where it is quarried for the manufacture of whetstones. The variety quarried contains 99·5 per cent. of silica, and is so compact as to absorb but ⅙ per cent. of water. As an abrasive material it is distinguished by its fineness, and its chief use is for giving the final finish to cutting edges. See the annual report of the Geological Survey of Arkansas for 1891. G. K. Gilbert.

Nova (or **New**) **Goa**: See Goa.

Novaković, nov'aăk-ov'ich, Stojan: author; b. at Šabac, Servia, Nov. 1 (o. s.), 1842; was educated at Belgrade, where he became professor in 1865, receiving in 1867 the position of national librarian. He was appointed Minister of Education in 1873, and reappointed in 1874, and again in 1880. During his term of office he reorganized the Servian schools. In 1876 he became Professor of Servian Philology and Literary History at the High School of Belgrade; in 1883 he became a senator; in 1884 Minister of the Interior; in 1886 resigned and was appointed minister to Turkey. His greatest work is a history of Servian literature, *Istorija srpske književnosti* (1867; 2d ed. 1871). In 1869 he published an exhaustive Servian bibliography for the period from 1741-

1867, which he continued in the *Glasnik*. Other noteworthy works of his are *Srpska sintaksa* (3d ed. Belgrade, 1874); *Kosovo*, a collection of folk-songs (3d ed. Belgrade, 1876); *Primjeri*, an historical chrestomathy (1877); *Pripovetka o Aleksandru Velikom* (The Servian Alexandreis, 1878): *Srpska gramatika* (Belgrade, 1879). J. J. Král.

Novalis: pseudonym of Friedrich Leopold, Freiherr von Hardenberg, a poet. He was born at Wiederstädt, a family estate situated in the county of Mansfeld, Saxony, May 2, 1772; studied philosophy at Jena, where he was deeply influenced by Fichte and Schiller, and afterward devoted himself to the study of jurisprudence, chemistry, and mathematics at Leipzig and Wittenberg. The sudden death of his betrothed overwhelmed him with grief, which developed into profound melancholy. During this period he wrote the famous *Hymnen an die Nacht* and the *Geistliche Lieder*, the most perfect of his poetical productions. In 1797 he went to the mining-school of Freiberg for the purpose of studying geology. By coming into renewed contact with life, and by a faithful devotion to his studies, he soon overcame the morbid state of his mind. Shortly after his return from Freiburg he joined in Jena the circle of young writers who gathered around the Schlegels and Tieck, and who are generally known as the founders of the romantic school in Germany. More profoundly than any of the other members he conceived the idea of the unity of poetry, philosophy, and religion, and assigned to poetry the gigantic task of solving the final problems of life. To the principles of romanticism as he understood them he tried to give artistic expression in his unfinished romance, *Heinrich von Ofterdingen*, which he wrote in opposition to Goethe's *Wilhelm Meister*. The air of mysticism surrounding this fragment and the deep philosophical thoughts, frequently assuming the tone of oracles, still fascinate the reader, though as a novel the work must be pronounced an utter failure. It was only in the domain of lyric poetry that the vague emotions of Novalis's deeply agitated soul found their adequate and highly musical expression. D. at Weissenfels, Mar. 25, 1801. His writings were collected and published by L. Tieck and F. Schlegel (2 vols., 1802; 3d vol. 1846): an excellent edition of his poems was made by W. Beyschlag (1869), and an English translation of a selection of his works was published in London in 1891. See also A. Schubart, *Novalis Leben* (1887), and I. Bing, *Friedrich von Hardenberg* (1893).

Julius Goebel.

Novara, nō-vaa′raă: town; in the province of Novara, Italy (see map of Italy, ref. 2-B); about 30 miles W. of Milan, on a rising ground in the midst of the great fertile plain between the Sesia and the Po. The cathedral rivals St. Ambrogio of Milan in antiquity, having been founded A. D. 400. Charitable institutions of all sorts abound, and the provision for general education is liberal. Novara is the largest grain-market in Piedmont, and its manufactures are numerous and extensive. Among these are cotton and linen cloths, starch, candles, sausages, earthenware, hides, etc. Novara is of pre-Roman origin; its inhabitants were noted for their industry in the time of Pliny; and it has played a considerable part in the history of Northern Italy. Early in the twelfth century it was taken and burned by the emperor Henry V. In 1500 Ludovico il Moro was held a prisoner here: in 1513 it was the scene of a battle that ended in the expulsion of the French from Italy; in 1821 the constitutional troops were here defeated by the Austrians; and here again, in 1849, the Austrians triumphed over the Sardinian army. Pop. (1890) 19,577.

Nova Scotia [Lat., New Scotland]: originally Acadia; a province of the Dominion of Canada, consisting of the peninsula of Nova Scotia proper and the island of Cape Breton, which is separated from the mainland by the Gut of Canso. It lies between 43° 25′ and 47° N. lat., and 59° 40′ and 66° 25′ W. lon. Its extreme length is 350 miles, and its breadth varies from 50 to 100. Total area, 20,907 sq. miles. The peninsula is joined to New Brunswick by an isthmus 13 miles wide, across which a ship-railway, joining the waters of the Bay of Fundy and Bay Verte, is (1894) in process of construction. The coast waters of Nova Scotia are the Gulf of St. Lawrence on the N., the Atlantic on the N. E., E., and S., and the Bay of Fundy on the W. (see map of Quebec, New Brunswick, and Nova Scotia).

Physical Features.—The province is intersected by chains of lofty hills, and is indented with deep bays and noble harbors all along its coast. On the southeastern or Atlantic side there are twelve, capable of affording shelter to the largest ships, while every few miles along the shore are smaller harbors, easy of access, forming an admirable shelter for the hundreds of fishing-vessels which ply their calling for the greater part of the year. The shore is studded with small islands. The interior is covered with a network of lakes which find their outlet in numerous small rivers, most of which are navigable for small vessels for from 5 to 12 miles. The chief rivers are the Shubenacadia, Avon, Annapolis, Lahave, Musquodoboit, and St. Mary's. The surface is generally hilly, but the greatest elevation is only 2,100 feet.

Geology.—The more regular geological formations run, for the most part, parallel to the general trend of the Atlantic coast-line. The region forming the southern half of the peninsula of Nova Scotia lies on the Atlantic in the form of a curved wedge, whose apex is formed by Cape Canso, and its base by the narrow triple belt of Silurian, Triassic sedimentary, and Triassic igneous. This area is essentially Cambrian, broken in several districts by the irruption of vast masses of granite, and in many places well covered with drift from the more northerly formations; it is the location of the extensive series of gold-bearing rocks. The Bay of Fundy is warded off from this region by the narrow triple bulwark already mentioned, consisting of, first, a huge wall of massive Triassic trap about 120 miles long, containing very interesting minerals and forming the range called the North Mountains. Next come the narrow Triassic intervals at the foot of this range, drained by the Cornwallis and Annapolis rivers toward Minas basin, and covered by the waters of St. Mary's Bay toward the Atlantic. Lastly, a Silurian strip, with Devonian patches, lying against the parallel range of the South Mountain, coterminous with the Cambrian area.

The northern half of the peninsula and the contiguous island of Cape Breton, to the eastward, are principally occupied by Carboniferous and Permian strata, through which rises, in the W., the chain of the Cobequid Mountains, a mass of ancient igneous rock 100 miles long. This is flanked on the S. with narrow strips of Silurian, Devonian, Carboniferous, Triassic, and the waters of the Minas basin. Through the Carboniferous and Permian in the E. protrude in irregular patches of greater or lesser extent areas of old igneous, Cambrian, Silurian, Devonian, and, in the highlands of Cape Breton, pre-Cambrian rocks also. Within these regions, from the Silurian to the Carboniferous, are found great deposits of iron, limestone, marble, gypsum, coal, freestone, manganese, copper, etc. The coal-fields are extensive and of great value. There are besides vast deposits of bituminous shale rich in petroleum.

Climate.—The climate of Nova Scotia is remarkably temperate, being greatly affected by the ocean currents which surround it. The extremes of temperature are not so great as farther inland. Along the coast the mercury rarely falls to zero, but occasionally it falls 10° below; in summer it rarely reaches 90°. For Nova Scotia the mean temperature of summer is about 61°, of winter about 23°. The average mean annual temperature is about 42°; the average annual percentage of cloud, 60 per cent.; average precipitation of water (rain and snow) per annum, about 45 inches. Wintry weather lasts generally from December to March. The spring is usually backward, but vegetation is very rapid. From May to November the weather is very pleasant and healthful.

Agricultural Products.—The dike lands around the Bay of Fundy are admirably adapted to the production of hay. The interval lands all over the province are rich and productive. The upland is of varying degrees of fertility. Wheat, oats, rye, barley, buckwheat, and Indian corn, together with almost every variety of vegetables, are produced abundantly. Apples, pears, plums, cherries, and all the small fruits of temperate climates are largely cultivated. Away from the sea grapes ripen in the open air. Increased attention is given to the cultivation of fruit, the Government having established a school of horticulture at Wolfville, and considerable quantities are shipped to the English market. In 1891 the farm products included 165,806 bush. of wheat, 227,530 of barley, 1,559,842 of oats, 5,113,612 bush. of potatoes, 63,391 tons of hay, 1,051,592 bush. apples, 9,004,118 lb. of butter, 589,363 lb. of cheese, and 1,072,234 lb. of wool.

The forests of Nova Scotia are very valuable, although they have been greatly injured by fires. They consist chiefly of white and red pine, oak, tamarack, rock maple, hickory, elm, and walnut.

Divisions and Population.—The province (including Cape Breton) is divided into eighteen counties, with population in 1881 and 1891 as follows:

COUNTIES.	* Ref.	Pop. 1881.	Pop. 1891.	COUNTY-TOWNS.	Pop. 1891.
Annapolis	2-A	20,598	19,350	Annapolis	.....
Antigonish	2-C	18,060	16,114	Antigonish	.....
Cape Breton	1-D	31,258	34,244	Sydney	2,427
Colchester	2-B	26,720	27,160	Truro	5,102
Cumberland	2-B	27,368	34,529	Amherst	3,781
Digby	2-A	19,881	19,897	Digby	2,000
Guysborough	2-C	17,808	17,195	Guysborough	....
Halifax	3-B	67,917	71,358	Halifax	38,556
Hants	2-B	23,359	22,052	Windsor	2,838
Inverness	1-D	25,651	25,779	Port Hood	.....
King's	2-B	23,469	22,489	Kentville	1,686
Lunenburg	3-B	28,583	31,075	Lunenburg	4,044
Pictou	2-C	35,535	34,541	Pictou	2,998
Queen's	3-B	10,557	10,610	Liverpool	2,465
Richmond	2-D	15,121	14,399	Arichat	.....
Shelburne	3-A	14,913	14,956	Shelburne	.....
Victoria	1-D	12,470	12,432	Baddeck	.....
Yarmouth	3-A	21,284	22,216	Yarmouth	6,089
Totals	.....	440,572	450,396		

* Reference for location of counties, see map of Province of Quebec, etc.

Principal Towns.—The chief towns are Halifax, the capital (pop. 38,556); Dartmouth (6,249); Truro (5,102); Yarmouth (6,089); Lunenburg (4,044); Spring Hill (4,813); Amherst (3,781); New Glasgow (3,776); Pictou (2,998); North Sydney (2,522); Windsor (2,838); and Liverpool (2,465). The eastern half of the province was settled almost wholly by Scotch, the center and west by English, Scotch, Irish, American loyalists, and a few Canadian French. The county of Lunenburg is almost wholly German. The Micmac Indians number 2,129.

Industries.—In addition to farming the chief industries of the province are fishing, lumbering, and mining. The fishery returns for 1891 show that during that year 14,065 vessels and boats, valued at $1,416,048 and manned by 24,070 men, were engaged in the work. The catch was valued at $7,011,300; comprising cod, $2,464,982; mackerel, $1,399,694; lobster, $1,100,927; herring, $621,722; all others, $1,423,975. The products of the forest included 202,938 cubic feet of white pine timber, 3,082,940 cubic feet of other timber, and 5,195,498 pine and spruce logs. The principal mining industries are coal and gold. In 1893 there were mined 2,229,715 tons of coal, while the production of gold amounted to 18,849 oz.

Prior to the introduction of steel and iron, ship-building was very extensively carried on. A large number of vessels are still built, the number on the returns for 1892 being 2,740, with a tonnage of 425,870. Since 1880 the manufacturing industries have greatly increased. There are two large sugar-refineries and a cotton-factory at Halifax, a cotton-factory at Windsor, and a cotton-duck factory at Yarmouth, smelting-works and rolling-mills at Londonderry, large iron-works at Ferona, steel-works and glass-works at New Glasgow, and numerous smaller establishments, including woolen-mills, tanneries, foundries, shoe-factories, canning-factories, agricultural-implement works, gunpowder and dynamite works. A railway system connected with the great lines of the continent extends throughout the province.

Religion, Education, etc.—According to the census of 1891 there are in the province 122,452 Roman Catholics, 108,520 Presbyterians, 83,122 Baptists, 64,410 members of the Church of England, 54,152 Methodists, 5,882 Lutherans, and 3,112 Congregationalists. The Roman Catholics have two dioceses: the archbishopric of Halifax and the bishopric of Arichat. There is also a bishop of the Church of England, whose diocese extends to Prince Edward Island as well as Nova Scotia. Public schools are supported by a grant from the Government amounting to $222,000, and by direct taxation of the municipalities. In 1893 there were 2,252 schools with 2,319 teachers and over 100,000 pupils. Each of the eighteen counties has an academy. There is a provincial normal school at Truro. There are also six colleges: Dalhousie College and University, at Halifax, which is non-denominational; King's College and University (Episcopal), at Windsor; Acadia College (Baptist), at Wolfville; St. Francis Xavier (Roman Catholic), at Antigonish; St. Ann's (Roman Catholic), in Digby County; and a Presbyterian Theological College, at Halifax. There is an institution for the blind and an institution for the deaf and dumb at Halifax. The province has an admirable system of public charity.

History and Government.—Nova Scotia was visited by the Cabots in 1497. It was first settled in 1604 by the French under de Monts. At that time Nova Scotia, New Brunswick, and a part of Maine were called Acadia. The settlement of Port Royal was attacked by the English colonists of Virginia under Sir Samuel Argall in 1614. They captured the place, and claimed the territory as belonging to England. For many years Acadia was a battle-field for the French and English. In 1621 James I. granted the whole peninsula to Sir William Alexander. It was then for the first time called Nova Scotia. A small Scotch settlement was formed opposite Port Royal, but it did not prosper. After many years of war Nova Scotia was finally ceded to Great Britain by the Treaty of Utrecht in 1713. In 1749 Halifax was settled by Lord Cornwallis. In 1755 the Acadians were expelled from King's and Annapolis Counties. The struggle now went on for the island of Cape Breton. It was ceded to Great Britain by the Treaty of Paris, 1763. Nova Scotia joined the Dominion of Canada in 1867. The Dominion pays an annual subsidy to the province for purposes of the provincial government. The province also enjoys a royalty on coal, gold, and other minerals. The local legislature consists of an upper house of twenty members, and a house of assembly of thirty-eight. The executive is composed of a lieutenant-governor appointed by the governor-general in council, and eight members, three with portfolios and five without.

AUTHORITIES.—See the histories by Haliburton, Murdoch, and Campbell; *Nova Scotia Archives*, compiled by Aikens; Dawson's *Acadian Geology*; and the public documents of Canada and Nova Scotia. JOHN FORREST.

Nova'tian (Lat. *Novatia'nus*): a schismatic Roman bishop of the third century, sometimes called "the first antipope," founder of the rigorous Puritanic sect called Novatians. Perhaps he had been a Stoic philosopher. He was learned and eloquent, but of melancholy temperament; was baptized by sprinkling while on a sick-bed, and not confirmed, but notwithstanding this twofold irregularity soon after became a presbyter. In 251 he was persuaded by Novatus from Carthage to be made bishop in opposition to Cornelius, but was formally excommunicated the same year by the dominant party. He then set out to organize an opposition church, but according to Socrates (*Hist.*, iv., 28) suffered martyrdom in the reign of Valerian (253–260 A. D.). We have a letter of his to Cyprian, in the name of the presbyters and deacons of Rome (*Ep.*, xxxi.). He wrote also *De Cibis Judaicis* (about 250) and *De Trinitate* (about 256), a very valuable treatise. There is an excellent edition of his writings by Edward Welchman (Oxford, 1724), but the best is by John Jackson (London, 1728); those mentioned are translated in the *Ante-Nicene Fathers* (New York, vol. v., pp. 308–311, 611–650). The sect spread E. and W., and continued till after 450 A. D. Revised by S. M. JACKSON.

Novatianism: See NOVATIAN.

Novation [from Lat. *nova'tio*, liter., a making new, deriv. of *nova're*, renew, make new, deriv. of *no'vus*, new; cf. Eng. *new*]: in Roman law, the substitution of a new obligation (see OBLIGATION) for an old one, the old obligation being thereby extinguished. In the new obligation the parties may be the same as in the old, or there may be a new obligee or creditor, or there may be a new obligor or debtor. In the two latter cases (which come under the head of "delegation") novation was resorted to by the Romans because in principle (as at English common law) obligations were not capable of being transferred to new parties.

English Law.—The fact that novation, like other Roman contracts, was independent of "consideration" in the English sense (see CONSIDERATION) makes the Roman rules of novation largely inapplicable in English law. Novation without change of parties does not seem to be recognized at all; novation with change of parties is recognized in but one class of cases. Where, for example, "A owes B £100 and B owes C £100, and the three meet and it is agreed between them that A shall pay C the £100," it is said that "B's debt is extinguished, and C can recover that sum against A." (Bullen, J., in *Tatlock* vs. *Harris*, 3 T. R. 174.) Such a transaction is strictly a double novation, since the new contract between A and C replaces and extinguishes two previous obligations, viz., that of A to B and that of B to C. It comes easily within the English rules of consideration, because C's surrender of his claim against B is a sufficient consideration for his contract with A; B's surrender of his claim against A is a sufficient con-

sideration for the release which he receives from C; and A's release from B's claim is a sufficient consideration for his promise to C.

Both in the Roman and the English law the substitution of a new creditor by novation requires the consent of the debtor, and the new creditor sues on the new obligation—facts which in both systems distinguish novation from the cession of an obligation or assignment of a debt. Both at Roman law and at English common law a method was devised for ceding or assigning a claim without the consent of the debtor, and with the effect of enabling the new creditor (the cessionary or assignee) to sue on the old obligation. In both systems the method devised was the same—the assignee was made *procurator* or attorney of the old creditor, and sued in the old creditor's name. (See MANDATE and POWER OF ATTORNEY.) In modern European law, as in English equity and the modern legislation of Great Britain and the U. S., rights of action on contract are regularly assignable, and the assignee sues in his own name.

Modern Codes.—In most of the European and South American codes, and also in the codes of Louisiana, California, and North and South Dakota, the Roman rules of novation are restated with little change; but the importance of the doctrine is far less than in the older Roman law. In modern European law obligations are regarded as capable of transfer not only on the active side (to a new creditor), but also on the passive (to a new debtor); and although in the latter case the assent of the creditor is necessary, it is not assumed that a new obligation has been contracted between him and the new debtor. Novation between the same parties is regarded as possible, but an agreement to change the form or the substance of an obligation or its modalities (e. g. time or place of payment) is not assumed, in case of doubt, to imply the creation of a new obligation. MUNROE SMITH.

No'va Zem'bla (in Russian, *Novaya Zemlya*, i. e. New Land): two large islands separated by a very narrow strait, forming an enormous crescent in the Arctic Ocean and separating the Sea of Barents from Kara Sea, N. of Northeastern Russia and Northwestern Siberia; belonging to Russia. Area, 34,500 sq. miles. They are uninhabited, but are visited during the summer by whalers and hunters of bears and reindeer. The islands are very desolate, and have been explored by Baron Nordenskjöld.

Revised by M. W. HARRINGTON.

Novel [from O. Fr. *novelle, nouvelle* (> Fr. *nouvelle*) piece of news, liter., femin. of *novel* (whence Eng. *novel*, new, strange) < Lat. *novellus*, dimin. of *novus*, new]: in English, a fictitious prose narrative, which describes real life, past or present, the term romance being applied to narratives of a more or less fantastic character. The distinction is not always closely observed, and no history of the novel can be at all satisfactory without including frequent reference to romance; they are simply two kinds of prose fiction, one the work of realism, the other of idealism.

Early Forms of Fiction.—Fictitious narratives are found in many early and remote literatures. There are Chinese, Japanese, and Egyptian novels, and toward the close of the ancient Greek literature we find prose romances of a somewhat fantastic sort, which were imitated freely at the time of the revival of letters. In Roman literature the *Metamorphoses* or *Golden Ass* of Apuleius is the only survival of a form of story that was extremely common, and the *Satyricon* of Petronius gives us a satirical representation of the corruption of imperial Rome. It was not from these fragments, however, that the modern novel arose, but rather from other sources, one of which was the collections of short tales by unknown authors that appeared in Italy in the fourteenth century. The most important of these was called *Il Novellino*. It contained a number of stories already told a thousand times in prose or verse, familiar in rhymed *fabliaux*, or as historical or biographical anecdotes. They had accumulated from all sources—from the classics, from the East; they were the common property of the world. There were many collections of this sort, but they are all mere inchoate beginnings in comparison with the *Decameron* of Boccaccio (1353), a collection of 100 tales, also gathered from various sources, but told with such charm and grace of style that the book became the model for modern prose. Other Italian novelists followed in Boccaccio's footsteps, and their work spread, in translations, over the rest of Europe. It was the English play, rather than the novel, that was fed from this supply. More important sources of the modern novel are to be found in Spain, a country which acquired power and influence as Italy lost them.

Spanish Romance.—In Spain it is possible to observe many instances of the never-ending conflict between idealism and realism. Nowhere has the division between these two ways of looking at the world been more sharply drawn. The romancers had the additional charm of looking at a world which had many of the qualities of fairyland. The most celebrated of these, the AMADIS OF GAUL (*q. v.*), forms the link that connects the mediæval romance with the modern novel. While it is a fantastic representation of the glory of chivalry it also contains much of the tendency to analytic reflexion which has become the main characteristic of later fiction, and it led directly to a host of imitators, from which the novel was laboriously developed. The origin of the *Amadis* is very obscure; its sources are to be found in Portugal, Spain, France, and England, and to this innate cosmopolitanism it owed perhaps a good part of its success, for it became popular throughout Europe. It was the work of various hands, and was probably first printed early in the sixteenth century. It was a literary representative of the popular taste, and was widely read in its many translations. In Spain it had many followers. In that country many mediæval forms still survived. The long conflict with the Moors had intensified the zeal for the Church as well as a love of warfare, and both these feelings found full expression in the romances which flourished until they were smiled away from out the world by *Don Quixote*. Their only rival in popular favor was the pastoral novel. The first and most important novel of this sort was Montemayor's *Diana*, which appeared about 1559. It owed much of its form to Sannazaro's *Arcadia* (1502), itself inspired by Boccaccio's *Ameto*. The *Diana* was widely translated and imitated. While it would be hard to devise any form of fiction that should be less like life, in time the pastoral secured a hold on reality by the habit which soon became common of describing real persons and incidents under the disguise of shepherds and shepherdesses and their doings. The novel lay hidden beneath those cumbersome trappings.

Spanish Novels.—The realistic novel had, however, a more definite pedigree in that alongside of these unreal works of fiction there grew up in Spain another and very dissimilar form which was destined to have a great vogue. This was the picaresque novel, a story describing real life. The name is derived from the Spanish *pícaro*, or scamp, who is always the hero of these novels. The first to appear was the *Lazarillo de Tormes*, in 1553. It was written by Hurtado de Mendoza, and at once attained great success abroad as well as at home. It was followed by other stories of the same sort by different authors. The most famous of these was *Guzmán de Alfarache*, by Mateo Aleman. While the extravagant romances gave expression to the most serious ideals of the Spaniards, these new picaresque novels indicated a reaction against their cloying impossibility. By the representation of evil deeds, of petty mischief, of ridiculous misadventure on the part of unmoral heroes of low birth, many being reminiscences of the mediæval tales, these novels became not merely formidable rivals, but severe criticisms of the romances which were already hastening to their end. The death-blow was given them, as was said above, by *Don Quixote* (1605–15).

French Romances.—Both the idealistic and the realistic novels made their way all over Europe, but it was in France, then acquiring the importance which Spain was losing, that their influence was greatest. It was the romance that found here a more congenial home than the picaresque novel, for it better suited the artificial society of the seventeenth century. D'Urfé's *Astrée* was the most famous of the pastoral novels, while there was a host of heroic novels of ponderous size and inflated incidents, such as La Calprenède's *Pharamond* (1647), Gomberville's *Polixandre* (1637), and Mlle. de Scudéry's *Clélie* (1660), with which the series closed. The heroic novels deserve to be mentioned with respect for the good they accomplished in expelling the pastoral stories from any possible authority over writers and readers. Their imposing formality, their fantastic artificiality, also served a good purpose in portraying models of decorum and honor for the civilization of a number of readers.

Realistic Novels in France.—While these were the accepted novels of the century, there ran alongside of them a counter-current of realistic fiction, bearing much analogy to the Spanish picaresque novel, from which it sprang. Barclay's *Euphormio* (1603) is the earliest; it was quickly followed by Sorel's *Francion* (1622), the first French novel

of manners. Sorel's *Berger extravagant* was a caricature of the extravagant pastorals. Scarron's *Roman comique* (1652) and Furetière's *Roman bourgeois* (1666) were realistic novels that really expressed not merely a literary but also a political reaction against accepted ideals. The long romances fell by their own weight, but they are always spoken of with respect; the realistic stories are, however, the ones that are read by posterity, and have had the most influence. Mme. de La Fayette's *Princesse de Clèves* (1678), thanks to its brevity as well as to its delicate sentiment, still survives as a study of passion told with rare directness and simplicity. It marked the end of the long romance by showing how unnecessary was the painful accumulation of mere incidents. Le Sage's *Gil Blas* was the successful realistic novel, and its form shows how dependent was this school upon the Spanish picaresque story.

Beginnings of English Fiction.—In England the novel slowly acquired importance. John Lily's *Euphues* (1579–80) was a didactic book in the form of a story. Sidney's *Arcadia* (1590) was the English representative of the pastoral, but the novels that were read for more than a century were for the most part translations of foreign masterpieces. The heroic romances of Spain and the picaresque novels were both extremely popular. These last inspired crude imitations in T. Nash's *Jack Wilton* (1594), and in *The English Rogue* (1665–71). In their time the French heroic romances were also translated and admired, but they had more direct influence on the drama than on fiction.

English Novels.—The most important forerunners of the English novel were Swift's *Gulliver's Travels* (1726)—to speak only of modern times, fantastic voyages had already been written by French satirists—and De Foe's *Robinson Crusoe* (1719), as well as in his other stories now almost wholly overshadowed by that more famous book; but satire is never a lasting inspiration—as Rabelais had shown—and De Foe's masterpiece, though it had many imitators, founded no school. A more fruitful source was the *Spectator*, with its intelligent recognition of the great advance in power of the *bourgeoisie*, and with Addison's untiring efforts to civilize this class. When they had acquired power, the romances became the reading of the ignorant and of children. Just as the flourishing monarchies of Spain and France had produced an aristocratic romance, dealing with great people who were enveloped in a misty splendor, England, now free, began to portray its own social and political ideals in the modern novel. Citizens became the heroes in the place of grandees deposed, and they preferred reading something near their own experience rather than a mere dilution of fairy tales. It was France, however, with its longer literary training, that produced the first novels of this sort, though distinctly under the influence of English ideas; and Marivaux, who had already brought out a sort of French *Spectator* modeled on Addison's, had the honor if not of inspiring yet of preceding Richardson with his *Marianne* (1731–41), a novel bearing much resemblance to *Pamela* (1740). In both novels there is a heroine of humble birth who rises through a series of probable incidents to a position of comfort and security, of perfect respectability, the new ideal. If Marivaux was the first to do this, it was Richardson who won all the credit for it, and it was his greater seriousness that secured it for him. His influence lasted throughout the eighteenth century, and he was, if possible, more warmly admired on the Continent than in England. His *Pamela*, *Clarissa Harlowe* (1748), and *Sir Charles Grandison* (1753) all indicated the importance of the citizen as contrasted with the noble, and the strong moral influences that were then at work to prepare the citizen for his duties. In all his novels Richardson preached virtue, prosily it seems to us, but eloquently it seemed to many of his contemporaries. Fielding, however, agreed with modern readers, and was moved by his weariness of Richardson's inartistic praise of virtue to describing people as he saw them and not as moralists might wish them to be. His *Joseph Andrews* (1740) is almost a caricature of *Pamela*. It is easy to see in it, as elsewhere in Fielding's work, reminiscences of the Spanish picaresque novels; yet what in those books is meager, disjointed, and void of atmosphere, becomes in Fielding's stories a vast and animated picture of life. The influence of Cervantes is more important. Especially is this true of *Tom Jones* (1749), his greatest work. In the novels of Smollett we also distinguish the Spanish influence, as well as that of Le Sage.

In Sterne's *Tristram Shandy* (1759–67) there appeared a new spirit, a combination of humor and pathos, delicate psychological study, and total disregard of incident. Sterne had read many French books and had learned the value of suggestion as a literary instrument, and both this book and his *Sentimental Journey* (1768) express the new cosmopolitanism of the last half of the eighteenth century. It is possible to see the influence of Cervantes in his humor; his sympathy with eccentric persons and with animals is a sign of a growing interest in objects hitherto ignored or derided, and this part of his work foretold, though dimly, the great change that was impending. He was also preparing for it by his iconoclastic denunciation of pedantry. In short, he was a disturbing writer. In Goldsmith's *Vicar of Wakefield* (1766), on the other hand, we find the graceful optimism, the exquisite form, of the best work of the century, and an apparent unconsciousness of the necessity and certainty of change.

Beginning of Modern Romantic Movement.—The change in England had begun with a return, already perceptible in other arts, to an interest in the Middle Ages. Horace Walpole's *Castle of Otranto* (1765) introduced the gloomy cloisters, the knight-at-arms, the wind whistling about battlements, all the paraphernalia of romance. A number of novels followed in the same direction, for instance, Mrs. Radcliff's *Mysteries of Udolpho* (1794).

Rousseau.—In France, meanwhile, Rousseau's *Nouvelle Héloïse* (1761) had opened a larger study of the world. The book was filled with a new love of nature; it dealt with novel social problems, breathing the spirit of democracy; its main characters had an infinite capacity for suffering; it contained most ardent descriptions of the familiar passion of love, and the whole impression made by the story was most noteworthy. We find in it many reminiscences of Richardson's *Clarissa Harlowe*, a strange ancestor for this new movement, and among its descendants is to be counted Goethe's *Werther* (1774). It was on the Continent that its influence was greatest. In England there was a reaction from the revolutionary spirit. In its place we find amusing pictures of life by Miss Burney and tales by Miss Jane Austen, and unimpeachable morality taught by Miss Edgeworth.

Scott.—It was Scott who gave the English novel world-wide importance. He expressed most vividly the patriotic and mediæval revival of his time; he brought back the past and he threw a new light on the present. He vivified history, he taught the love of nature, and delighted generations with his abundant invention. He made over not only the art of novel-writing, but that of writing history. In France we see his influence in Dumas and Victor Hugo, and in Germany the historical novel still survives, though without proving a dangerous rival to Scott's fame. While Scott inspired many followers, the new problems of the nineteenth century called many writers away to their discussion. Dickens studied social abuses and often hid direct practical teaching under a mask of raillery. Thackeray drew pictures of the new polite society, and his acute observations and gentle ridicule were miscalled cynicism. Bulwer combined romanticism and the study of the present with more popularity than success.

George Sand.—In France George Sand employed the novel as a means of asserting the rights of women, just as in England Miss Brontë's *Jane Eyre* touched the subject. Balzac made a profound study, half romantic and half real, of the motley society he saw about him. A complete view of society brought into fiction, notably in the work of George Sand, a new class, the country people, whose virtues she set in sharp contrast with the vices of those who dwelt in cities. Auerbach did the same service for Germany in his *Village Tales*.

American Novelists.—J. F. Cooper in the U. S., inspired by Scott, had drawn romantic pictures of the red Indian. Hawthorne, with far more literary art and a subtler imagination, described New England life in the past and in the present, and also Italy in *The Marble Faun*. All his pages were lit by the last and, in the estimation of many, the most beautiful rays of romanticism, now approaching its end. Mrs. H. B. Stowe's *Uncle Tom's Cabin*, with its vivid drawing of the wrongs of slavery, is perhaps more noteworthy as a campaign document than as a work of art.

Realistic Movement.—Everywhere we find the novel something more than a mere piece of literature. It was continually employed, and not always consciously, to express the writer's emotions and interests, sometimes narrow or special in its aim. Again, as in George Eliot's hand, we find life criticised in its relation to the principles of mo-

rality. It is easy to observe the gradual change in the methods of novel-writing. The great wave of romanticism gradually spent its force after enriching the world with new sympathies and a larger vision. It was succeeded by a tendency toward realism. In England the two had long been combined, as in Scott, without antagonism. Balzac in France alternated between the two, but the movement toward an exacter study of life may be observed in him as well as in his contemporaries. Zola, the most important of living French novelists, has advocated realism with tireless energy, but he has not been able to escape the influences under which he was born, and although he has continually struggled to be a faithful disciple as well as preacher of realism, his work often contradicts his theories. When he is furthest from the literary theory which he detests, he is only too prone to substitute the study of repulsive details for an exact study of life, and it is in the representation of a great picture rather than in the faithful study of incidents that he is greatest. The movement toward realism, which owes much to the scientific advance of the present days, has also been greatly aided by the example of the eminent Russian novelists Turgeneff and Tolstoï. The former aided the movement for the abolition of serfdom by his *Stories of a Sportsman*, which were followed by longer novels written with the utmost art. Tolstoï seemed to abandon all the current theories of composition and to portray life unshaped, but crowded with event as we see it, never modeling itself into a rounded whole. In France Flaubert and de Maupassant rigidly confined themselves to the portrayal of exact truth, and the movement holds sway over the later novelists of the U. S., Italy, Spain, and Scandinavia. That this is but a temporary movement is obvious, for every art that grows changes, and already among the younger writers there is an effort to give greater sway to imagination.

THOMAS SERGEANT PERRY.

Novel'lo, VINCENT: musician; b. in London, England, Sept. 6, 1781; was of Italian descent; became organist of the Portuguese chapel at an early age; was one of the members of the Royal Society of Musicians and a founder of the Philharmonic Society; was a voluminous editor of old musical classics and composer of numerous pieces of considerable merit. D. at Nice, France, Aug. 9, 1861.—His daughter, CLARA ANASTASIA, born in London, June 15, 1818, a distinguished soprano singer and prima donna, married Count Gigliucci, an Italian nobleman, in 1843, and retired from the stage in 1860.—Another daughter is a distinguished Shakspearean scholar. See CLARKE, MARY COWDEN.

November [from Lat. *Novem'ber*, *Novem'bris* (sc. *mensis*, month), originally the ninth month of the Roman year, deriv. of *novem*, nine]: the eleventh month of the year, containing thirty days.

Nov'gorod: government of European Russia, bounded W. by the government of St. Petersburg, and comprising an area of 47,236 sq. miles. The ground is low, the surface mostly undulating, the soil not very rich, and the climate cold. Lakes and navigable rivers are numerous, and connected with each other by canals. Rye, barley, and oats are grown. Large forests and meadows are found, and timber and hay are the chief articles of export. Pop. (1897) 1,392,931.

Novgorod, called also **Novgorod Velikiĭ** (the great): capital of the government of Novgorod, European Russia; on the Volkhov, near its issue from Lake Ilmen; 110 miles by rail S. S. E. of St. Petersburg (see map of Russia, ref. 6–D). It is an old town, and was in the fifteenth century the largest and most important town of Northern Europe. It was in 862 made the capital of the Russian monarchy, founded in that year by Rurik, on the thousandth anniversary of which event a magnificent monument was erected in the city, which otherwise is rather poorly built. It is now entirely dependent for its trade on St. Petersburg and Archangelsk. Pop. (1890) 20,599.

Novikov', NIKOLAĬ IVANOVICH: writer; b. on his father's estate in the government of Moscow, Russia, Apr. 27, 1744. Although he was educated for the army, his literary tastes were so noticeable that the Empress Catherine II. had him transferred to the civil service, from which he retired in 1768. He was one of the earliest of Russian journalists. His first paper was a satirical one called *Trvten* (The Drone, 1769–70). In 1772 he founded *Zhivopisets* (The Painter), which had a great success, and in 1777 he started a monthly review called *Utrennyĭ Svet* (The Morning Light), and continued it for years under various names. He also leased for a decade and gave new life to the *Moscovskyĭa Vedomosti* (Moscow Gazette), previously a mere official sheet of the university. He reproached his fellow countrymen with their mania for everything foreign, and strove in every way to bring the best national things into honor, not only writing *An Attempt at a Dictionary of Russian Writers*, but publishing nineteen volumes of his *Drevnaĭa Rossiskaĭa Vivliofeka* (Old Russian Library), a collection of documents of historical value. He had become a Freemason, and in course of time devoted himself chiefly to philanthropic work, while his ideas showed an increasing tendency toward mysticism. His fame and influence grew apace, so that the Masons were for a time the fashion of the day, but he had numerous enemies, while the empress, who had originally supported him, became more and more suspicious. The French Revolution brought about a sharp reaction against everything that savored of liberalism. Severe measures were taken against the Masons, and Novikov was thrown into prison, from which he was not released until the accession of the Emperor Paul. D. July 31, 1818. See works on him by Longinov (1867), Neselenov (1875), and others. A. C. COOLIDGE.

No'vi Li'gure: town; in the province of Alessandria, Italy; on the northern slopes of the Apennines, at the head of a wide and fruitful plain (see map of Italy, ref. 3–C). It was formerly strongly fortified, having four gates with drawbridges. Novi contains a public library, museum, academies of literature and art, a valuable private picture-gallery, and silk-factories. It is said to have been destroyed by Attila; in 999 it is spoken of as *Corte Nova* or *Castro Novo*, and from that time till 1447, when it gave itself to Genoa, it maintained a semi-independence. This town gave its name to the battle of Aug. 15, 1799, between the French and Russians, in which the French general, Joubert, lost his life. Pop. about 10,000.

Nov'ius: a Latin writer of *fabulæ Atellanæ* of about 100 B. C. Some forty-three titles of his plays are known, and the fragments (117 verses) are given by Ribbeck, *Frag. Comicorum Rom.*, pp. 254–272 (Leipzig, 1873). M. W.

Novorossisk: town of the Black Sea district, Russia; 30 miles S. E. of Anapa (see map of Russia, ref. 10–E). It is the port for Yekaterinodar, and terminus of a railway opened in 1888; also the port for the Stanitza Ilskaia or petroleum district. Coal and ores of metals are found in the neighborhood. Pop. (1880) 2,000; (1890) 10,000. M. W. H.

Novo Tcherkask: town of Russia (founded in 1806); on the Don (see map of Russia, ref. 10–E). It is the capital of the province of the Don Cossacks; is finely built, has a large cathedral, and is the see of an archbishop. Its manufactures are extensive, and it carries on an active trade in cattle, grain, and wine. Pop. (1890) 38,476. E. A. G.

No'vum Or'ganum [Lat., liter., new instrument (or method)]: the name given by Francis Bacon to his great work treating of the proper mode of studying nature in order to extend the dominion of man over the inanimate world. Bacon's great aim was to recall the minds of men from what he deemed the vain and useless speculations of the ancient philosophers to the pursuit of the practical and useful. In order to present the different points of his subject in a manner at once comprehensive and striking, he has given them in the form of aphorisms. In the second aphorism of his first book he tells us that as the naked hand is often unable to perform its proper work without the aid of an instrument, so the human intellect, left to itself, is comparatively inefficient, and needs the help of instruments no less than the hand. To supply this need he composed his great work (published in 1620), comprising the ripe and rich results of a life of study. "In our judgment," says Macaulay, "Bacon's greatest performance is the first book of the *Novum Organum*. All the peculiarities of his extraordinary mind are found there in the highest perfection. Many of the aphorisms, but particularly those in which he gives examples of the influence of the *idola*, show a nicety of observation that has never been surpassed. Every part of the book blazes with wit, but with wit which is employed only to illustrate and decorate truth. No book ever made so great a revolution in the mode of thinking, overthrew so many prejudices, introduced so many new opinions. Yet no book was ever written in a less contentious spirit. . . . What we most admire is the vast capacity of that intellect which without effort takes in at once all the domains of science—all the past, the present, and the future, all the

errors of 2,000 years, all the encouraging signs of the passing times, all the bright hopes of the coming age." *Essay on Lord Bacon*, second part, where will be found many eloquent and admirable passages upon the philosophy of Bacon, though the remarks of the critic on the ancient philosophers, particularly Plato, are to be received with great allowance.

Now'ell, INCREASE: colonist; b. in England about 1590; was chosen as assistant governor of Massachusetts Colony 1629, previous to its actual foundation; emigrated with Winthrop in 1630; was ruling elder of Wilson's church 1630–32; one of the founders of the church in Charlestown 1632; commissioner for military affairs on the occasion of the first Pequot war 1634, and secretary of the colony 1636–49. D. at Boston, Nov. 1, 1655.—His son SAMUEL, b. at Charlestown, Mass., Nov. 12, 1634; graduated at Harvard College 1653; became chaplain in Philip's war, and assistant treasurer 1680–86, and afterward treasurer of Harvard University. He was a stanch supporter of the old charter, and went to England in its behalf in 1688. He did not succeed, however, in accomplishing anything for his purpose, as he died in September, soon after his arrival in London.

Noyes, HENRY DRURY, A. M., M. D.: ophthalmologist; b. in New York city, Mar. 24, 1832; graduated M. D. from the New York College of Physicians and Surgeons in 1855; was elected Professor of Ophthalmology and Otology in Bellevue Hospital Medical College in 1864, a chair he still holds; was attending surgeon to Charity Hospital, New York, 1865–75; has been surgeon to New York Eye and Ear Infirmary since 1869, and is a member of many scientific societies. He is the author of *A Treatise on Diseases of the Eye* (New York, 1881); a *Text-book on Diseases of the Eye* (New York, 1890; 2d ed. 1894), and of numerous monographs published in medical journals. S. T. ARMSTRONG.

Noyes, JOHN HUMPHREY: religious leader; b. at Brattleboro, Vt., Sept. 6, 1811; graduated at Dartmouth College in 1830; studied law, but subsequently studied divinity at Andover and at New Haven, Conn., and was licensed to preach; founded in 1838 a community of Perfectionists near Putney, Vt.; removed in 1847 to Lenox, Madison co., N. Y., where he established the ONEIDA COMMUNITY (*q. v.*). Subsequently he established another branch at Wallingford, Conn. He was the author of various works sustaining his peculiar views. D. at Niagara Falls, N. Y., Apr. 13, 1886.

Nu (or **Nun**): an Egyptian deity, representing the primeval celestial ocean on which Ra, the sun-god, sails and whence he proceeded. He was called "the oldest of the gods," and was regarded as the father of Ra and of the gods in general, being the author of creation and the source of all things. The corresponding female principle was Nu-t or Nun-t (= Nile-water), and together they appear to have signified the male and female personification of the waters of the Nile inundations. C. R. G.

Nubia: a large region in Northeastern Africa, forming a part of the Egyptian possessions, but mostly under Mahdist control since 1882. It has never been a political entity, but it may be roughly described as bounded N. by Egypt, E. by the Red Sea, S. by Abyssinia, Senaar, and Kordofan, and W. by the Libyan Desert and the waste S. of it. Area about 350,000 sq. miles. Lying N. of the region of tropical rains, the country is excessively dry, and not unhealthful; agriculture and stock-raising, the main occupations of the people, are confined to the province of Taka, a few oases, and to a narrow fringe along the Nile. The most arid and desolate part of this region is the Nubian waste, in the northern part of Nubia, which would be impassable were it not for a few oases and wells. These verdant spots, scattered throughout the north, have made a number of important caravan routes practicable, and for centuries a large trade was carried on along these routes, until it was destroyed, for the most part, by the Mahdist revolt. The most productive region is the province of Taka, in the extreme south, which is well watered by streams from the Abyssinian highlands. The people are a mixture of Semitic, Hamitic, and Negro elements, speaking dialects of the Nuba language as well as Arabic, and fanatically Mohammedan in their religious faith; they number probably less than 1,000,000. C. C. ADAMS.

Ñuble, nyoo'blā: an interior province of Chili; between Concepcion and the Argentine frontier; crossed by lat. 37° S. Area, 3,556 sq. miles. It lies partly on the steep slope of the Andes and partly in the plain called the Valley of Chili; the soil of the latter is very fertile, and this is one of the chief wheat-growing provinces. The mountain lands yield excellent timber. Capital and largest city, Chillan. Pop. (1891) estimated, 157,349. HERBERT H. SMITH.

Nubti: a Hyksos King of Egypt, whose reign fell 400 years before the close of the reign of Ramses II., as is shown by a granite stele erected by the latter at Tanis. (See *Records of the Past*, ser. i., vol. v., p. 33 ff.; *Aegyptische Zeitschrift*, 1878, p. 89–106; 1879, p. 138–143; Birch, *Egypt*, p. 76; Wiedemann, *Aegypt. Geschichte*, p. 295.) This tablet was found by Mariette, copied, and reburied. Recent excavators have not succeeded in finding it again. If the Exodus of the Hebrews occurred under Meneptah, the successor of Ramses II., the record of this tablet, taken in connection with the biblical statement that the sojourn of Israel in Egypt lasted 430 years, would show that Joseph lived in the time of one of the early Hyksos kings. This "era of 400 years" is the only example of the kind in Egyptian history, and it appears to have been used in only one other instance, the reign of Bocchoris, the sole king of the twenty-fourth dynasty, who is said by George Syncellus, quoting Manetho, to have lived 990 years after Nubti. CHARLES R. GILLETT.

Nucleobranchia'ta: a name applied by de Blainville to the group of molluscs previously called by Lamarck HETEROPODA (*q. v.*).

Nucle'olus and **Nucleus**: See HISTOLOGY (*The Cell*).

Nucleus (of the earth): See GEOLOGY.

Nudibranchia'ta [Mod. Lat., liter., naked-gilled ones; Lat. *nu'dus*, naked + *bran'chiæ*, from Gr. βράγχια, gills]: a group of Opisthobranchiate molluscs in which the gills, when present, project freely into the water. A shell is always lacking in the adult, on which account these forms are commonly known as naked molluscs. See GASTEROPODA.

Nuevitas: See the Appendix.

Nuevo Leon, nōō-ā'vō-lā-ōn', or **New Leon**: state of Mexico; bounded N. E. and E. by Tamaulipas, S. W. by San Luis Potosí, and W. and N. by Coahuila; separated from the frontier of Texas only by a narrow portion of Tamaulipas. Area, 23,592 sq. miles. It is traversed from N. W. to S. E. by the eastern Sierra Madre; from one-third to one-fourth of the territory S. W. of the Sierra is included in the Mexican plateau, which here has an average elevation of about 6,000 feet; the northern and northeastern portions are in the tierra caliente, low rolling lands or plains falling toward the Rio Grande and varied with a few isolated mountains. The climate of the plateau and the slopes of the Sierra is mild and agreeable; some parts of the lowlands, however, are hot and unhealthful. Rains in good years are abundant, but they are very irregular, and droughts sometimes last for several years; these are especially felt on the plateau, where there is a lack of running water and springs. Much of the population is gathered along the northeastern slope of the Sierra, a well-watered, fertile, and very beautiful district. The principal occupation is agriculture; the most important crops are maize on the higher lands and sugar-cane on the lower ones. The mines are rather unimportant, though rich silver deposits were worked during the colonial period. Nuevo Leon was settled during the last years of the sixteenth century. Pop. (1895) 309,252. HERBERT H. SMITH.

Nuisance [from O. Fr. *noisance*, *nuisance* < Lat. *nocentia*, transgression, guilt, deriv. of *noce're*, hurt, harm]: a rather indefinite legal term which may be said, however, to denote those acts or omissions which unlawfully disturb a person or the public in the enjoyment of property or the exercise of common rights. In the early English law nuisance (*nocumentum*) had in some respects a broader, and in others a narrower, signification than it bears at present. On the one hand, it was confined to annoyances to the enjoyment of a freehold; while now the possessor of any interest in land, and in some cases of movables, may complain of a nuisance. On the other hand, it was applied to any form of such annoyance. Bracton opens his discussion of the topic with this statement: "And it is to be known that of nuisances, one is tortious and hurtful, and another hurtful (*damnosum*) but not tortious (*injuriosum*)." (3 *De Legibus Angliæ*, chs. xliii.–xlvi.) Now the term is limited to harm which is actionable, which produces legal injury as well as damage.

In some instances the same act may be treated by the injured party as a nuisance or as some other kind of tort. One who wrongfully floods his neighbor's land, or erects a building with eaves projecting over the adjoining premises, or allows a tree to grow so near his line that the branches

overhang another's property, thereby commits both a trespass and a nuisance. The same act or omission produces two wrongs. One is the interference with the possession, the other is the incommodity, the discomfort, the annoyance to the possessor. Again, a person who maintains an insecure structure which endangers his neighbor's property commits a nuisance, and is also chargeable with actionable negligence if injury ensues.

An act or omission which would constitute a nuisance at common law may be legalized, and thus cease to be actionable. It is not to be understood, however, that every statute which authorizes a person to do a particular thing or to carry on a particular business will protect him from liability where the thing is so done or the business so carried on as to constitute a common-law nuisance. As a rule it will relieve him from any public prosecution, but it will not bar a private action, unless it shows a clear intent on the part of the legislature to authorize the affair even though a nuisance should result. This is well illustrated by two decisions of the House of Lords. In one (*Metropolitan Asylum District* vs. *Hill*, 6 Appeal Cases 193; cf. *Morton* vs. *Mayor, etc., of New York*, 140 N. Y. 207) it was held that the statute in question empowered the district to build a smallpox hospital only in case this could be done without creating a nuisance. Its hospital turned out to be a nuisance to Hill, and the statute in no way affected his rights. In the other (*London Ry. Co.* vs. *Truman*, 11 Appeal Cases 45) it was held that the company received authority by statute to build its road and maintain a cattle-yard whether a nuisance was created or not. Hence the property-owners who suffered extreme discomfort by reason of the noises and odors of the cattle-yard were without redress. In the U. S. legislative power is limited by constitutional provisions, and a statute undertaking to legalize a nuisance may be unconstitutional as an attempt to authorize the taking of property without compensation. *Baltimore Ry. Co.* vs. *Fifth Baptist Church*, 108 U. S. 317.

Public Nuisance.—An act or omission which endangers the lives, safety, health, property, or comfort of the public, or by which the public are obstructed in the enjoyment of any common right, is a public nuisance. The obstruction of highways, disorderly houses, indecent performances in public, exhibiting or selling obscene articles, selling diseased food, the public exposure of persons having contagious diseases, the pollution of water used by the public, the manufacture, storage, or display of dangerous explosives to the peril of the public, the exercise of offensive trades in thickly settled neighborhoods or adjoining public thoroughfares are examples. There is considerable authority for the statement that a purpresture or encroachment upon public property does not amount to a nuisance unless it subjects the public to some degree of inconvenience. The tendency of modern decisions, however, is to treat every unlegalized purpresture as a nuisance *per se*. Persons responsible for a public nuisance may be proceeded against, at common law and under modern statutes, by indictment for a misdemeanor. Upon conviction the court may subject them to fine and imprisonment, and, if the nuisance still continues, may order its abatement. It may be abated also without indictment in a suit by the proper officer in behalf of the crown or people, but a mob has no right to act for the public in abating it. Nor does abatement extend to the destruction of property which does not of itself constitute the nuisance, but is merely accessory to it. *Brightman* vs. *Inhabitants of Bristol*, 65 Maine 426.

Whether a public nuisance will sustain a private action, either for damages or abatement, depends upon the harm it inflicts upon the individual complaining. If it is a disturbance of all persons alike in the enjoyment of common rights, the injury of any individual is said "to be merged in the common nuisance and injury to all citizens, and the right is to be vindicated and the wrong punished by a public prosecution, and not by a multiplicity of separate actions in favor of private persons." Where the public nuisance, however, produces particular damage to an individual beyond that which he suffers in common with his fellows, he may bring a private action. Accordingly, one whose residence is rendered unfit for comfortable or respectable occupation by an adjoining house of prostitution can maintain an action against those responsible for the nuisance. *Crawford* vs. *Tyrrell*, 128 N. Y. 341.

Private Nuisance.—This "affects only one person or a determinate number of persons, and is the ground of civil proceedings only." It is no defense to an action for a nuisance that it benefits more persons than it harms. A street-railway may improve greatly its passenger service by substituting steam motors for horses; but unless the change is authorized by legislation, and in the U. S. compensation is made to abutting land-owners for the interference with their easements of access, of light, and of air, the benefit conferred on its many patrons will be no answer to a suit by one whose premises are injured and made uncomfortable by the noise, the vibrations, the cinders, the smoke, and the dust resulting from the new appliances. (*Hassner* vs. *Brooklyn City Ry.*, 114 N. Y. 443.) Nor can the defendant relieve himself from liability by showing that he has exercised the utmost care to save the plaintiff from harm. The essence of the wrong we are now considering is the unlawful incommodity to the plaintiff, not the negligence nor the bad motive of the defendant. A man "may not, under color of enjoying his own, set up a nuisance which deprives another of the enjoyment of his property." (See *Hauck* vs. *Tide Water Pipe Line Co.*, 153 Penn. 366.) It is no justification for a nuisance that the defendant has maintained it for many years without complaint; nor that he was careful to establish it in a suitable place, distant from habitations; nor that the plaintiff bought and took possession of his property with knowledge of the nuisance. If it were, a person might prevent the growth of a town, or the proper development of a locality, by establishing a useful but offensive business, such as burning lime, smelting copper, manufacturing gas, or slaughtering animals. Any place where an operation is carried on, so that it does actionable injury to another, is not, in the meaning of the law, a suitable place. *St. Helens Smelting Co.* vs. *Tipping*, 11 House of Lords Cases 642.

However, the place where an alleged nuisance is maintained is often a circumstance of importance in determining whether the plaintiff has sustained actionable injury. A man who chooses to reside in a city must endure the noises and discomforts which are incident to the locality. He has no right to complain if his neighbor blasts rock, or erects an iron building to his temporary annoyance. (*Booth* vs. *Railway*, 140 N. Y. 267.) So a man having an estate under which there are veins of valuable minerals "must take the gift with the consequences and concomitants of the mineral wealth in which he is a participator." Were persons so circumstanced allowed to stand on their extreme rights, the business of the whole country would be seriously hampered.

The courts have found it impossible to define the amount or the exact character of the annoyance or inconvenience which will constitute a nuisance. It is settled, however, that the state of things complained of need not be actually injurious to health. If it seriously interferes with the rational enjoyment or reasonable comfort of the plaintiff's premises it is enough. On the other hand, where damage to property is complained of, it must be "such as can be shown by a plain witness to a plain juryman." It must be substantial and actual, not contingent or remote or sentimental. In a leading English case Lord Justice James illustrated this doctrine in the following manner: "It would have been wrong, as it seems to me, for this court in the reign of Henry VI. to have interfered with the further use of sea-coal in London because it had been ascertained to their satisfaction that by the reign of Queen Victoria both white and red roses would have ceased to bloom in the Temple Gardens. If some picturesque haven opens its arms to invite the commerce of the world, it is not for this court to forbid the embrace, although the fruit of it should be the sights and sounds and smells of a common seaport and ship-building town, which would drive the dryads and their masters from their ancient solitudes." (*Salvin* vs. *North Brancepeth Coal Co.*, Law Reports, 9 Chancery Appeals 705.) When the nuisance is alleged to consist in defendant's use of his property to the inconvenience and discomfort of the plaintiff, the latter must show that the noises, the odors, the sights, or other annoyances complained of rendered his premises uncomfortable to ordinary persons. If one's right to use his property were to depend upon the effect of the use upon a person of peculiar temperament or disposition, or upon one suffering from disease, the standard for measuring it would be so uncertain and fluctuating as to paralyze industrial enterprises. *Rogers* vs. *Elliott*, 146 Mass. 349.

Parties Liable.—The person who creates a nuisance is answerable therefor, and the owner and occupant of land upon which it exists is also liable, as a rule, where he has the legal right and is under a legal duty to keep the premises in proper condition. Where a municipal corporation unlawfully authorizes an individual to commit a nuisance it is

liable for all resulting damages. *Cohen* vs. *Mayor, etc., of New York*, 113 N. Y. 532.

Remedies.—These are abatement, damages, and injunction. The victim of a nuisance may abate it, without instituting a legal proceeding; but where he thus takes the law into his own hands, even in defense of person or property, he acts at his peril. He must be prepared to show that the thing abated was a nuisance, and that he did no unnecessary damage in abating it. (*People* vs. *Board of Health*, 140 N. Y. 1.) In an action for damages the plaintiff may recover nominal, actual, or exemplary damages, according to the facts. (See DAMAGES, MEASURE OF.) "The most efficient and flexible remedy is that of injunction. Under this form the court can prevent that from being done which if done would cause a nuisance; it can command the destruction of buildings or the cessation of works; and its orders may be either absolute or conditional upon the fulfillment by either or both of the parties of such undertakings as appear just in the particular case." See INJUNCTION; also Pollock's *Law of Torts*, and Wood's *Law of Nuisances*.

FRANCIS M. BURDICK.

Nu'kha: a walled town of Asiatic Russia, government of Trans-Caucasia; at the foot of the Caucasian Alps (see map of Russia, ref. 12–G). The inhabitants, consisting mostly of Persians, Tartars, and Armenians, with very few Russians, are engaged in breeding silkworms. The vicinity is one garden of mulberry-trees. Pop. (1892) 25,894.

Nullification [from Lat. *nullifica'tio*, contempt, liter., making void, deriv. of *nullifica're*, despise, liter., make void or as nothing; *nul'lus*, none + *fa'cere*, make. For meaning cf. Eng. *null*]: the act of making null, void, or invalid. The word has acquired a special meaning in the political history of the U. S., as signifying what has been claimed to be the right of one or more of the States in the American Union to declare a law passed by the national Congress unconstitutional, and to refuse to be bound by such an act. This claim, of course, implies the right of each individual State to interpret the Federal Constitution for itself, and thus to impose a check upon the law-making power of the general Government. According to this doctrine, a State which nullified a law of Congress was entitled to all its former privileges, though refusing obedience to the law in question. If, in case of such nullification, the President should attempt to enforce the authority of Congress, the enforcement would be an unconstitutional act, and the State would have the right to retire from the Union.

History of the Doctrine.—Soon after the adoption of the Constitution numerous questions arose involving the relations of the Federal Government to the individual States. During the administration of President John Adams there was so much opposition in some parts of the country to the alien and sedition laws that the people in several of the States boldly took the ground that the U. S. Government had no constitutional right to pass and enforce a law that was manifestly antagonistic to the interests of any individual State. This opinion took the most formal and prominent expression in the Kentucky resolutions of 1798 and the Virginia resolutions of 1799. In the Kentucky resolutions, which were written by Thomas Jefferson, it was held that the Government was a compact between States, and that in this compact the Government "was not made the exclusive or final judge of the extent of the powers delegated to itself, and that, as in all other cases of compact among powers having no common judge, each party has an equal right to judge for itself, as well of infractions, as of the mode and measure of redress." Though the people who adopted these resolutions never went further than the expression of a political opinion, the resolutions are entitled to the distinction of having definitely formulated the doctrine of nullification. At the HARTFORD CONVENTION (*q. v.*) also free expression was given to opinions of a similar nature in regard to the attitude of Congress toward the New England States. The most striking example illustrative of the doctrine was shown by some of the Southern States nearly twenty years later. The occasion was the passage of the tariff law of 1828, and the attitude of Congress toward the Territories in the Northwest. The people of South Carolina deemed the action of Congress oppressive to the Southern States, and accordingly advanced again the theory that the law might be made void by State action. The question was discussed in one of the most memorable debates in the history of Congress by Senator Hayne, of South Carolina, on the one side, and by Daniel Webster, of Massachusetts, on the other. In Webster's celebrated reply to Hayne, delivered Jan. 26, 1830, the views in opposition to the right of nullification were put with such cogency and eloquence that the people of the North, especially of the Whig party, were convinced that the doctrine could not be maintained on any constitutional grounds. The people in the South, however, were by no means convinced. Accordingly, in Nov., 1832, soon after Gen. Jackson's second election to the presidency, a convention was summoned to meet at the capital of South Carolina to consider the question still at issue. The convention drew up and unanimously passed an "ordinance of nullification," which embodied the views on State sovereignty held by Calhoun. (See CALHOUN, JOHN C.) The tariff law just enacted was pronounced "null and void, and no law, nor binding on this State, its officers, or citizens." The ordinance also declared that no appeal to the Supreme Court of the U. S. should be permitted; that any appeal from the decision of a court of the State upholding this ordinance should be treated as contempt; that all officers and jurors were required to obey the ordinance; that all legislative acts to enforce its provisions should be obeyed; and that any measures of force adopted by the general Government for the purpose of levying duties on the foreign commerce of South Carolina would justify the State in regarding itself no longer a member of the Union. Fortunately for the country at the time of this action Gen. Jackson was President. His vast popularity in the South, as well as in the North, gave to his authority great advantages, and he did not hesitate to act with characteristic decision and promptness. He ordered the collector of customs to make use of the revenue cutters and any other vessels that might be available for the purpose of seizing all cargoes liable to pay duties. On the meeting of Congress in Dec., 1832, the President's annual message declared that it was his intention to treat all armed resistance as treason against the U. S. This remarkable paper, written by Edward Livingston, the Secretary of State, not only set forth the constitutional objections to nullification with great power, but it also showed clearly that the Government would be desperately in earnest in the enforcement of its authority. This utterance and the special message addressed to Congress in Jan., 1833, very generally commended themselves to all except the special advocates of nullification. The so-called Clay compromise of 1833 propitiated South Carolina so that the ordinance of nullification was abandoned.

It would not be correct to suppose that the spirit of nullification has been confined to South Carolina, or indeed to the Southern States. In 1820 Ohio passed resolutions approving the Kentucky and Virginia resolutions of 1798–99. Alabama in 1828 entered a formal protest against the validity of the tariff of that year, and in 1831 prohibited the establishment of a U. S. bank in that State. In the same year the Legislature of Maine (Mar. 28) passed a resolution declaring that the U. S. Government in fixing the boundary by treaty with Great Britain between Maine and Canada had exceeded its constitutional powers, and had encroached upon the rights of the State of Maine. The Legislature asserted that the Government of the U. S. had violated the Constitution of the U. S., and "impaired the sovereign rights and powers of the State of Maine," and that "the State of Maine is not bound under the Constitution to submit to the decision which is, or shall be, made under that convention." It further resolved that no decision of any umpire provided by the treaty would have any force "unless the State adopt and sanction the decision." A still more striking case, involving also the question of boundary-line, occurred in Wisconsin. By the Ordinance of 1787 organizing the Northwest Territory the line between Ohio, Indiana, and Illinois, and the territory on the N. was determined as "an east and west line drawn through the southern bend or extreme of Lake Michigan." When the three Southern States, however, were organized their northern line was fixed so as to include a very considerable strip of land N. of the boundary designated by the Ordinance. Michigan at a later period claimed all the territory to which she was originally entitled, and the so-called Toledo war might have become serious had not Congress satisfied the claim by granting to the new State the upper peninsula as a compensation; but the claim of Wisconsin could not be so easily disposed of. According to the line established by the Ordinance, Chicago, Rockford, Galena, and other important towns of Northern Illinois, besides 8,500 sq. miles of the best of farming land, would belong to Wisconsin. From 1838 to 1846 the inhabitants of the territory in dispute

strongly desired to be a part of Wisconsin instead of Illinois, chiefly, no doubt, on account of the State debt of Illinois incurred for internal improvements. The claim of the people rested on the fact that the Ordinance was a compact which could only be annulled "by the consent of all parties," and therefore was superior to the Constitution and the acts of Congress in its binding force. In 1843 an address to Congress was prepared, in which the people declared that if their request was not granted, the people of Wisconsin, "relying on their own resources, and looking to Him who aids the injured for protection, would seek in themselves for that measure of redress which their own right arm can bring them." This belligerent tone, however, was ineffectual. A majority of the people were too indifferent to the subject to venture upon active hostilities, and finally the Supreme Court of the U. S., in *Strader* vs. *Graham* (3 H. 589), declared that the Ordinance of 1787 "was superseded by the adoption of the Constitution of the U. S.," and that the six articles forming the compact of the Ordinance "are not superior and paramount to the Constitution." Thus the claim fell to the ground.

In the same State a conflict of authority grew out of the arrest and detention of a fugitive slave in 1854. The U. S. deputy marshal had seized a fugitive slave by the name of Glover under authority of the Fugitive Slave Law. A local judge issued a writ of *habeas corpus*, but as this was not respected by the U. S. authorities, Glover was rescued by a mob incited and led on by an editor named Booth. Booth was arrested for aiding in the escape of a fugitive slave, and at once made application to A. D. Smith, a justice of the Supreme Court of Wisconsin, for a writ of *habeas corpus*, on the ground that he was detained under an unconstitutional act of Congress. The justice, after prolonged arguments, discharged Booth, holding the Fugitive Slave Law unconstitutional. In the decision it was held that "the State will never consent that a slave-owner, his agent, or an officer of the U. S., armed with process to arrest a fugitive slave from service, is clothed with entire immunity from State authority." Booth was then arrested, convicted, and sentenced by U. S. authority. The State Supreme Court issued a writ of *habeas corpus*; but the action was overruled by the Supreme Court of the U. S., and Booth was remanded to serve out his term. This very interesting instance of conflict of authority will be found fully discussed in 1 Wis. Reports 1–218; 11 Wis. 517; 21 Howard 506–526; and in Hare's *Am. Constitutional Law*, 1202.

The several instances given are enough to show that there was throughout the country a more or less prevalent belief that a State had the supreme constitutional right of ultimate decision in case of an alleged infraction of the Constitution by the Government of the U. S. The attempt of the several Southern States in 1861 to secede was founded upon the assumed right of nullification, and it was not till the close of a terrible war that the question was authoritatively and finally settled.

AUTHORITIES.—Hampden, *The Genuine Book of Nullification* (Charleston, 1831) contains a large list of referenees to cases where the authority of the general Government has been either defied or disputed. The question of constitutional right, however, will be found most satisfactorily treated in the *Debates in Congress*, especially in the *Speeches* of Webster, Calhoun, and Hayne. See also Greeley, *American Conflict*; Stephen, *War between the States*; Lincoln, *Speeches and Messages*; Nieolay and Hay, *Life of Lincoln*; *Histories of the Civil War*, by Davis, Draper, Pollard, and others; also Thwaites, *Boundaries of Wisconsin*; Sanford, *State Sovereignty in Wisconsin*. C. K. ADAMS.

Numan'tia: an ancient city of Spain; the capital of the Celtiberian Arevaci; situated on the Douro, near the present Soria in Old Castile. It became very celebrated on account of the heroic valor with which it defended its independence against the Romans. Of its population, 8,000 men were capable of bearing arms, and with this force it fought successfully against Quintus Fulvius Nobilior in 153 B. C., Quintus Cæcilius Metellus in 143, Quintus Pompeius in 141, Marcus Popilius Lænas in 139, and Cneius Hostilius Mancinus in 137; but in 134 Publius Cornelius Scipio the Younger received the command. With an army of 60,000 men he laid siege to Numantia, and inclosed it completely. His propositions of surrender were rejected, and the siege continued for fifteen months. When Scipio entered the city he found no one to oppose him. Those whom plague and famine and the arrows of the besiegers had spared had fallen upon their own swords. He felt that he himself had been utterly defeated, and in his fury he leveled the vacant houses with the ground.

Nu'ma Pompil'ius: in the mythical history of Rome, the successor of Romulus. His reign, which is said to have lasted from 715 to 672 B. C., was regarded by the Romans as a sort of golden age of peace and prosperity. All the ecclesiastical institutions which formed the basis of the religious ceremonial of the Romans were ascribed to him, and he is also said to have improved the social and political institutions of Rome.

Number [from O. Fr. *nombre* < Lat. *nu'merus*, number]: abstractly considered, the measure of the relation between quantities of the same kind; in this sense it is identical with the term *ratio* or *quotient*. Technically considered, it is a *single* thing, or a *collection* of things of the same kind; it is in this sense that the term is generally employed in mathematics. By an extension of meaning always permissible in the use of mathematical terms, the term *number* is made to include 0, ∞, and also all *surds*; we shall use the term in this extended signification in the following article. For methods of writing numbers, see NOTATION.

Classes of Numbers.—Numbers are divided into classes in many different ways, according to their different properties. The names of some of these classes are given below, with a brief statement of their peculiar properties.

(1) *Odd and Even Numbers.*—The series of integers, 0, 1, 2, 3, 4, etc., called the series of *natural numbers*, is subdivided into two series—the series of *odd numbers*, 1, 3, 5, 7, etc., none of which is exactly divisible by 2, and the series of *even numbers*, 0, 2, 4, 6, etc., each of which is exactly divisible by 2. The following are some of the properties of these two classes of numbers: 1, the sum or the difference of any two even numbers, or of any two odd numbers, is always an even number; 2, the sum of any number of even numbers, or the sum of an even number of odd numbers, is an even number, but the sum of an odd number of odd numbers is an odd number; 3, the product of any number of even numbers is an even number, and the product of any number of odd numbers is an odd number; 4, all the integral powers of even numbers are even numbers, and all the integral powers of odd numbers are odd numbers, and consequently the difference between any power of an odd number and the number itself is an even number.

(2) *Prime and Composite Numbers.*—A *prime* number is one that can not be exactly divided by any other number except 1; all numbers that are not prime are said to be composite—that is, composed of two or more factors; thus 2, 3, 5, 7, etc., are prime numbers; 4, 6, 9, etc., are composite numbers. See PRIME NUMBERS.

(3) *Figurate Numbers.*—Figurate numbers are those which can be derived from the general form

$$\frac{n(n+1)(n+2)\ \ldots\ (n+m)}{1\ .\ 2\ \ .\ 3\ \ \ \ldots\ (m+1)}$$

by making particular suppositions on the arbitrary integers m and n. If we assume m equal to any whole number, and then make $n = 1, 2, 3$, etc., we shall have one series of figurate numbers; by giving to m every value from 0 up, we obtain in succession an infinite number of figurate series. See FIGURATE NUMBERS.

(3) *Polygonal and Pyramidal Numbers.*—These numbers are so named because they express the different numbers of equal spherical balls that can be symmetrically arranged so as to form certain polygonal and pyramidal figures. The polygonal numbers are formed by taking the successive sums of the terms of an arithmetical progression whose first term is 1; if the common difference is 1, we have triangular numbers; if the common difference is 2, we have square numbers; if the common difference is 3, we have pentagonal numbers: and, in general, if the common difference is $m-2$, we have m-gonal numbers. Thus,

{ *Arithmetical series*, 1, 2, 3, 4, 5, 6, 7, etc.;
{ *Triangular numbers*, 1, 3, 6, 10, 15, 21, 28, etc.

{ *Arithmetical series*, 1, 3, 5, 7, 9, 11, etc.;
{ *Square numbers*, 1, 4, 9, 16, 25, 36, etc.

{ *Arithmetical series*, 1, 4, 7, 10, 13, 16, etc.;
{ *Pentagonal numbers*, 1, 5, 12, 22, 35, 51, etc.

Pyramidal numbers are derived from polygonal numbers according to the same law. Thus,

{ *Square numbers*, 1, 4, 9, 16, 25, etc.;
{ *Square pyramidals*, 1, 5, 14, 30, 55, etc.

Here each number of the second line is formed by adding the corresponding number of the first line. The last line of numbers gives the number of equal spherical balls that can be piled in different pyramids having square bases. It is a general principle that any whole number is equal to the sum of 1, 2, or 3 triangular numbers, or to the sum of 1, 2, 3, or 4 square numbers, or to the sum of 1, 2, 3, 4, or 5 pentagonal numbers, etc. Thus the number 23 is equal to 21 + 1 + 1, or to 9 + 9 + 4 + 1, or to 22 + 1, etc.

(4) *Redundant, Defective, and Perfect Numbers.*—If the sum of all the divisors of a number (except itself) is greater than the number, it is said to be *redundant*; thus 12 is a redundant number, because $1 + 2 + 3 + 4 + 6 > 12$. If this sum is less than the number, it is said to be *defective*; thus 10 is a defective number, because $1 + 2 + 5 < 10$. If this sum is just equal to the number, it is said to be *perfect*; thus 6 is a perfect number, because $1 + 2 + 3 = 6$. If $(2^n - 1)$ is a prime number, then is $2^{n-1}(2^n - 1)$ a perfect number; thus $2^7 - 1$, or 127, is prime, and $2^6(2^7 - 1)$, or 8128, is a perfect number.

(5) *Amicable Numbers.*—Two numbers are said to be amicable when each is equal to the sum of all the divisors of the other. Thus 284 and 220 are amicable numbers, as are 17296 and 18416, and also 9363583 and 9437056.

(6) *Bernoulli's Numbers.*—These are the coefficients of the different powers of x in the series obtained by developing the expression $x(e^x - 1)^{-1}$. These numbers are used in the higher branches of applied mathematics, and for this reason they have been computed and tabulated. The general forms of Bernoulli's numbers may be found in the larger French books on the calculus. For a complete discussion of the theory of numbers the reader is referred to Gauss's *Disquisitiones Arithmeticæ*, Dirichlet's *Zahlentheorie*, or to Legendre's *Essai sur la Théorie des Nombres.*

Revised by S. Newcomb.

Numbers, Book of: the fourth book of the Pentateuch, so called because it contains an account of the second census of the Hebrews, made at Sinai in the second month of the second year of the Exodus (ch. i.); it also contains (ch. xxvi.) an account of a third census, thirty-eight years later. Its contents treat largely of the history of the tribes in the journey through the wilderness, and in it are also portions of the Mosaic Law. See Hexateuch and Pentateuch.

Numerals, or **Figures** [*numerals* is from Lat. *numera'lis*, pertaining to numbers, deriv. of *nu'merus*, number]: the characters by means of which numbers are expressed. See Notation.

Numerator: See Fractions.

Numid'ia: that part of the northern coast of Africa which extended between Mauritania in the W. and *Africa Propria*, the ancient territory of Carthage, in the E., corresponding nearly to the modern Algeria. It was inhabited by the same race of people as Mauritania, the Moors, the ancestors of the modern Berbers, and it was divided between many different tribes. By the help of the Romans, as a reward for his support in the wars against Carthage, Massinissa succeeded in uniting the tribes and establishing an empire, several of whose rulers became famous in Roman history, as for instance Jugurtha and Juba. In 46 B. C. Numidia was made a Roman province, and the Romans formed several colonies here, of which Hippo Regius was the most noticeable.

Numid'idæ [Mod. Lat., named from *Nu'mida*, the typical genus, from Lat. *Nu'mida*, a Numidian]: a family of gallinaceous birds typified by the well-known Guinea-fowls (*q. v.*). The general form is familiar to all, and in this respect all the species of the family agree, the body being squat, with the head small and the neck comparatively long, but not as much so as in the turkeys; the head is always more or less wattled and naked; the bill moderate; the nostrils large, oval, and partly covered by a membrane; the tarsi moderately long; the hind-toe a little elevated; the tail depressed or bent downward. The family is sustained, according to Prof. Huxley, by a number of osteological characters. It differs from all others by the absence in its representatives "of any backward process of the second metacarpal, and in the obtuseness and somewhat outward inclination of the costal processes. The acromial process of the scapula is also singularly recurved." In most other respects, however, it agrees essentially with the *Meleagridæ* and *Phasianidæ*, having the same kind of sternum, skull, etc., but slightly modified. The family is peculiar to Africa. The species are chiefly found in the woodlands, and especially along the margins of rivers, and congregate in flocks of 200 and 300 individuals, scattering along in search of food, which consists of insects as well as small grains. The eggs are numerous and are laid in a rude nest, generally concealed in the bush. The dozen or so species are contained in three genera: (1) *Numida*, including the common guinea-fowl (*Numida meleagris*); (2) *Agelastes*, with one species; and (3) *Phasidus*, also with one species. These nearly average in size the domestic species. Revised by F. A. Lucas.

Numismat'ics [from Lat. *numis'ma*, coin (by analogy of *num'mus*, coin), from Gr. *νόμισμα*, something sanctioned by usage, especially a coin, deriv. of *νομίζειν*, own as a custom, deriv. of *νόμος*, custom, law]: the study of coins and, with these, of medals; though properly only of those struck in a die, excluding those east. (See Medal and Medallion.) It has been usual to divide coins for purposes of study (omitting minor details) into three grand classes: (1) *Ancient*, from their earliest existence in the seventh century B. C. to the deposition of Romulus Augustulus (A. D. 476); (2) *Mediæval*, from this period to the beginning of the sixteenth century; (3) *Modern*, from about 1500 to the present time.

The *ancient* coins are classed under (1) Greek, (2) Roman, (3) Græco-Oriental, or Byzantine, under each of which it is customary (following the arbitrary arrangement proposed by Eckhel of Vienna) to take the countries in their order from W. to E., the cities of each country being placed alphabetically. Of the three, the Greek are unquestionably the most important. Heads and full-length representatives of divinities and legendary persons are found on these; sometimes, too, celebrated games—e. g. those of Olympia—are commemorated, as in the chariot-race types of Syracuse; or well-known myths, as that of the Labyrinth, on coins of Cnossus in Crete. Maritime states are often denoted by dolphins and other fish; rivers, like the Achelous, by bulls with human heads. The materials of the coins are gold, silver, bronze, electrum, an alloy (sometimes natural) of silver with gold, or potin or billon, bronze or copper washed with silver. It is supposed that the metal was first formed in roundish lumps and then struck cold, but no ancient die is known to exist in any museum; the materials, however, for coining, the hammer, the anvil, and the tongs, may be seen on a denarius of the Roman family Carisia. Inscriptions on Greek coins are generally in the genitive, on Roman and Oriental in the nominative, the word *νόμισμα* (coin) being in the first case understood. The finest period of Greek art lasts from 460 to 390 B. C., and is nearly coincident with the best period of sculpture; and, as a rule, the colonial coins of Italy and Sicily rival those of Greece proper in beauty, and are even more varied and rich. In one instance, that of Athens, the coins remain to the last rude and ugly, perhaps owing to their great commercial importance, the peoples of the Mediterranean objecting to any change of type. In weight, Greek coins are generally very accurate, but different countries and towns preferred the different standards of the Phœnician, Aginetæ, or Attic talent. Thirteen multiples or submultiples of the Athenian drachma (67·5 troy grains) are known; and of these, 100 went to the *mina*, and 60 minæ to the talent. The two-drachma piece (didrachm) and the four-drachma piece (tetradrachm) are the most usual sizes, the gold generally following the standard of the silver. Bronze coins are usually submultiples of the *obelos*, itself one-sixth of the drachma.

Greek coins are found in Europe in Spain, Gaul, Britain, Italy, Sicily, Thrace, Macedonia, Thessalia, Attica, Bœotia, and the Peloponnesus; and in Asia in Ionia, Phrygia, Lydia, Caria, Cilicia, Phœnicia, and Egypt. In Italy we find magnificent specimens of the colonial coinage at Heraclea, Metapontum, Neapolis, Pandosia, Tarentum, Terina, Thurium, and Rhegium; of very early types at Caulonia, Croton, Pæstum, Populonia, and Sybaris; of the ancient mode of writing, from right to left, on some of the earliest; and of the use of the digamma at Heraclea. The finest coins of Sicily are in like manner colonial, with some resemblance to those of Italy, the earliest ascending in date to B. C. 490 or 480. At Agrigentum the name of the people is written *boustrophedon*—i. e. from right to left and from left to right, as an ox plows. The Syracusan decadrachms represent the largest of ancient Greek coins. Connected with Sicily are some very fine coins bearing Phœnician inscriptions, sometimes attributed to Carthage; indeed, there is no doubt the best specimens were struck for that great city in Sicily at Panormus and other places, and by Greek artists. The beautiful coins of Philistis commemorate a lady not men-

tioned in history, but believed to be the wife of Hiero II., as her name is found carved on a seat in the theater at Syracuse.

In Greece proper we find very early and beautiful specimens of Greek art at Abdera, Œnos, and Thasos, and in various towns of Macedonia and its neighborhood, as Acanthus, Amphipolis, Chalcidice, Lête, and Neapolis. The types in many cases refer to old and well-known myths, as the Gorgon's head at Neapolis. Two remarkable coins exist of Geta, King of the Edoni, both of which were found in the Tigris, and therefore may have been carried back to Persia after the defeat of Xerxes. Of Philip and Alexander the Great coins abound in gold and silver, but are less frequent in bronze, the former being of good art and the latter confirming the extent of his conquests; while those of Lysimachus, King of Thrace, are noteworthy for the portrait they exhibit of Alexander himself, with the symbols of the Young Ammon. Thessaly exhibits some good specimens in the money of Larissa, with some resemblance in fabric to those of Sicily; and Epirus offers the beautiful series from Ambracia, with the noble head of its king, Pyrrhus, treated as the Jupiter of Dodona. The coins of Pyrrhus were probably struck at Tarentum or Syracuse. Athens naturally affords the largest series of Greek coins; some specimens are as early as 500 B. C. Those of the adjacent island of Ægina are very interesting from their antiquity, and from the tradition that Pheidon, King of Argos, first struck coins here in the eighth century B. C. In the Peloponnesus the series of the money of Corinth claims especial attention from its great extent and long-preserved excellence. At Elis we find the digamma on early types of the time of Xerxes, and a magnificent series of the finest period, with the head of Juno and her name, HPA, inscribed on a bandeau over her forehead. With these may be ranged scarcely less noble specimens from Trazene, Arcadia (with the head of Zeus Ætophoros), and Stymphalus—the latter possibly Cretan. Sparta naturally records her famous ruler, Lycurgus, though on a late copper coin. Mantinea and Heræa have good archaic types.

Asia Minor offers us coins partly Greek and partly Græco-Oriental; there is a magnificent head of Mithridates VI. of Pontus; in Mysia we have a unique series of *electrum* coins, called *staters* of Cyzicus, with other splendid trophies of Greek art, in the money of Cyzicus, Phocæa, and Pergamus. The tetradrachms of the last place are called, from their peculiar type, *cistophori*. Ilium in Troas naturally records its local traditions, placing Hector (ΕΚΤΩΡ) on its money, and Æneas carrying Anchises and leading Ascanius. Lydia comes next, with its rude and archaic gold coins, probably, the earliest specimens of Greek numismatic art, though those of Ægina could not have been much later; then comes Ionia, with its great series of Smyrna and Ephesus, and the noble coins of Clazomenæ. Magnesia records its river by the type of a bull butting within the pattern, hence called "Mæander." Early coins of Phocæa exhibit the seal, whence its name; and Chios, Samos, Calymna, and Cos early produced many curious specimens. The coins of Rhodes have an importance of their own, and comprise very fine specimens, with the head of Apollo, probably the same type as was afterward known as the Colossus of Rhodes. On the opposite coast Lycia and Pamphylia afford a remarkable series, the elder ones inscribed in the local character and languages, and Side in the latter province having some especially fine tetradrachms, with the pomegranate fruit (Σιδή) as their type. In Pisidia we have curious locally inscribed coins at Selge, resembling those of Aspendus in Pamphylia. Phrygia offers several coins of interest of the imperial times with local myths, such as that of Deucalion and ΝΩΕ, and Cilicia some remarkable coins inscribed with Phœnician characters and struck by the Persian rulers of that district. These are called "satrap" coins. There are also some interesting types at Tarsus, bearing legends similarly written. These, and the types prevailing along the coast of Syria, at Sidon, Tyre, Aradus, and Byblus, together with the early money of the Bactrian series, might perhaps best be termed Græco-Oriental. The native coins of Carthage and of Judæa must be called Oriental; they do not exhibit anything worthy of remark, except, perhaps, the earliest "shekels" of Judæa, which were probably struck soon after the return of the Jews from Babylon.

Roman numismatics begins about 230 or 240 B. C. with a massive copper coinage, termed technically *æs grave*, having the *as* for its largest size, and the *uncia* (or ounce) for its unit. At first the *as* actually weighed 1 lb., and hence was called *as libralis*, the ounce being its twelfth part; but it was soon and rapidly reduced. The leading types of the Roman *as* are the *Janus bifrons* and the prow of a galley. Other and similar coins were struck in the neighboring towns of Etruria and in Umbria and Apulia. About 170 B. C. gold, silver, and copper coins were issued by various Roman families, who were permitted by the state to strike coins—often, too, beyond the bounds of Italy; and with Julius Cæsar began the imperial series, which lasted till 476 A. D. The main characteristic of Roman art is individuality as opposed to idealism; faithful portraiture, often exceedingly good, as in the cases of Nero, the Antonines, the two Faustinas, etc., with a remarkable permanence of religious types on the reverses. Many historical events are recorded on them, as the crowning of Ptolemy Epiphanes by Lepidus, the introduction of elephants into Rome by Metellus, the construction of the port of Ostia and of the Colosseum by Nero and Vespasian respectively, and the overthrow of Judæa by Titus.

It is probable that all the finest Roman coins were executed by Greek artists, and their chief value for study is the illustration they afford of contemporary sculpture, and the influence they have exercised over mediæval and modern art. After Julius Cæsar the senate reserved to itself the striking of the copper money, which for a long time is always marked with S. C. (*senatûs consultu*). Names for Roman coins are scarce, but we know that the earlier gold and silver coins were termed, respectively, the *aureus* and the *denarius*, the latter of which names was preserved through the Middle Ages as the *denier* of France. Besides the regular coins, the Romans had also what are termed *medallions* (see MEDALLION), and *contorniates*, which were probably tickets of admission to the theaters or games. Christian types, as the *labarum* or standard bearing the cross, are found from Constantine downward, and on one are seen the celebrated words, "*Hoc signo victor eris.*" With the imperial Roman it is usual to class the *imperial Greek* coins, struck in the Greek cities by nearly every emperor, and in some cases, as at Antioch and Alexandria, forming a series unrivaled in number and duration.

The Greek coinage of the Byzantine emperors down to the capture of the city by the Turks in 1453 is generally supposed to begin with Anastasius in A. D. 491. The inscriptions on it are at first in Latin, thence continuously in Greek, its varying orthography showing the gradual change of the language. The Byzantine coinage is mostly in gold, and its chief interest is that it was the principal coinage of Middle and Eastern Europe till the introduction of the florins and ducats of the Italian republics; and, further, because the money of the Vandals in Africa, of the Ostrogoths in Spain and of Nicæa, Thessalonica, and Trebizonde, was framed on Byzantine models.

The early *mediæval* types are a barbaric imitation of the Roman, their art being progressively worse as they were removed farther and farther from Italy, which always retained some traces of her earlier civilization. The earliest mediæval coins are those of the Lombard and Merovingian kings and of the dukes of Benevento, and in Britain the small silver pieces called *sceatas*. In France and in England the *denier* and the *penny-sterling* (i. e. Easterling) were the common and the most important coins. Coins were (except in England, where the right of striking coins was always much restricted) issued by princes and ecclesiastics, as well as by kings, and somewhat later by free cities and corporations. Mediæval coins are not relatively so important to us as the seals of the same epoch, of which many originals and many impressions exist. The coins are nearly always inferior in beauty to those seals, and still more decidedly inferior to the cast medallions of Italy. (See MEDAL and MEDALLION.) It is only in very modern times that the same care and pains have been spent upon die-sinking for coins that are given to the other arts.

Besides the various series above enumerated there exists a vast number of coins struck by different Oriental rulers from the beginning of the empire of the khalifs to the present day. These coins are not very important in the history of art, but very valuable in determining the dates of dynasties; as a rule, with the exception of the Chinese, they are written in the characters of the Mohammedan conquerors, or in some modification of the Devanâgari (or Sanskrit) alphabetic system. Revised by RUSSELL STURGIS.

Nummulite: See FORAMINIFERA.

Nun: See NU.

Nunataks: See GLACIERS.

Nuncio: See LEGATES AND LEGATION.

Núñez, noon'yāth, RAFAEL: statesman; b. at Cartagena, New Granada, Sept. 28, 1825. He studied in his native city; was elected to congress in 1851, and thereafter took a prominent part in politics; was secretary of the treasury 1855–57 and 1861–62; and edited *El Porvenir* and other journals. From 1863 to 1865 he lived in New York, where he conducted a Spanish newspaper; later he was in Europe until 1874, acting as consul of Colombia at Havre and Liverpool. Returning to his native country, he was the candidate of the liberal party for the presidency in 1875, but was defeated; was governor of the state of Bolivar, senator, and secretary of the treasury for a short time in 1878; and was elected president in 1879. His term of two years (1880–82) was very prosperous. He was again elected for the term beginning Apr., 1884; in 1885 a rebellion was put down, and in 1886 a new constitution was adopted, by which the federal system was abolished, and the presidential term was extended to six years. Under this constitution Dr. Núñez became president in 1886, and again in 1891. D. in Bogota, Sept. 18, 1894. HERBERT H. SMITH.

Núñez de Arce, -dā-aar'thā, GASPAR: dramatist and poet; b. at Valladolid, Spain, Aug. 4, 1834. His studies were pursued at Toledo, and even before they were completed he was given the freedom of the city for a successful drama. Soon after he went to Madrid, where he began to write for various periodicals, and also, both alone and in association with the poet Antonio Hurtado, to produce plays. From his own pen we have the comedies *¿ Quién es el autor ?* (1859); *La Cuenta del Zapatero* (1859); *Como se empeñe un marido* (1860); *Ni tanto ni tan poco* (1865); and the dramas *Deudas de la honra*: *Quien debe, paga*; *Justicia providencial*; and *El Haz de Leña*. The last of these, produced in 1882, and devoted to the story of Don Carlos, is one of the best recent Spanish plays. With Hurtado he wrote *El Laurel de la Zubia* (1865); *Herir en la sombra* (1866); *La Jota aragonesa* (1866); *Una página de oro, ó el Sitio de Cartagena en 1815* (1873). It is, however, quite as much by his poetry as by his plays that Núñez de Arce has obtained his commanding place in Spanish letters. On the whole, he is the best exponent in Spain of the doubts and pessimistic inclinations of the nineteenth century; but at the same time he has often shown remarkable patriotic passion in denouncing the political evils of his country. Through the wretched revolutions of the last half of the century, his voice has again and again been raised against the cruelty and selfishness of self-styled patriots, and more than once his words have echoed throughout Spain. He has given the title *Gritos del Combate* (5th ed. 1885) to the collection of these passionate poems. Besides this volume, he has published several longer poems that have had remarkable popularity: *Última lamentación de Lord Byron* (23d ed. 1884); *Maruja* (9th ed. 1886); *La Pesca* (15th ed. 1886); *La Selva Oscura* (15th ed. 1886); *El Vértigo* (25th ed. 1886); *La Visión de Fray Martín* (15th ed. 1886); *Un Idilio y una Elegía* (18th ed. 1886). In 1860 Núñez de Arce went as correspondent of the Madrid journal *Iberia* to the war between Spain and Morocco; and this is described in his *Recuerdos de la Guerra de África*. He early began to take part in politics, always on the liberal-monarchical side, and in 1865 he was first elected to the Cortes. In 1882 he was Minister of Colonial Affairs. He was elected to the Spanish Academy in 1876. He has published his four chief dramas under the title *Obras dramáticas* (Madrid, 1879); various tales and articles as *Miscelánea literaria* (Barcelona, 1886). A. R. MARSH.

Núñez Vela, -vā'lăă, BLASCO: first Viceroy of Peru; b. at Avila, Spain, about 1490. He held various civil and military offices, and was appointed Viceroy of Peru in 1543, with special directions to enforce the new laws for the abolishment of Indian slavery. He reached Lima in May, 1544. He had already shown his good intentions by refusing the forced services of Indian porters during his journey, and laying an embargo on a cargo of silver, on the ground that it was the product of slave labor; but he lacked discretion to introduce so great a reform against the violent opposition of the colonists. A revolt quickly broke out, headed by Gonzalo Pizarro. Vela made matters worse by imprisoning his predecessor, the governor Vaca de Castro, and in Sept., 1544, he killed the factor, Carbajal, after accusing him of conspiring with Pizarro. He was finally deposed and arrested by the Audiencia, and put on board a ship, to be sent to Spain. The captain of the ship allowed him to land at Tumbez, where he began to organize an army; but Pizarro pursued him, and he fled through Quito to Popayan. Thence, re-enforced by Benalcazar, he returned to Quito, but was defeated and killed by Pizarro at the battle of Añaquito, Jan. 18, 1546. HERBERT H. SMITH.

Nu'nivak: an island in Bering Sea, belonging to the U. S.; in lat. 60° N., lon. 166° W.; off Cape Vancouver and separated from the mainland by Etolin Straits, about 40 miles wide. It is an irregular quadrilateral, about 50 miles long by 30 broad, and contains about 1,200 sq. miles. It is unexplored, but is known to be lightly wooded in sheltered places and to contain many high hills. It is lowest in the northern part, and has no harbors. It is inhabited by Innuits, very degraded and filthy, and noted for the beauty of their ivory carvings and of their skin canoes. Their chief articles of trade are fox-skins, oil, and ivory. M. W. H.

Nun of Kenmare, The: See CUSACK, MARY FRANCES, in the Appendix to Vol. III.

Nur-ed-din Mahmud, or **Malek-al-Adel** (just prince): Sultan of Syria; b. at Damascus in 1117; son of Zenghi, Emir of Bassorah, who had conquered Northern Syria. After Zenghi died (1146), his elder son, Seïf-ed-din, succeeded to the northern half of his dominions, while Nur-ed-din took possession of the rest. In 1147 he defeated Count Joscelin de Courtnay and captured Edessa, the bulwark of the Christian kingdom of Jerusalem. For its recapture Louis VII. of France and Conrad III. of Germany undertook the second crusade. Nur-ed-din defeated Louis, took Antioch, Tripolis, and Damascus (1154), which he made his capital, overthrew Baldwin III., King of Jerusalem, near the Jordan (1155), and gradually mastered nearly all Syria and Palestine. The civil dissensions of the Mussulmans in Egypt led him to interfere in that country, which was subdued and pacified by his generals, the Kurds Schir-Kou and Salah-ed-din. D. at Damascus in 1174. Nur-ed-din was a man of noble character, revered by the Mussulmans and admired by the Christians. His victories were due not only to his diplomacy and military skill, but to his firm persuasion that he was chosen by God as the soldier of Islam. E. A. GROSVENOR.

Nu'remberg (Germ. *Nürnberg*): town of Bavaria; on the Little Pegnitz, here crossed by seven bridges, and on three railway lines; 95 miles N. by W. of Munich (see map of German Empire, ref. 6–E). Of all German cities it is the most interesting and characteristic with respect to its architecture. The houses face the street with their gables, and balconies profusely ornamented with carvings in stone or wood overhang the sidewalks. It is very rich in splendid mediæval monuments which show that its ancient boast of being the commercial, industrial, and literary center of Germany was not vainglorious. Of its many remarkable buildings, the most striking is the Church of St. Sebald, a Gothic structure ornamented with paintings by Albert Dürer, and containing the famous tomb of St. Sebald executed in bronze by Peter Vischer, who, with his five sons, worked on it for nearly thirteen years. The town-hall, the largest building of its kind in Germany, with subterranean dungeons and torture-chambers, the castle, and the Church of St. Lawrence are also interesting edifices. The Albrecht Dürer Platz contains a statue of the great artist, erected in 1840. The principal manufactures of Nuremberg are carvings in wood, bone, and metals, children's toys and dolls, lead-pencils, chemicals and ultramarine, looking-glasses, watches, carriages, and machinery. Its trade is very extensive.

Nuremberg was once the wealthiest and most important of the free imperial cities of Germany. Among the earliest of German cities to accept Protestantism, it gave hearty support to the followers of Luther, and was the seat of important diets during the Reformation. It gave its name to the religious peace of 1532, which granted temporary liberty of worship to Protestants in order to secure united action against the Turkish invaders. Although it suffered greatly during the Thirty Years' war, and gradually declined until in 1806 it lost its independence and was annexed to Bavaria, it is still a great and rich town. Its fortifications, consisting of a double wall and a moat, were demolished during the occupation by the Prussians in 1866, and have been transformed into promenades. Pop. (1900) 261,022, of whom about 25,000 are Roman Catholics.

Nursery: in horticulture, an establishment for the rearing of plants; in the U. S., however, there is a tendency to restrict the term to those areas devoted to the growing of woody plants alone, like trees and shrubs, while the propa-

gation of herbaceous plants is referred to floriculture. The peculiarity of nurseries in the U. S. as distinguished from those of other countries is the enormous quantity of fruit-tree plants which are propagated, a circumstance which arises from the fact that fruit-growing is the chief horticultural pursuit of the republic. In 1890 the nurseries of the U. S. occupied 172,806 acres of land, and represented an invested capital of $52,425,669.51. They employed 45,657 men, 2,279 women, and 14,200 animals. There was a total of 3,386,856,778 plants growing for sale, of which 518,016,612 were fruit-trees and 685,603,396 were grape-vines and small fruits. The greatest number belonging to a single species were 240,570,666 apple-trees, grown upon 20,232¾ acres. Evergreen trees were represented by 822,038,324 plants, and deciduous ornamental and forest trees by 1,297,408,257. The most important nursery region of the U. S., considering both extent and variety of the industry, is Western New York, particularly the counties of Ontario, Monroe, Wayne, and Niagara.

The nursery interest may be divided into two categories with respect to the use and economy of the land—the growing of fruit-trees and plants, and the growing of ornamentals. The market value of fruit stocks is measured by their age and size combined, and it is therefore essential that they be grown upon unworn land in order that the greatest possible growth may be obtained in a given time. It is almost a universal practice to grow only one crop of fruit-trees upon the land. Nursery lands are therefore largely rented for a term of four or five years, after which farm crops are raised upon the soil. A high system of fertilizing would undoubtedly restore the soil to a condition to allow of successful nursery business, but in practice it is found to be cheaper to plant upon land which has never been used for nursery purposes. Ornamental stocks are valued according to their size alone, and these can therefore be satisfactorily grown upon land already used for nursery crops.

Fruit-trees are grown from seeds, and the seedlings are budded or grafted (see GRAFTING) with whatever varieties of the same, or in some cases allied, species the nurseryman may desire. Ordinarily, the growing of seedlings is a separate business from the propagating and growing of named varieties. The seedlings of plums, pears, quinces, and generally of cherries, are mostly grown in France, where labor and seeds are cheap and the climate is adapted to the work. These seedlings are exported to the U. S. at the end of the first season's growth and are planted in nursery rows. The following summer (that is, the second season from the seed) these seedlings are budded to the various named varieties. These buds do not grow until the following spring, at least not in the North; so that when the bud, which is to make the body and top of the tree, begins to grow, the root is two years old. The trees are ready for sale when the bud or top is two or three years old. Apples are now mostly grown upon seedlings raised in the rich soil of the Western States. These seedlings are dug and shipped in the fall of the first year. The purchaser may root-graft these stocks the same winter and plant them in the spring, or he may set them in nursery rows and bud them the following July or August. Peaches are budded in late August or September (in the North) of the first year, and the trees are ready for sale at the close of the following year. That is, peach-trees are sold when the top is one year old and the root two years old. Ornamental trees and shrubs are multiplied in a great variety of ways. Some are budded or grafted, and many are increased directly by seeds, cuttings, or layers. (See CUTTINGS.) Grapes are almost wholly grown from cuttings of the mature wood (see GRAPE), as are also currants and gooseberries. Raspberries and blackberries are multiplied both by means of cuttings of the roots and by suckers which spring from near the base of the plant; but the blackcap raspberries are usually propagated by bending over the growing shoots or canes and allowing the tip to root in the soil, after the manner of a layer. (See LAYERING.) For detailed accounts of nursery practice, consult Barry's *Fruit Garden*, Fuller's *Propagation of Plants*, and Bailey's *Nursery Book*.

L. H. BAILEY.

Nurse-shark: a large shark (*Somniosus microcephalus*) found in Arctic or cold northern waters. It is of a robust form and attains a length of from 12 to 20 feet, but has very small teeth and is sluggish in its motions. This name is also applied to a smaller and more slender shark (*Ginglymostoma cirrata*), occurring in the Caribbean Sea and adjacent waters.

F. A. L.

Nusairieh, Ansyreeh, Ansaries, or **Ansonians**: a Mussulman sect. They inhabit the lower Ansyrean mountain range between Lebanon and Antioch, in Syria, and also are numerous in towns and villages along the coast. They sprang from the Shiïtes, with whose heresies they united many Christian, Jewish, and pagan ideas. Their prophet Nusair taught that God had appeared several times in human form, as in Abraham, Moses, Jesus, Mohammed, and Ali, and will once more manifest himself in El Mahdi or the Messiah. They regard Christ as a prophet, revere the Virgin Mary, observe Christmas, adore the sun and moon, accept the Koran, which they claim was revealed to a Mohammed of their sect and not to the Arabian prophet, maintain the divinity of Ali, who they say was incarnated seven times, practice polygamy, indulge in wine, and believe in the transmigration of souls. In their belief, whoever is apostate or unfaithful to his religion will after death be transformed into a Jew, Mussulman, Christian, or animal. They endeavor to keep their creed secret, and many of their doctrines are unknown. Their neighbors give them a bad reputation, but, though ignorant and superstitious, they are kindly and hospitable.

E. A. GROSVENOR.

Nut: an Egyptian deity, wife of Seb (or Qeb) and mother of Osiris, Isis, Nepthys, and Set-Typhon. She was the personification of the heavens, and is represented as a woman standing like a quadruped upon her hands and feet, while her body symbolized the heavens in which the stars appear. Similarly she is represented by the figure of a cow. Nut is to be distinguished from Nu-t. See NU. C. R. G.

Nutation: See PRECESSION OF THE EQUINOXES.

Nutcracker: a bird of the crow family, so called from the readiness with which it cracks the nuts that form a part of its food. Its scientific name is *Nucifraga caryocatactes*, and it is nearly related to the jays. It is a little over a foot in length; the thick, soft plumage is dark brown, with white or whitish spots on the head and neck; the wings and tail are black, the latter with a white band. The nutcrackers frequent the pine forests of Northern Asia and Europe, feeding on grubs, the seeds of the pine, etc. They associate

The European nutcracker.

in flocks and are active and noisy, except during the breeding season. Although the birds are very common, the eggs were for a long time unknown, owing to the fact that the birds nest early in the spring while the snow is still on the ground, and at this time are shy and quiet. The American nutcracker, better known as Clarke's crow (*Picicorvus columbianus*) is an inhabitant of the pine woods of the western parts of the U. S. It is of a gray color, wings black with a white mark on the secondaries, tail white, except central feathers, which are black.

F. A. LUCAS.

Nutgalls: See GALL INSECTS, GALLOTANNIC ACID, and GALLS.

Nuthatch: any one of a number of small birds belonging to the family *Sittidæ*, and, with a few exceptions, to the genus *Sitta*. They have round, pointed beaks, long wings, short, rather square tails. They are active climbers, and may be seen scrambling about trees, often head downward,

in search of insects and their eggs. They get their popular name from a habit of placing a seed, or small nut, in some convenient crevice, and hacking, or *hatching*, out the contents with blows of the beak. The greater number of species are found in Europe, Asia, and North America, but a few peculiar genera, which may possibly not rightfully belong to the group, are found in New Zealand, Australia, and

The common European nuthatch.

Madagascar. The common European species is *Sitta europea*; the common nuthatch of Eastern North Ameriea is *S. carolinensis*, a bird 6 inches in length, bluish ash above, dull white below; wings blackish, tail, except central two feathers, brown, and nape black. It nests in holes, which it hews out for itself, and lays a number of white eggs speckled with reddish and purplish colors. F. A. Lucas.

Nutmeg: See Myristica.

Nutria Fur: See Coypee.

Nutrition [from Lat. *nutri're*, nourish, whence Eng. *nourish*]: the process by which appropriate material is taken into living organisms and utilized to maintain their existence, promote their development, and facilitate the performance of their functions. This definition covers vegetable as well as animal nutrition. The discussion of the former will be found in the articles on botanical subjects; in this only animal nutrition will be considered. Animal nutrition includes the absorption of gases and of water, and the preparation, appropriation, and assimilation of solid food. The absorption of gases and water takes place, in very simple organisms, through their general surface; in higher organisms the absorption of gases (and perhaps to a very limited extent of water) takes place through lungs or gills by the function of respiration; the absorption of liquids takes place chiefly in the stomach, and of semi-liquids and solids in the intestines. The function of respiration accomplishes an exchange of gases, by which those needed by animal tissues in active life are received into the blood, and those excreted by them are conveyed out of the body. This is as really a part of the process of nutrition as that which consists in appropriating nourishment taken into the stomach, and its details may be found in the article on Respiration.

Briefly stated, nutrition is the result of appropriating food, and food is anything which, when appropriated by the tissues—or, more properly, the cells—of the body, contributes to their life, growth, or functional activity. The simplest forms of animal and vegetable life (amœbæ, bacteria) are nourished by direct absorption of suitable material from the surrounding media, in this respect, as in many others, resembling the individual cells of higher organisms. For the latter, the first step in the process of taking food (after any form of preparation) is called by physiologists "prehension" (laying hold of); the second (applicable to solid or semi-solid food) is usually "mastication" (chewing); the third is usually "deglutition" (swallowing). Some animals, like birds, perform the act of mastication in the stomach (gizzard); others, like fishes, do not masticate at all; others, like cattle, masticate their food after it has been once swallowed and then regurgitated —what is called "rumination." In the highest animal organism, man, the three processes named above are followed by Digestion (*q. v.*), and this by absorption through the walls of the stomach of liquids and the products of gastric digestion, which then enter the blood-vessels and lymph-channels and are conveyed in the blood and lymph to the remotest parts of the body. The undigested food passes into the intestinal canal, where it is further elaborated (for the details of which process see Digestion), the prepared portion being taken up by blood and lymph vessels of the wall of the intestines and conveyed into the circulation, while the residue is carried on and finally expelled by the process of defecation. After nutritive material enters the circulation, it is carried to various parts of the body and comes in contact with individual cells, which then (in health) take up and appropriate to their nourishment what they need. A necessary complement to the process of appropriation is that of exeretion, which consists in the casting off by each cell of effete matter, the product of its own vital activities, which is conveyed by the blood-vessels to the various points of exit from the body—the lungs, the skin, the kidneys, and the bowels.

A correct understanding of the process of nutrition involves, as a fundamental conception, the fact that the most complex being is a community of individual cells, each living by itself, growing, developing, reproducing its like, decaying, and dying in due time, and from the beginning to the end of its existence maintaining its individuality. The life and health of a man depend upon the life, health, and harmonious action of the cells of which his body is composed, and the state of nutrition of a man corresponds to the state of nutrition of his cells. When a man grows fat it is because the cells which make up his adipose (fat) tissue are in a state of high nutrition; when he grows thin, it is because they are under-nourished. When a man grows muscular, it is because his muscle-cells are well nourished; and when these are impoverished, his muscles will be weak and small. All the steps in nutrition previous to the appropriation of food by each cell are but preliminary to that final act in which each cell—like an amœba in a drop of water—takes from its surrounding medium that which is suited to its needs. By means of a process of which nothing is certainly known the material that each cell appropriates undergoes changes which make it like that which already occupies the cell, and fit it to take the place of that which, having served its purpose, is undergoing further changes, and is about to be cast out into the same current which has brought the needed supply of nutrient material. This is the real process of nutrition. Charles W. Dulles.

Nuts: See the Appendix.

Nut'tall, Thomas: botanist and ornithologist; b. in Yorkshire, England, in 1786; was brought up a printer; went to the U. S. in youth; devoted much time to botanical and ornithological studies; traveled in nearly every State of the Union; explored the Great Lakes, the upper courses of the Missouri and Arkansas rivers; crossed to Oregon, the Sandwich islands, and California. He published, among other works, *The Genera of North American Plants* (2 vols., 1818); *A Journal of Travels into the Arkansas Territory* (1821); *A Manual of the Ornithology of the United States and Canada* (1832–34); and *The North American Sylva* (3 vols., 1842–49), being a continuation of F. A. Michaux's work on the same subject. Nuttall was curator and lecturer at the botanic garden of Harvard College at Cambridge 1822–28; returned to England about 1841 on inheriting an estate. D. at St. Helens, Lancashire, Sept. 10, 1859.

Nux Vom'ica [Mod. Lat.; Lat. *nux*, nut + *vo'mere*, vomit]: an important drug consisting of the seeds or beans of a small tree (*Strychnos nux vomica*) of the natural order *Loganiaceæ*, growing in the coast districts of India. The leaves are roundish-oblong, stalked, smooth, and with terminal corymbs. The fruit is a globular berry, about as large as a small orange, with a brittle shell and several seeds lodged in a white gelatinous pulp. The seeds are gray, disk-shaped, a little less than an inch in diameter, and about a sixth of an inch in thickness. They have a very bitter taste and are exceedingly poisonous, both these qualities depending on the presence of the alkaloids strychnine and brucine. Of these, strychnine is the more powerful and important. It is a white powder, almost wholly insoluble in water, odorless, but of an intensely bitter taste. It is highly poisonous, producing in poisonous dose, within half an hour after taking, violent tetanic spasms, the body during the paroxysms being arched backward, with every muscle convulsed and stiff. The mind is unaffected. Death occurs within an hour or two or earlier from a spasmodic prolonged spasm of the muscles of respiration, so that the patient can not breathe. The physiological antidotes are bromides and chloral, and drugs producing motor paralysis, such as Calabar bean, hemlock, tobacco, nitrite of amyl, the anæsthetic ethers, etc., are useful in mitigating the severity of the spasms. Medicinally, strychnine and preparations of nux vomica seeds are used in small repeated doses in cases of nervous debility and paralysis of various kinds, to help in restoring proper functional activity in the affected muscles or organs. Revised by H. A. Hare.

Ny'ack: village; Rockland co., N. Y. (for location of county, see map of New York, ref. 8–J); on the west bank of the Hudson river, and on the Erie, the N. Y., Ont. and W., and the W. Shore railways; 28 miles N. of New York city, with which it has daily steamboat communication, and opposite Tarrytown, with which it is connected by a ferry. It contains Rockland College (non-sectarian, opened in 1874), Nyack Seminary (Protestant Episcopal), Nyack Library Association (founded 1879), public, high, and union schools, several private schools, electric lights, 2 daily and 3 weekly newspapers, a national bank, capital $50,000, a private bank, and manufactories of shoes, pianos, pipe-organs, steam-yachts, boilers, engines, and paper boxes. Pop. (1880) 3,881; (1890) 4,111; (1900) 4.275.

EDITOR OF "JOURNAL."

Nyan'za: a word for lakes in Eastern Equatorial Africa, and especially applied to two great lakes, the *Victoria Nyanza*, or *Ukerewe*, and the *Mwutan*, or *Albert Nyanza*. Nyassa is another form of the same word. See ALBERT NYANZA, NYASSA, and VICTORIA NYANZA.

Nyas'sa: one of the large lakes of inner Africa: about 340 miles long and from 15 to 34 miles wide; 700 feet deep in the south and shallower toward its northern end; area about 14,220 sq. miles. Its waters run to the Zambesi through the Shire river. The shores for the most part are steep, particularly on the west and northeast coasts, and in general the lake gives the impression of a deep cleft in the highland filled with water. Many small rivers flow into the lake on the west coast, but the water receipts of the east coast are small. German and English steamers ply on the lake, whose coasts are divided between those nations. The lake offers (1894) the best route to Central Africa from the Indian Ocean.

C. C. ADAMS.

Nyassaland: See the Appendix.

Nyāya Philosophy: the youngest of the six systems of Brahmanical philosophy (MĪMĀṄSĀ, VEDĀNTA, SĀṄKHYA, YOGA, NYĀYA, and VĀIÇESHIKA, *q. v.*), founded probably some time after the Christian era, and by a man named Gotama, or, as he is often nicknamed, Aksha-pāda, literally, "Having his eyes on his feet." The system bears the Sanskrit name *nyāya*, that is logic, because its importance is chiefly due to its extraordinarily thorough and acute exposition of formal logic, an exposition which has held its own, even until to-day, in India, and which serves as the basis of all philosophical studies, and whose terminology has made its way into the younger treatises of all the other systems. The importance attached to the Nyāya system is evident from the fact that Gotama, in the opening sentence of his manual, the *Nyāya-sūtras*, in enumerating the sixteen fundamental logical conceptions, declares that upon the right understanding of their nature depends the attainment of the supreme welfare, that is, the liberation of the soul from the round of existence. The Nyāya philosophy, however, aims not merely to develop a system of logic, but rather also a complete philosophical system; and is, in this aspect, a continuation and supplement of the Vāiçeshika system, and requires, accordingly, for its proper understanding, some knowledge of the VĀIÇESHIKA (*q. v.*). The metaphysical bases of both systems are the same: both regard the world as a conglomerate of eternal, causeless, and unchangeable atoms; and both agree in their psychology, holding, namely, that the souls are eternal and endless, that they possess certain qualities, and that they can apprehend only by means of the atomistic organ of thought that belongs to them.

The Indic philosophies in general separate strictly two kinds of causes, the material cause (*upādāna-kāraṇa*) and the instrumental cause (*nimitta-kāraṇa*). The material cause of a thing is the matter from which it proceeds and of which it consists. As instrumental cause of a thing is regarded not only the occasion of its coming into being, but also the means by which it is produced. While the material cause of a certain object is always the same, the instrumental causes thereof need by no means be so. Instead of the usual term *upādāna-kāraṇa*, the Nyāya employs—with evident reference to the sixth category of the Vāiçeshika system—the term *samavāyi-kāraṇa*, inherent cause; and assumes, moreover, a third kind of cause—which we should denominate the formal cause—namely, the *a-samavāyi-kāraṇa*, or non-inherent cause. Thus, to use the stock-example, the threads are the inherent cause of the cloth; the connection of the threads, the non-inherent cause; the loom and tools of the weaver, his personal skill, his activity, and the weaver himself are the instrumental causes. Or, again, the cloth is the inherent cause of its qualities, while the qualities of the threads are the non-inherent cause of the qualities of the cloth.

The Nyāya recognizes four sources of true knowledge, to wit: 1, Perception (*pratyaksha*); 2, inference (*anumāna*); 3, analogy (*upamāna*); and 4, trustworthy testimony (*çabda*). Of these, the second palpably outranks the rest. Inference is of three sorts: *a*, From cause to effect (*pūrvavat*), as when from the gathering of the clouds you conclude that it is going to rain; *b*, from effect to cause (*çeshavat*), as when from the swelling of the streams you conclude that it has rained; *c*, from the particular to the general (*sāmānyato dṛshṭa*), answering to our induction, as when, at the sight of a blossoming mango-tree, you infer that the mangos in general are in bloom; or when, from the consideration of the single senses, you arrive at the general idea of the instrument of perception.

The syllogism of the Nyāya has five members, and may be illustrated by the stock-example:

1. Proposition (*pratijñā*): This mountain has fire,
2. Reason (*hetu*): because it has smoke.
3. Example (*drshṭānta*): Whatever smokes has fire, as a kitchen hearth.
4. Application (*upanaya*): This mountain smokes.
5. Conclusion (*nigamana*): Therefore it has fire.

All this, compared with the Aristotelian syllogism, seems needlessly prolix, since 4 and 5 are only repetitions of 2 and 1; but Gotama was not aiming at the utmost brevity, but rather to teach how to present the syllogism in the best and clearest manner to another—that is, the five-membered syllogism is merely the tripartite logical one modified by rhetorical considerations. The conception that underlies the Nyāya syllogism is called invariable concomitance or pervasion (*vyāpti*). Instead of proceeding with one of the "universal affirmatives" of Occidental logic, as "Every smoke presupposes the existence of a fire," the Nyāya proceeds with the invariable concomitance, e. g., of smoke by fire. The observed characteristic (*liñga*), e. g. smoke, is the invariably concomitated (*vyāpya*); the inferable bearer of the characteristic (*liñgin*), e. g. fire, is the invariable concomitant (*vyāpaka*). Although strange in form, this is logically correct. Smoke is invariably accompanied by fire, albeit the converse is not true. The definitions of *vyāpti* and the doctrine of its application are important not only in the Nyāya system, but also in the other philosophic writings of the Hindus.

Such are some of the salient features of the Nyāya. The system goes on to discuss other logical topics, fallacies, and various faults of controversy, often with complicated detail and hair-splitting subtlety. For an outline of these matters, see Garbe's translation of *Aniruddha's Commentary on the Sānkhya-sūtras* (Calcutta, 1892), pages 233–237.

One important point, which concerns both the Vāiçeshika as well as the Nyāya system, still demands our notice. The fundamental works (*sūtras*) of both schools are without any mention of God; and since, moreover, they declare the souls and likewise the substance of the external world to be eternal and uncreated, and since, in agreement with the general Indic view, they hold the fate of the individual to be the product of his good and evil deeds in former existences, there is, accordingly, little room to doubt that the original character of both systems was atheistic. This may be due to the influence of the Sānkhya system. (See SĀNKHYA.) Indeed, the Nyāya and Vāiçeshika doctrines, although presenting many striking contrasts to the Sānkhya, show various peculiarities which seem to rest upon some of the fundamental conceptions of the Sānkhya: such are their pessimistic coloring; their rejection of bliss in heaven as transitory and as leading to new misery; their teaching that even good works are a hindrance to the attainment of salvation; the view that salvation involves the cessation of joy no less than of sorrow—in short, a condition of absolute unconsciousness. Here, too, belongs the fondness for the numerical groupings of the categories and the like.

In later times, both Nyāya and Vāiçeshika go over to theism; but they do not go so far as to hold the personal God to be the creator of matter. Their theology is worked out in the *Kusumāñjali* (written by a Nyāya teacher named Udayanāchārya about 1300 A. D.) and in various works which treat of both systems together. According to these, God is a definite eternal soul, as are all other individual eternal souls: but with this difference, that he is free from the qualities which condition the migration of the other souls (merit, sin, aversion, joy, sorrow), and that he alone possesses the qualities by which he is fitted to govern the universe, to wit, omnipotence and omniscience.

Next to the Vedānta, the Nyāya has produced the greatest number of text-books. Fitzedward Hall's *Index to the bibliography of the Indian philosophical systems* enumerates 202. The *Nyāya-sūtras* were edited with the commentary of Viçvanātha Bhaṭṭāchārya by Nimāi Chandraçiromani (Calcutta, 1828), and with that of Vātsyāyana by Jayanārāyaṇa Tarkapañchānana (*Bibliotheca Indica*, Calcutta, 1865). These *sūtras*, except the last and hardest (the fifth) book, were translated into English, with extracts from Viçvanātha's commentary, by J. R. Ballantyne (Allahabad, 1850–54). *The Kusumāñjali*, with commentary, was edited and translated by E. B. Cowell (*Bibl. Ind.*, Calcutta, 1864). Among the modern works that mingle Nyāya and Vāiçeshika doctrines are especially useful the *Bhāshāparicheda* of Viçvanātha, edited and translated by E. Röer (*Bibl. Ind.*, Calcutta, 1850), and the *Tarkasaṁgraha* of Annabhaṭṭa, edited, translated, and annotated by J. R. Ballantyne, under the title, *Lectures on the Nyāya Philosophy, embracing the text of the T. S.* (Allahabad, 1849; 2d. ed. 1852). Of the last three works various other editions exist.

Among European works on Nyāya-Vāiçeshika, most important are H. T. Colebrooke's treatise in the *Transactions of the Royal Asiastic Society*, i., 92–118, 1824, reprinted with valuable notes by Cowell in Colebrooke's *Miscellaneous Essays*, 2d. ed., i., 280–318 (London, 1873), and three articles by Max Müller, *Beiträge zur Kenntniss der indischen Philosophie*, in volumes vi. and vii. of the *Zeitschrift der deutschen morgenländischen Gesellschaft*.

RICHARD GARBE. Translated by C. R. LANMAN.

Nyblom, nü'blōm, KARL RUPERT, Ph. D.: poet and critic; b. in Sweden, in 1832; graduated at Upsala in 1857; was in 1860 appointed assistant professor in the university, and in 1867 Professor of Æsthetics, Literature, and Art History. In 1879 he was elected a member of the Swedish Academy, which institution had already in 1853 awarded him its prize for the poem *Arion*. Nyblom has been very productive both as æsthetic author and as poet. Among his æsthetic works may be mentioned *Konststudier i Paris* (Art Studies in Paris, 1864), and others collected under the title *Estetiska Studier* (Æsthetic Studies, 1873). As a poet he has published *Dikter* (Poems, 1860); *Bilder från Italien* (Pictures from Italy, by Carlino, 1864; 2d ed. 1883, entitled *Et tår i Södern*); *Nya Dikter* (New Poems, 1865); *Vers och Prosa* (by Carlino, 1870); *Valda Dikter* (Selected Poems, 1876). Besides these original productions he has translated Thomas Moore's *Irish Melodies* (Irländska Melodier, 1858); Shakspeare's *Sonnets*; *American Humorists* (Amerikanska Humorister, 1874). From 1865–68 he edited *Svensk Literaturtidskrift* (Magazine of Swedish Literature).—His wife, a native of Denmark, has shown considerable talent as a novelist. P. GROTH.

Nybom, nü'bōm, JOHAN: poet and publicist; b. in Sweden in 1815; studied at Upsala, but never completed a course. Since 1860 he has resided at Vesterås, at the beginning earning his living as a newspaper writer. His earlier poems are remarkable for their splendor of expression, warmth of feeling, and vivid imagination, but his later efforts have to a large extent fallen below the standard of his earlier work. Among his poems may be noted *Byron i Grekland* (Byron in Greece, 1838); *Sista Natten i Alhambra* (Last Night in the Alhambra); *Dannemora och Österby* (1847). His complete poems (*Samlade Dikter*) appeared 1844–48; 4th ed. 1880. P. GROTH.

Nyctalo'pia: See BLINDNESS.

Nye, EDGAR WILSON: humorist; b. at Shirley, Me., Aug. 25, 1850. He went to Wyoming when a young man, studied law, and was admitted to the bar. He afterward gained reputation as a humorous writer and lecturer under the pseudonym *Bill Nye*, and removed to New York. Among his works are *Bill Nye and the Boomerang* (1881); *The Forty Liars* (1883); *Baled Hay*; *Remarks* (1886). D. Feb. 22, 1896.

Nyerup, nü'e-rōōp, RASMUS: scholar; b. on the island of Fünen, Denmark, in 1759. After passing the philological and theological examinations he entered the Royal Library and began his literary activity, which continued until his death. His chief merit is the interest he aroused in Scandinavian folk literature and archæology. The Museum of Northern Antiquities in Copenhagen is a result of his earnest efforts. His religious and political views were far in advance of his time. D. June 28, 1829. He published *Bidrag til den danske Digtekunsts Historie* (with Rahbek, 6 vols., 1800); *Historisk-statistisk Skildring af Tilstanden i Danmark og Norge i ældre og nyere Tider* (4 vols., 1803–06); *Udvalgte danske Viser fra Middelalderen* (with Abrahamsôn and Rahbek, 5 vols., 1812–14); *Almindelig Morskabslæsning i Danmark og Norge igjennem Aarhundreder* (1816); *Dansknorsk Literaturlexikon* (with J. E. Kraft, 1818); *Peder Laales Ordsprog* (1828), etc. D. K. DODGE.

Nylander, nü'lăăn-der, WILLIAM: lichenologist; b. in Uleaborg, Finland, in 1823. He was Professor of Botany for many years in the University of Helsingfors, and was afterward a resident of Paris. Author of many books and papers on the structure and classification of the lichens, among them *Synopsis Methodica Lichenum* (1858–59); *Lichenes Scandinaviæ* (1861); *Synopsis Lichenum Novæ Caledoniæ* (1868); *Recognitio Monographica Ramalinarum* (1870); *Lichenes Novæ Zelandiæ* (1888); *Lichenes Insularum Guineensium* (1889). CHARLES E. BESSEY.

Nylghau: See NILGHAU.

Nymph: See ENTOMOLOGY.

Nymphs [from Lat. *nym'pha* = Gr. *νύμφη*, nymph]: maiden divinities, inferior in rank to the other gods. They were neither mortal nor immortal, but lived to a great age; they ate ambrosia, and associated with the gods even in Olympus. They enjoyed the sweets of love with Hermes and the Sileni, and from the union sprang high trees which in the end had to die, and with them died also the Nymphs. They were very numerous, inhabiting mountains and valleys (*Oreads*, *Napææ*), springs, rivers, fountains, lakes (*Næads*, *Oceanids*, *Krenææ*, *Limnads*), forests and trees (*Hamadryads*, *Dryads*), groves and grottoes (*Alseids*, etc.), seas (*Nereids*), etc. They were beneficent genii of their dwelling-places, where they hunted, danced, sang, wove, and aided mankind in manifold ways. Goats, lambs, fruit, and oil were offered to them, but no wine. In art they are represented as charming maidens. J. R. S. STERRETT.

Nymphs, Grotto of the: See CAPRI.

Nym'wegen, or **Nijmwegen** (Fr. *Nimègue*: Germ. *Nimwegen*): town of the Netherlands, province of Gelderland; on the Waal; 73 miles by rail E. of Rotterdam (see map of Holland and Belgium, ref. 6–H). It is important on account of its commanding position on the Rhine and Waal, and has extensive manufactures of beer, brandy, eau de cologne, tobacco, and cigars. Treaties of peace were concluded here between Holland and France (Aug. 11, 1678), between Holland and Spain (Sept. 17, 1678), and between France and Germany (Feb. 5, 1679). Pop. (1896) 38,576.

O

: the fifteenth letter of the English alphabet.

Form.—The form is derived through the Latin O from the early Greek and Phœnician **O**, the sixteenth letter of the Phœnician alphabet as adopted by the Greeks.

Name.—The Semitic name *ayin*, meaning "eye," had reference to the shape of the letter, and this name, on account of its meaning, gave the letter its place in the alphabetical series with *pē*, "mouth," *qoph*, "head," *resh*, "head" (side-view), *shin*, tooth, i. e. in a group of letters whose shapes suggested resemblances to the head or its parts. The sound denoted by the Semitic letter was a guttural breathing not existing in the Greek language. The Greeks therefore applied the sign to denote a vowel-sound, as they did also in the case of *aleph* (*a*), *hē* (*e*), and *yōd* (*i*). They used it at first for all the various sounds of *o*: the short, the open-long (later **ω**), and the close-long (later **ου**). The alphabet of Miletus developed early (not later than 800 B. C.) a differentiated form, **Ω**, which was applied to express the long (open) *o*. This symbol was adopted into use at Athens toward the end of the fifth century, and by the middle of the following century in all Greek alphabets. The early Greek (Attic) name for *o* was **οὖ** (cf. **εἶ**, the older name for epsilon, and **ὖ** that for upsilon); the later, post-classical name, *omicron*, **ὂ μικρόν** (little *o*), to distinguish from *omega*, **ὦ μέγα** (big *o*). In Latin the practice of calling the letter by its long sound was revived, and this name, *ō*, has been continued into English.

Sound.—The simple letter *o* is used in English to denote two principal groups of *o*-sounds: (1) The close *o*, vulgarly called "long *o*": (*a*) In stressed monosyllables, before a voiced consonant or finally, this *o* appears as long and is accompanied by a vanish-sound or glide like *u*, i. e. it is a diphthong; thus *node*, *rode*, *old*, *go*, *no*, *so*. The same sound is denoted variously also, e. g. by *ew* in *shew*, *sew*, by *eau* in *beau*, by *ou* in *dough*, *though*, by *ow* in *throw*, *crow*, by *oa* in *moan*. (*b*) In stressed monosyllables before a voiceless consonant the sound is half-long, as in *note*, *ghost*, *post*. (*c*) In words of more than one syllable the vanish-sound nearly or quite disappears, even under the accent, as in *notary*, *October*, *social*. (*d*) In unaccented open syllables the close *o* appears as a short slack ("wide") vowel, as in *obey*, *poetic*.

(2) The open *o*, vulgarly called "short *o*." In phonetics it is the low-back-round vowel. It appears in two forms: (*a*) Slack ("wide"), as in *not*, *pot*, *mob*, *fog*, *odd*, *box*. The vowel in *soft*, *often*, *frost*, *broth*, *strong*, etc., i. e. before *f*, *s*, þ, ŋ, is generally the same with slightly increased quantity. The same sound is denoted by *a* in *wasp*, *swan*, *wad*, *quality*, *yacht*, etc., by *ou* in *hough*, *ow* in *knowledge*. (*b*) Tense ("narrow"), in the position before *r*, as in *corn*, *lord*, *or*, *abhor*. The same sound is denoted by *a* in *all*, *water*, *law*, etc.; by *ou* in *cough*, *trough*. There is also a recent tendency in England to use the sound in *door*, *floor*, *four*, *oar*, *board*, *glory*, etc., where more generally the sound classified above as 1 (*a*) is used.

O stands also for the following *u*-sounds: (1) The high-back-narrow-round of *do*, *prove*, *shoe*, *two*, *who*, *lose*, etc. The same sound is denoted by *oo* in *spoon*, *too*, by *ou* in *youth*, *through*, by *u* in *rude*, *truth*, by *ew* in *Jew*, *crew*, by *ui* in *fruit*, *sluice*. (2) The high-back-wide-round of *wolf*, *woman*, *bosom*. This sound is denoted also by *oo* in *book*, *wood*, by *u* in *bull*, *full*, *push*, by *ou* in *should*, *could*. (3) The unrounded vowel of *son*, *ton*, *dove*, *love*, *month*, *oven*, *mother*, *does*. This sound is denoted also by *u* in *up*, *but*, by *ou* in *tough*, *rough*, *double*, *southern*, *cousin*, *touch*, by *oo* in *blood*, *flood*.

Source.—(1) Of the close *o* as in *no* the chief sources are: (*a*) O. Eng. *ā*: Germ. *ei*, *ē* < Teutonic *ai* < Indo-Europ. *ai*, *oi*; *home* < O. Eng. *hām*: Germ. *heim*: Goth. *haims*, cf. Gr. **κοιμάω**; *goat* < O. Eng. *gāt*: Germ. *geiss*, cf. Lat. *hœdus*; *-one* in *alone*, *only* < O. Eng. *ān*: Germ. *ein*: Goth. *ains*; cf. Gr. **οἴνη**, Lat. *ūnus*; *dough* < O. Eng. *dāg*: Germ. *teig*, cf. Gr. **τοῖχος**; *bone* < O. Eng. *bān*: Germ. *bein*; *oak* < O. Eng. *āc*: Germ. *eiche*; *lode* (*loadstone*) < O. Eng. *lād*, cf. Germ. *leiten*: Goth. *laidjan*; *dole* < O. Eng. *dāl* (*dǣl*): Germ. *theil*: Goth. *dails*; *toe* < O. Eng. *tā*: Germ. *zehe*; *mole* < O. Eng. *māl*: Goth. *mail*; *whole* < O. Eng. *hāl*: Germ. *heil*. (*b*) O. Eng. short *o*, which later suffered lengthening in open syllables and before *ld*, *mb*; as *hole* < *hol*; *stolen* < *stolen*; *knoll* < *cnoll*; *bolt* < *bolt*; *gold* < *gold*; *mould* < *molde*; *foal* < *fola*; *shoal* < *scolu*: *sworn* < *sworen*; *shorn* < *scoren*; *hoard* < *hord*; *board* < *bord*; *over* < *ofer*; *cove* < *cofa*; *clove* < *clofe*; *smoke* < *smocian*; *folk* < *folc*; *throat* < *þrotu*; *float* < *flotian*; *rose* < *rose*; *comb* < *comb*. (*c*) O. Eng. long *ō* preserved (i. e. not changed to *ū*, as in *nōn* > *noon*) before *w*; as *flow* < *flōwan*; *blow* < *blōwan*; *grow* < *grōwan*; *stow* < *stōwian*; *glow* < *glōwian*; *row* < *rōwan*; *low* < *hlōwan*. (*d*) O. Eng. *ea* (*a*) before *l* + *consonant* < Teutonic *a*; as *old* < O. Eng. *eald*: Germ. *alt*, cf. Lat. *alo*; *cold* < O. Eng. *ceald*: Germ. *kalt*: Goth. *kalds*; *hold* < O. Eng. *healdan*: Germ. *halten*: Goth. *haldan*; *bold* < O. Eng. *beald*: Germ. *bald*: Goth. *balþs*.

(2) Of the open *o* the chief sources are: (*a*) M. Eng. short open *o*. This was derived either from O. Eng. *o*, as in *moth* < *moððe*, *lost* < *gelosed*, *broth* < *broð*, *god* < *god*, *horn* < *horn*, *corn* < *corn*, or from O. Eng. *ŏ*, *ō* before nasal < Teutonic *a*, as in *long* < *long*: Germ. *lang*; *song* < *song*: Germ. *sang*; *soft* < *sōfte*: Germ. *sanft*; *brought* < *brōhte*: Goth. *brāhta* (**branhta*); *thought* < *ðōhte*: Goth. *þāhta* (**þanhta*). (*b*) M. Eng. *a* < O. Eng. *a* (*ea*) < Teuton. *a*, as in *salt* < *sealt*: Germ. *salz*, *warm* < *wearm*: Germ. *warm*. (*c*) M. Eng. *au* < O. Eng. *a* + guttural (or *w*) < Teuton. *a*; as in *draw* < *dragan*; *cause* < O. Fr. *cause*; *sauce* < O. Fr. *sauce*. (*d*) M. Eng. *o* < O. Fr. *o*; *cord* < O. Fr. *corde*; *order* < O. Fr. *ordre*.

(3) *O* in its value as *ū* (*oo*) is generally derived from O. Eng. *ō*. This may represent Teutonic *ō*, as in *stool* < O. Eng. *stōl*: Goth. *stōls*; *food* < O. Eng. *fōda*: Goth. *fōdeins*; *mood* < *mōd*: Goth. *mōþs*. Or it may represent Teutonic *an*, as in *goose* < O. Eng. *gōs*: Germ. *gans*; *tooth* < O. Eng. *tōð*: Germ. *zahn*. In certain words *o* (pronounced *ū*) may come from an O. Eng. *ā* preceded by *w*; as *who* < *hwā*, *two* < *twā*, *swoop* < *swāpan*, *swoon* < *swānian*.

(4) *O* in its value as *ŭ* is chiefly derived: (*a*) From M. Eng. *ō*, O. Eng. *ō*, which was shortened in closed syllables after having changed to *ū*; thus in *hoof* < *hōf*, *roof* < *hrōf*, *book* < *bōc*, *good* < *gōd*. Before nasals this O. Eng. *ō* may represent Teutonic *ān*, as in *soon* < *sōna*: O. H. Germ. *sān*; *spoon* < *spōn*: O. H. Germ. *spān*. (*b*) From M. Eng. *u*, after *w* or before *l*, as in *wolf* < M. Eng. *wulf*, O. Eng. *wulf*: Goth. *wulfs*; *wool* < *wulle*; *pull* < *pullian*.

(5) *O* in its value as unrounded *ŭ* is chiefly derived: (*a*) From O. Eng. *u*, as in *son* < O. Eng. *sunne*, *love* < O. Eng. *lufian*; *tongue* < *tunge*; *won* < *gewunnen*; *some* < *sum*. (*b*) From O. Eng. *o* < Teutonic *o*, as in *honey* < O. Eng. *honeg*: Germ. *honig*; *oven* < O. Eng. *ofen*: Germ. *ofen*. (*c*) From O. Eng. *ō*, as in *mother* < *mōder*, *brother* < *brōðor*, *glove* < *glōf*, *flood* < *flōd*, *blood* < *blōd*, *done* < *gedōn*.

Symbolism.—O = oxygen (in chemistry); Ohio; Old, as in O. T., Old Testament, O. Eng., Old English; Ō = 11 (in mediæval Roman notation); O. F. = Odd Fellows; O K = all correct; O. S. = Old Style (calendar previous to 1752).

BENJ. IDE WHEELER.

Oa'hu: one of the Hawaiian islands. (See HAWAII-NEI.) The second in area and the most populous. Honolulu, the capital, is on this island. Pop. (1900) 58,504.

Oak [O. Eng. *ōc*: O. H. Germ. *eih* > Mod. Germ. *eiche*; this name for the tree (*aik-*) is apparently restricted to the Teutonic, and probably replaced an Indo-Europ. name, of which Lat. *quercus*, and Germ. *föhre* are representatives]: any one of a genus (*Quercus*) of trees of the family *Cupuliferæ*, related closely to the chestnuts and beeches, and somewhat distantly to the hazels, hornbeams, alders, and birches, with which they agree in their amentaceous staminate flowers, small perianth, three-celled ovary, and exalbuminous seeds, but from which they are separated by the production of the familiar "acorn" fruit. (Figs. 1, 2, 3.) The ovary contains two ovules in each cell; but after fertilization one of these

grows rapidly at the expense of the rest, so that at maturity there is but one cell, and this usually contains but one seed. The little root of the embryo is directed to the point of the

FIG. 1.—The oak of Europe (*Q. robur*), with flowers and fruit.

acorn. The cup of the acorn is an involucre, which grows up around the fruit after fertilization.

There are about 300 species of oaks, nearly all of which grow naturally in the north temperate zone. They are most abundant in North America, Europe, and Asia. They are absent from Australia, Africa (except the extreme northern portion), South America (except Colombia), and Madagascar. In the U. S. there are about forty-five species, besides half a dozen or more pretty well marked varieties.

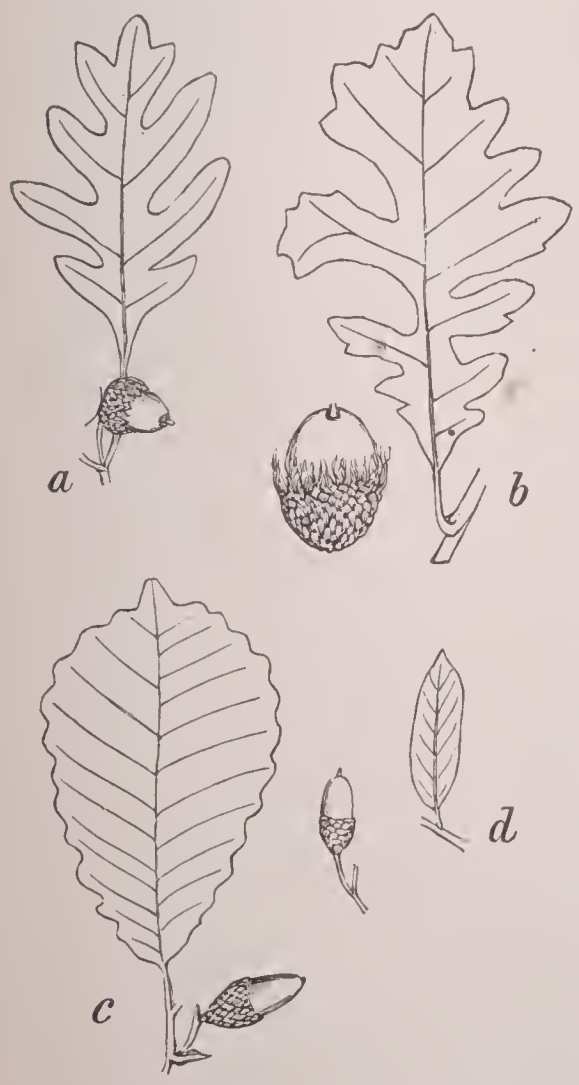


FIG. 2.—*a*, white-oak; *b*, bur-oak; *c*, chestnut-oak; *d*, live-oak (one-fourth natural size).

The white oak (*Q. alba*, Fig. 2, *a*) is one of the most valuable trees of the Eastern U. S. Its tough, hard wood is used in the manufacture of wagons, the frames of railway-cars, heavy machinery, and implements in which great strength is required. It is also much used in making fine furniture, and for the inside woodwork of houses. Bur-oak (*Q. macrocarpa*, Fig. 2, *b*) is notable for its large acorns and fringed cups. It occurs E. of the Rocky Mountains. The chestnut-oak (*Q. prinus*, Fig. 2, *c*) occurs in the northeastern parts of the U. S. Live-oak (*Q. virginiana*, Fig. 2, *d*) occurs from Virginia to Texas and Mexico near the coast. It is evergreen, and attains a height of from 15 to 18 meters (50 to 60 feet). Its wood is very heavy, hard, and tough, and in the days of wooden ships was held in high repute for ship-building. The California live-oak (*Q. agrifolia*, Fig. 3, *a*) is a large spreading,

FIG. 3.—*a*, California live-oak; *b*, red oak; *c*, laurel oak; *d*, cork-oak (one-fourth natural size).

evergreen tree of the coast region of California. The red oak (*Q. rubra*, Fig. 3, *b*) is a fine tree ranging from the great plains eastward. Laurel oak (*Q. imbricaria*, Fig. 3, *c*) is a close-topped tree with pretty foliage. Its range is nearly the same as that of the red oak. The cork-oak (*Q. suber*, Fig. 3, *d*) of the Mediterranean region is of great importance for the commercial cork which it produces.

The oak of England—"British oak"—is *Q. robur* (Fig. 1), a fine tree with foliage resembling that of the white oak. It grows also throughout Europe and Western Asia.

Many oaks attain a great age. Trees from 400 to 500 years old are of common occurrence in the great forests of the U. S. In Europe some trees are supposed to be more than 1,000 years old. CHARLES E. BESSEY.

Oak-apple and **Oak-galls**: See GALL INSECTS and GALLS.

Oak Harbor: village; Ottawa co., O. (for location, see map of Ohio, ref. 2–E); on the Portage river, and the Lake Shore and Mich. S. and the Wheeling and Lake Erie railways; 23 miles E. of Toledo. It is principally engaged in lumber manufacturing, and has a State bank with capital of $25,000, and two weekly newspapers. Pop. (1880) 987; (1890) 1,681; (1900) 1,631.

Oakland: city; capital of Alameda co., Cal. (for location, see map of California, ref. 7–B); on San Francisco Bay, and the Southern Pacific Railroad; opposite and 7 miles E. of San Francisco. An estuary of the bay separates the city from Alameda, and steam-ferries connect the cities of Oakland and San Francisco. Its location on the bay and at the western terminus of the railway system gives the city a large commercial importance. It is in an agricultural and fruit-raising region; is lighted by gas and electricity; has electric street-railways, paid fire department, and efficient police, water, and sewerage services; and contains many costly residences of San Francisco business men. The census of 1890 showed that 103 manufacturing establishments (representing 44 industries) reported. These had a combined capital of $4,015,014, employed 2,944 persons, paid $1,794,317 for wages and $3,246,222 for materials, and had products valued at $5,672,888. The manufactories include flour

and planing mills, marble and iron works, tanneries, smelting and refining works, fruit-preserving works, potteries, a cotton-mill, a large jute-factory, and carriage, windmill, and other factories. In 1890–91 there were 10,183 children enrolled in public schools, and 2,132 in private and parochial schools; 15 public-school buildings, and public-school property valued at $1,002,970. There were 2 colleges, the Pacific Theological Seminary (Congregational), 7 private academies and secondary schools, a private normal and training school, a business college, and 8 libraries of all kinds, containing over 34,000 volumes. In 1894 there were 4 state banks, 2 national banks, a savings-bank, and 4 daily, 10 weekly, and 7 monthly periodicals. Pop. (1880) 34,555; (1890) 48,682; (1900) 66,960. EDITOR OF "ENQUIRER."

Oak-lungs: See LUNGWORT.

Oan'nes: the man-fish god of the Babylonians, resembling Dagon of the Philistines. He is said to have issued from the Persian Gulf, and to have founded the civilization of Lower Chaldæa. As represented by art, a man's head was under that of the fish, and a woman's feet were joined to its tail.

Oases, ō-a'sēez [sing. oasis = Lat. = Gr. *ὄασις*. Cf. Coptic *ouahe*, dwelling-place, oasis, deriv. of *ouih*, dwell]: fertile areas in deserts. Like many geographical terms, oasis originally had only a local application, being the name of certain parts of the SAHARA (*q. v.*). The cause of barrenness of deserts generally being their dryness (see DESERTS), any local supply of moisture may induce fertility amid arid surroundings. Oases are therefore usually found in depressed districts, where a more or less subterranean supply of water is gathered from the occasional rainfall on the surrounding more elevated regions. The Saharan oases, El-Kharga, El-Siwah, etc., are of this kind. Wells are frequently dug in order to increase the supply of water for irrigation; and by using better methods than those of the Arabs the French have improved the condition of various Algerian oases. In Persia and Central Asia many settlements or oases on the margins of the interior deserts are located at points where streams escape from deep valleys in the inclosing barren mountains; here the water may frequently be led over the plain before disappearing in the central arid area, as at Kashgar, Yarkand, and Khotan. In other cases the oasis is near the termination of the stream, where its dwindling waters are easily led about in irrigating canals, as at Merv. Many settlements in the western arid region of the U. S. and in the drier parts of South America are similarly located. Although the term oasis is often used in a figurative or poetical sense to indicate a place of great attractions, the actual oases of deserts can not be so described. Their water-supply is often scanty and impure; they are generally excessively dusty; their products are narrowly limited in variety, and often fall short in quantity. W. M. DAVIS.

Oat, or **Oats** [O. Eng. *ātan*, a name not found outside English, and of doubtful etymology; it displaces a Teutonic word represented by Germ. *hafer* or *haber* < O. H. Germ. *habaro*: Dutch *haver*; cf. *haversack*]: the common name for the seeds and plants of the numerous species of a genus of grasses, *Avena*, generally characterized by having the spikelets in loose panicles, the glumes as long as the florets, the paleæ firm and almost cartilaginous, and the outer one of each floret provided with an awn, which is twisted at the base, but this generally disappears in cultivation. The cultivated oat (*Avena sativa*) is an annual, though the genus contains several perennial species. It is supposed to have developed from *Avena fatua* found growing wild in Europe, where it is considered a weed. It is also wild in California, where it is sometimes cut when green and cured for hay. The oat is decidedly a northern plant and thrives best in a cool, moist soil, reaching the highest state of development in the higher latitudes, and rapidly degenerating when grown in a hot country. Some varieties when threshed part with the hull, and are called hull-less oats; *Avena nuda* is one of these varieties. There is a great difference in the varieties regarding the awn; in some it is entirely wanting, while in others it is long and bent; and as it is hygroscopic, considerable motion is produced when it is changed from a dry to a moist atmosphere. *Avena sterilis* is one of the so-called animated oats.

Oats are produced as one of the chief cereals in nearly all countries where they can be grown; they furnish the most common grain food for horses, and are much used also as food for men. There are more than 150 varieties in the U. S.; in 1900 the acreage was 27,364,795, the product was 809,125,989 bush., and value $208,669,233. The most productive States were: Illinois, 133,642,884 bush.; Iowa, 130,572,138; Wisconsin, 61,971,552; Indiana, 44,866,035; New York, 44,538,974; Kansas, 43,063,943; Pennsylvania, 38,000,872. The oats grown in the Southern States are inferior, and are mostly of the red or dun varieties. In most of the States the legal bushel is 32 lb. Most varieties are cultivated for the grain, although a few are useful for fodder. The oat is a rapid grower, and requires an abundance of available plant-food for perfect development.

The following analyses are the average of many analyses made at experiment stations in the U. S. They are both given in per cent.:

FERTILIZER ANALYSIS.

SUBSTANCE.	Nitrogen.	Phosphoric acid.	Potash.
Grain	1·60	0·77	0·55
Straw	0·65	0·22	1·22

FODDER ANALYSIS.

SUBSTANCE.	Water.	Ash.	Protein.	Crude fiber.	N.-free extract.	Fat.
Grain	11·0	3·0	11·8	9·5	59·7	5·0
Straw	9·2	5·1	4·0	37·0	42·4	2·3

The oat has comparatively few insect enemies, but is subject to about the same fungus diseases as wheat, rust being quite prevalent, particularly if the weather is hot and moist. It is also subject to loose smut in a way similar to wheat, the smut, however, being more destructive to oats than to wheat. Early varieties and early-sowed grain are the least likely to be attacked by fungus diseases. G. C. WATSON.

Oates, TITUS, *alias* AMBROSE: a notorious informer; b. in London, England, about 1620; educated at Merchant Taylors' School and at Cambridge; took orders in the Church of England; officiated in several parishes; became a chaplain in the navy; was dismissed from that post on a charge of disgraceful conduct; professed conversion to Roman Catholicism; became a Jesuit; resided some months in the colleges at Valladolid and St.-Omer; was expelled from both institutions for alleged misconduct; returned to England in 1678, and gave information to the authorities of the existence of a "Popish plot" for the extirpation of Protestantism in England, accusing several of the Roman Catholic nobility and gentry of participation in the pretended conspiracy. The admitted zeal for Roman Catholicism displayed by James, Duke of York, the suspected inclination of King Charles II. to the same faith, and the unexpected corroboration of a part of Oates's testimony by the discovery of some incriminating papers in the possession of one of the accused gave color to the charges, and the murder of Sir Edmondbury Godfrey, the magistrate before whom the testimony was taken, produced conviction in the popular mind. Oates thereupon developed his original testimony into a circumstantial account of the intended burning of London and the shipping in the Thames, a massacre of Protestants, and a landing of a French army in Ireland, adding that the pope had intrusted the government of England to the Jesuits, that the chief officers of state had already been parceled out among the great Roman Catholic lords, that the king was to be assassinated, and that the queen was privy to the plot. The king was incredulous from the first, and refused to countenance the attacks upon his wife; but among the people the excitement was intense, many believing that the Roman Catholics intended to repeat in England the massacre of St. Bartholomew. The houses of Roman Catholics were searched, and extraordinary precautions taken against the supposed danger. Oates was lodged in Whitehall, received a large pension, and had guards assigned him. The accused Roman Catholics were put on trial Nov., 1678; several were convicted and executed; and fresh victims were added from time to time for two years. After the execution of Lord Stafford, Dec., 1680, there was a revulsion of public sentiment; the bad character of Oates was exposed; the Duke of York obtained a verdict of £100,000 against him for defamation (1685), and he was imprisoned as a debtor. On the accession of James II. severer measures were taken; Oates was convicted of perjury, sentenced to stand in the pillory five times a year in as many different towns during his life, to be whipped from Aldgate to Newgate, and thence to Tyburn, and to be imprisoned for life. Public sentiment being now fiercely against him, he was mobbed and nearly killed at the first

pillory, and received 1,700 lashes at the whipping. After the accession of William and Mary, Parliament declared the conviction of Oates illegal. He was pardoned, received a pension of £300 per annum, and survived in obscurity seventeen years longer, dying in London, July 23, 1705. Oates's career is described at some length in Macaulay's *History of England*. See also the accounts in Lingard's and Burnet's works. Revised by F. M. Colby.

Oath [M. Eng. *othe* < O. Eng. *āð* : Germ. *eid* : Icel. *eiðr* : Goth. *aiþs* < Teuton. *aiþa-z* : O. Ir. *oeth*, oath ; akin to Gr. *ὅρκος*, defined as *ὅρκος* by Hesychius ; cf. *ἕρκος*, firm] : in law, a solemn asseveration or promise under sanction of the maker's religion, in the presence of one legally authorized to administer it. If administered without authority, it has no legal effect as an oath (see Perjury), although the transaction may subject the parties to punishment under statutes against unlawful oaths. (Stephen's *Digest of the Criminal Law*, §§ 83–85.) In certain contingencies a person has authority to administer an oath to himself. (*Wilson* vs. *De Coula*, 22 Chancery Division 841.) The object of an oath is so to affect the conscience of the maker as to guaranty his future conduct or present veracity. The means employed in most legal systems is an invocation to a superior power to attest the maker's good faith or veracity, or an imprecation of divine vengeance upon him for false swearing, or both. Primitive oaths contain often no express appeal to a deity. For example, two men grasp an animal, which is chopped in two, as emblematic of what will befall the one who is false to his vow ; or the swearer calls on a fierce beast to punish him if he lies. In other cases, however, the primitive oath-taker calls upon a river, like the Ganges, or upon the sun, or other great natural object which he worships, to destroy him if he swears falsely.

The most important legal oaths in modern times are those required of officials and those required of witnesses. Official oaths are usually promissory, as the following examples will show. The British sovereign upon coronation solemnly promises and swears to govern the people of Great Britain and dominions thereto belonging according to the statutes in Parliament agreed on and the laws and customs of the same; to cause law and justice in mercy to be executed in all his judgments; to maintain the laws of God and the Protestant reformed religion established by law; and to secure unto the bishops and clergy of the nation all such rights and privileges as by law shall appertain unto them. The oath required of the President of the U. S. is that he will faithfully execute the office, and will, to the best of his ability, preserve, protect, and defend the Constitution of the U. S. (Art. 2, § 1, cl. 8.) An English judge takes an oath to "do right to all manner of people, after the laws and usages of this realm, without fear or favor, affection or ill-will"; and similar promises are made by judges in the U. S. upon taking office. A juror's oath is promissory, binding him to try the issue joined in the particular case, and give a true verdict according to the evidence. At times test oaths are required of officers. Of this kind was the oath prescribed by § 1756 of the U. S. Revised Statutes (repealed by ch. 46, Laws of 1884), often called the iron-clad oath, to the effect that the affiant had never voluntarily borne arms against the U. S. since he had been a citizen thereof, nor voluntarily given aid, countenance, counsel, or encouragement to persons engaged in armed hostility thereto. Such official oaths are declaratory. The ordinary witness oath is promissory in form, the witness swearing that the evidence he shall give shall be the truth, the whole truth, and nothing but the truth. An affidavit is in the form of a declaratory oath.

In the absence of express statutory directions the oath is administered in that form which the one taking it considers most binding on his conscience. According to the ordinary common-law form, the affiant holds the New Testament in his bare right hand, assents to the promise to tell the truth addressed to him by the proper officer, and kisses the book. Jews are sworn on the Pentateuch, the closing language of the oath being, "So help you Jehovah"; Mohammedans on the Koran, and Parsees on their sacred books. A part of the ceremony of swearing a Hindu consists in his touching the foot of a Brahmin, or, if a Brahmin is sworn, in his touching another Brahmin's hand. In some parts of India the native takes his oath on water from the Ganges. Chinese oath-takers break a saucer or behead a fowl as an essential part of the ceremony, thereby imprecating punishment upon them for false swearing.

As the religious sanction is an essential element of the oath, it can not properly be taken by an atheist. Under the U. S. Constitution and the constitutions of several States any religious test as a qualification to any office or public trust is forbidden, and officers are allowed to substitute an affirmation for an oath. (See U. S. Constitution, Art. 6, cl. 3, and U. S. R. S., § 1.) In nearly one-half of the U. S. atheists are no longer incompetent as witnesses, but are permitted to give their evidence under the sanction of a solemn affirmation. (Stimson's *American Statute Law*, §§ 45, 46, 47.) Persons having conscientious scruples against taking an oath are generally allowed to affirm. The Oaths Act of 1889 (51 and 52 Vict., c. 46) permits every person who objects to be sworn, either because he has no religious belief or because the taking of an oath is contrary to his religious belief, "to make a solemn affirmation instead of taking the oath, in all places and for all purposes." This legislation was induced largely by the punishment inflicted upon Charles Bradlaugh for sitting and voting in Parliament, in July, 1880, without taking an oath. *Clarke* vs. *Bradlaugh*, 7 Queen's Bench Division 38.

The employment of oaths, even in legal proceedings, has been criticised as irreligious, and also as useless. Pothier declared : "In the exercise of my profession for more than forty years . . . I have not more than twice known a party restrained by the sanctity of the oath from persisting in what he had before asserted." (1 Pothier, *On Evidence*, § 831.) It has been said in reply : "Even the good might be too negligent and the bad would frequently have no concern at all about their words if it were not for the solemnity of this religious act." The tendency of modern legislation is to substitute declarations for unnecessary oaths (see Promissory Oaths Act, 31 and 32 Vict., c. 72), and to treat a solemn affirmation as affording a guaranty of the good faith and veracity of the maker equally trustworthy with that furnished by the oath.

Reference to Oath.—This in Scotch law is the last resource of a party who despairs of any other evidence. It is allowable in civil actions only, and by it the party who refers places the cause on the sole issue of his antagonist's oath. Whatever the antagonist swears to is indisputably true for that cause, though in another proceeding, as a prosecution for perjury, it may be proved to be false. Bell's *Principles of the Law of Scotland*, §§ 2263 to 2269 ; E. B. Tylor's *Ordeals and Oaths*, 34 *Macmillan's Mag.* 1 ; J. E. Tylor *On Oaths* (London, 1835) ; Junkin *On the Oath* (New York, 1845) ; Ford *On Oaths* (London, 1890). F. M. Burdick.

Oaxaca, or **Oajaca**, ō-ăă-haa'kăă : a state of Mexico ; bounded S. by the Pacific and bordering on Guerrero, Puebla, Vera Cruz, and Chiapas; the eastern portion is included in the Isthmus of Tehuantepec. Area, 28,778 sq. miles. With the exception of a narrow coast belt it is mountainous throughout, the principal range being the Sierra Madre del Sur, which crosses it from E. to W., with peaks nearly 12,000 feet in height. Many of the intervening valleys are below 3,000 feet. The soil nearly everywhere is fertile and well watered ; the climate, except in the coast belt, is delightful and very salubrious. Almost the only prominent industry is agriculture ; the principal crops are maize (for home consumption) on the highlands, and sugar, cotton, and indigo in the warm valleys ; coffee-planting has also risen in importance. The cochineal insect is indigenous, but comparatively small quantities are now exported. The mountain forests have abundance of valuable timber. The mineral deposits are said to be extensive and very rich ; but few mining improvements have been introduced, and the present annual yield of gold and silver does not exceed $2,000,000. The state has many interesting antiquities. (See Mexican Antiquities.) Pop. (1893) estimated, 815,460, of whom seven-eighths are civilized Indians, principally Zapotecs and Mixtecs. Herbert H. Smith.

Oaxaca : capital and principal city of the Mexican state of the same name ; situated near the center of the state, in a beautiful valley at the foot of the Sierra Madre del Sur, 3,900 feet above the sea (see map of Mexico, ref. 8–H). The valley was granted in fief to Hernando Cortés (whence his title of Marqués del Valle), and the town was officially founded in 1532. Owing to its isolation it has had little share in the progress of modern Mexico. It is the seat of a bishopric and has a theological seminary, a good public library, cathedral, etc. Pop. (1895) 32,641. H. H. S.

Ob, or **Obi**, o'bĕĕ : a river of Western Siberia. It rises in the Altai Mountains within the Chinese dominions, and

flows in a northern and northwestern direction, with a tortuous course of 2,600 miles, into the Gulf of Obi, an inlet of the Arctic Ocean on the shore of Siberia. It receives many affluents, of which the principal is the Irtish (1,500 miles long), coming in from the left, 200 miles below Tobolsk. It is navigable from Tomsk to its mouth, and forms the commercial highway between China and European Russia. From May 15 to Sept. 15 steamers and lighters ply between Tomsk and Tiumen on the Tobol, near the frontier of Russia.

Revised by M. W. HARRINGTON.

Obadi'ah [from Heb. *'Obadeyāh*, liter., worshiper of Jehovah]: one of the minor Hebrew prophets, of whom nothing is known, except what can be inferred from his book, the briefest book of the Old Testament. This is a monograph on the Day of Jehovah, and especially on the relations of Edom to that day. Punishment has just been inflicted on Edom (verses 1–6) for an offense committed against Jacob (7–14), and the impending day of Jehovah will complete the overthrow of Edom and the triumph of Jacob (15–21). The book has strong affiliations with Joel and with Jer. xlix. 7–22. Different scholars assign it to all places among the prophets, from the earliest to the latest; but the way in which it mentions Judah, Joseph, Ephraim, Samaria, seems to indicate a date before the overthrow of the northern kingdom. Its position among the books of the minor prophets indicates that it belongs to the earlier group of them, and it fits well the historical situation in the reign of Amaziah, King of Judah, 2 Kings xiv. 7–8, 10; 2 Chron. xxv. 11–12, 19. According to this view the similar sentences in Jer. xlix. are quoted from Obadiah.

W. J. BEECHER.

Oban'do, JOSÉ MARIA: general and politician; b. in New Granada about 1797. Nothing is known of his birthplace and parentage; it is said that he was stolen when a child and was adopted by a family of Popayan, whose name he took. In 1822 he joined the republican army, and later he became prominent as a leader of the liberals in the disturbances which ended in the dissolution of the first republic of Colombia. The republic of New Granada having been formed, Obando was vice-president and acting president in the provisional government Nov. 23, 1831, to Mar. 10, 1832. Under Santander he was Secretary of War 1832–37, and in the latter year he was an unsuccessful candidate for the presidency. Marquez was elected and Obando led a revolt against him which lasted until 1841, but he was eventually defeated and banished for several years. Subsequently he was prominent in congress, was president of Cartagena 1850, and was elected president of New Granada for the term beginning in 1853. In 1854, owing to a conflict with congress, he assumed dictatorial powers, and was deposed. In the civil war of 1860 he supported the federalists, commanding a force in Cauca, where he was killed at the battle of Cruz Verde, June 29, 1861. H. H. SMITH.

Obeid', El: the capital of Kordofan, in the Sudan, Africa. It derives its importance primarily from the fact that it lies in a depression of a vast semi-arid plain and its wells never lack water (see map of Africa, ref. 4–F). When the Mahdist revolt occurred (1882), the town had about 100,000 inhabitants. It was a great supply center for Darfur and other parts of the Sudan, and sent large quantities of ostrich feathers and Kordofan gum to the Nile. The houses were mud huts with the exception of the Egyptian Government buildings, which were of sun-dried brick. Insurrections, epidemics, and the ruin of commerce in the Mahdist domain greatly injured the town. C. C. ADAMS.

Ob'elisk [from Lat. *obelis'cus* = Gr. *ὀβελίσκος*, dimin. of *ὀβελός*, spit, pointed pillar]: the name given by the Greeks to the quadrilateral, tapering monolithic monuments erected by the Egyptians in front of their temple pylons as votive offerings to the gods and as memorials of the victorious might conferred by the deities upon the Pharaohs. They are usually composed of Syenite granite, and were cut from the rock with great skill. There is now near Syene, in Upper Egypt, a partially finished obelisk which measures 10½ feet square at the base and 92 feet in length, 72 feet of it being completed. These great masses were finished on three sides before being finally detached from the bedrock by the use of drills and wet wedges. They were made slightly convex, to obviate the concave effect produced by sides that were exactly flat. The usual method of inscription was with a single column of hieroglyphs down the center of each side; three lines to the side ordinarily indicate a later usurpation. They were placed in pairs, for architectural effect, before the great pylons of the temples, and were devoted to the glorification of the Pharaoh in bombastic and landatory phrase. With the exception of a small obelisk found in the necropolis of Memphis by Lepsius, the oldest one known is that now standing at Heliopolis (the city whose hieroglyphic name was written with the sign of the obelisk), erected by Usertasen I., the second king of the twelfth dynasty. Its companion fell in the twelfth century. It is of Syenite granite, 66 feet high, but is now partially buried at the base and has its deeply cut hieroglyphs obliterated on two sides by bees' nests. Till a comparatively recent date its top was covered by a metal sheathing. Cleopatra's Needles was the name given to a pair of obelisks removed from Heliopolis to Alexandria in Roman times, one of which is now on the Thames Embankment in London, and the other in Central Park, New York, the latter having been presented by the Khedive Isma'îl. They were originally erected by Thothmes III. It was one of the great feats of Queen HATASU (*q. v.*) to have completed and erected one of the largest obelisks, 109 feet high, in the short space of seven months. (See Edwards's *Fellahs, Pharaohs, and Explorers*, p. 268 ff.) At Luxor one obelisk is still *in situ* at the E. of the temple pylon; the western and smaller one now stands in the Place de la Concorde at Paris, being 75 feet high, and weighing 212 tons. This pair was erected by the great Ramses. At Karnak, at about the center of the temple as it now exists, stood two obelisks which indicated the entrance to the temple at the time of Thothmes I. Both were erect in 1738, when Pococke visited the place, but one has since been destroyed. The other stands 76 feet high. At Philæ in the portion of the Temple of Isis built by Nectanebo, were two sandstone obelisks, the western one being still *in situ*, while its mate is in England. These monoliths had on their bases Greek inscriptions which gave assistance in the original decipherment of the hieroglyphic character. Two others in granite in the same temple have been destroyed. Moldenke gives a list of 50 obelisks, erect and prostrate or in fragments, 20 of which are in Egypt, 2 in Constantinople, 12 in Rome, 7 in other parts of Italy, 2 in France, 5 in England, 2 in Germany, and 1 in New York. The list, however, includes copies and uninscribed stones. See *Cleopatra's Needle* (in By-paths of Bible Knowledge Series); Gorringe, *Egyptian Obelisks* (1882); Moldenke, *The New York Obelisk* (1891); Maspero, *Egyptian Archæology* (1887); Ebers, *Cicerone durch das alte und neue Aegypten* (1886), etc. CHARLES R. GILLETT.

Ober, FREDERIC ALBION: See the Appendix.

Ober-Ammergau, o'ber-aa'mer-gow: a village of Bavaria, with a population of 1,200; beautifully situated on the Ammer, 46 miles S. W. of Munich; celebrated for the performance of a mystery representing the passion and death of Christ, which takes place here every ten years (see map of German Empire, ref. 7–F). The custom originated in 1634, when the population made a vow to this effect if the village escaped from further invasion of the plague, which prevailed in the vicinity and had begun to ravage their community. The performance requires nearly 600 actors, many of whom are children, chosen among the inhabitants themselves, lasts from 8 A. M. to 5 P. M., with an intermission of an hour and a half, is repeated on Sunday, Monday, and Friday generally, from May to September, and attracts very large audiences, as it is the only place in which mysteries are still performed in true mediæval style. See W. T. Stead's *The Passion Play in 1890* (London, 1890), which gives the text of the play in German and English.

Revised by S. M. JACKSON.

Oberge, EILHARD, von: mediæval German poet who appears in documents from the years 1189–1207 as a vassal of Henry the Lion. With the latter he probably visited England, where he may have learned about the legend of Tristan and Isolde, which he for the first time introduced into German literature by his epic poem *Tristant und Isolde*. Of this poem only a few fragments are extant, from which, however, we may gather that Oberge's account of the legend in many respects differed from the later version of Gottfried von Strassburg. See Franz Lichtenstein, *Eilhard von Oberge* (1878); W. Golther, *Tristan und Isolde* (1887).

JULIUS GOEBEL.

Oberhausen, o-berhow'zen: town; in the Rhine province, Prussia; 5 miles from the east bank of the river Rhine and 20 miles N. of Düsseldorf (see map of German Empire, ref. 4–C). It is a busy railway center; has zinc-smelting works, manufactures of wire rope, glass, porcelain, etc. Extensive

coal-pits are in the vicinity. It is of modern origin, its first houses being built in 1845, and received its municipal charter in 1875. Pop. (1890) 25,249.

Oberlin: village; Lorain co., O. (for location, see map of Ohio, ref. 2–G); on the Lake Shore and Mich. Southern Railway; 35 miles S. S. W. of Cleveland, 105 miles N. N. E. of Columbus. It is the seat of OBERLIN COLLEGE (*q. v.*), and contains a manual-training school, a business college, a school of telegraphy, a national bank, a State bank, and a bi-monthly, a quarterly, and three weekly periodicals. Pop. (1880) 3,242; (1890) 4,376; (1900) 4,082. EDITOR OF "NEWS."

Oberlin, JOHANN FRIEDRICH: philanthropist; b. at Strassburg, Aug. 31, 1740; early showed a remarkable degree of benevolence; was educated at the Strassburg University; was ordained to the Lutheran ministry; became in 1767 pastor of Steinthal or the Ban de la Roche, a wild district in the Vosges Mountains. Here, under his wisely directed care, deep ignorance was succeeded by general intelligence; moral darkness gave place to piety and a remarkable improvement in the industry and thrift of the district, which retained its prosperity, and in 1890 had 6,000 inhabitants. The Ban de la Roehe was visited by many philanthropists, to whom Oberlin's work served as a model. D. at Waldbach, June 1, 1826. See Butler's *Life of Johann Friedrich Oberlin* (London, 1882); and the *Writings* edited by Burkhardt (4 vols., Stuttgart, 1843).

Oberlin College: an institution of learning at Oberlin, O.; founded in 1833 by Rev. John J. Shipherd and Philo P. Stewart. It was chartered Feb. 28, 1834, as Oberlin Collegiate Institute, and retained that name until 1850. The plan was to establish a Christian school for the liberal education of both sexes, encouraging students to assist themselves by manual labor. By 1835 there were theological, college, ladies', and preparatory departments; there was added in 1867 a conservatory of music. The theological seminary has an intimate relation to the Congregational churches of the U. S., but is not authoritatively controlled by them. Its graduates receive the degree of D. B. The seminary building contains accommodations for 100 students, besides the chapel and lecture-rooms. In the college proper there are three courses, the classical, the philosophical, and the scientific, leading respectively to the degrees of A. B., Ph. B., and S. B. The three courses are on an equality as to requirements for admission and graduation. After the freshman year two-thirds of the work is elective. The preparatory school is called the academy. It offers four-year courses leading to the different college courses. The general faculty consists of the president, and 68 professors, permanent instructors, lecturers, and tutors. Of these, 6 professors and 17 instructors are in the conservatory of music. The productive endowment is $912,803. The tuition is $75 per year. The libraries contain 40,000 volumes. The men's gymnasium, the women's gymnasium, and an athletic field furnish opportunities for physical culture. The chemical, botanical, and zoölogical laboratories have separate buildings. There is a valuable museum and herbarium. Asa Mahan was president from 1835 to 1850, Charles G. Finney (1851–1866); James H. Fairchild (1866–1890); William G. Ballantine (1891–96); John H. Barrows, D. D. (1899–). The board of trustees consists of twenty-four members, four of whom are elected annually. The alumni elect one-fourth of the board. Negro students have never been refused admission, and they have constituted from 3 to 5 per cent. of the whole. The total attendance of students, averaging from 1,300 to 1,500 a year, is about equally divided between the two sexes, and about half of all come from outside the State of Ohio. ALBERT A. WRIGHT.

O'bersteiner, HEINRICH, M. D.: alienist; b. in Vienna, Austria, Nov. 13, 1847; studied medicine in the university of that city, graduating in 1870; was appointed director of the insane asylum of Ober-Döbling in 1872, and Extraordinary Professor of Psychiatry at the Vienna University in 1880. His most important work is *Anleitung beim Studium des Baues der nervösen Central-Organe im gesunden und kranken Zustande* (Vienna, 1888). S. T. A.

Obes'ity [from Lat. *obe'sitas*, deriv. of *obe'sus*, fat, plump; liter., having eaten one's fill; *ob* + *e'dere*, eat]: an abnormal deposit of adipose tissue under the integument and around the viscera. The amount of adipose tissue in the organism may be considerably augmented without giving rise to any inconvenience on the part of the individual in the way of encumbering his movements or interfering with the functions of the viscera, etc.; but such a condition would not come within the scope of this article. It is still a condition of health, and the term *obesity* should be applied only to those cases where the deposit of fat is so great as to incommode the patient. Among the predisposing conditions to obesity may be mentioned, first, *hereditary susceptibility*. It is common to meet certain families in which most of the members are corpulent, and sometimes the tendency to become so may be traced through several successive generations. Inactivity and sedentary occupations exert a very material influence over the production of fat, especially when combined with a rich diet. In women the predisposition to corpulence exists in the first years of child-bearing, and again after the "change of life"; in men, between the ages of forty and sixty. The exciting cause is generally found to be malassimilation, due to some derangement of the digestive organs. Fatty food may be directly deposited as such in the tissue, but this is by no means the only source of tissue fat. The albuminoids ingested are converted into two portions, one a fatty, the other a nitrogenous, and thus albuminous food aids largely in the production of adipose tissue. Starches and sugars aid, not so much by conversion into fat as by being readily oxidizable, and therefore preventing destruction of existing fats or fatty elements newly presented. The symptoms of obesity may be enumerated as follows: Diminution of mental and bodily activity, impeded action of the viscera, the organs of respiration, circulation, and digestion. The slightest exertion will bring on panting; the blood is comparatively deficient in quality and quantity, and, as a result, the muscles become weak and flabby. The countenance becomes bloated and sallow, and the patients are liable to suffer from a variety of affections which depend on malassimilation, as gout, rheumatism, etc. Often fatty degeneration of the heart or liver coexists, and we then have the symptoms of these maladies superadded. Harvey has shown in his work on corpulence that the senses of *hearing*, *taste*, *smell*, or *sight* are often absent altogether or blunted to a very annoying extent in corpulent persons. The only methods of treatment that promise good results are the hygienic and dietetic. These methods, which have become famous from the labors of Banting, Oertel, and others, depend for their success upon the regulation of exercise in such manner that the processes of oxidation of food may proceed in normal manner; and regulation of the food, that no excess of fatty elements, and indeed a less quantity than normal, may be presented to the organism. To this end fatty foods are to be reduced almost to nothing, and with them also carbohydrates, whereas the albuminous food, though also reduced, is still given in somewhat liberal measure. The last is necessary that the general systematic tone and functions may be maintained for the purposes of efficient circulation and destruction of fat. Exercise requires definite regulation to suit the needs of each case. Cold bathing, by stimulating the general system and by furnishing a certain amount of exercise, is a useful adjunct. WILLIAM PEPPER.

Obi: a river of Siberia. See OB.

Ob'iter dictum [Lat., liter., said incidentally; *o'biter*, by the way; *dictum*, neut. perf. partic. of *di'cere*, say]: in law, a remark or suggestion made by a judge or a court in disposing of a question which is not necessary to its decision, sometimes termed a *dictum*. Such a suggestion is not regarded as authoritative when the point comes up for positive decision. A *dictum* may, however, have much influence from its reasonableness or from the high reputation of the tribunal from which it emanates. Much law is generated in this manner, one court uttering dicta and another at a later date embodying them into decisions.

Revised by F. M. BURDICK.

Oblates, ob-lāts' [from Lat. *obla'tus* (*offer're*), offered > Span. *oblado*: Fr. *oblat*]: in the Roman Catholic Church, persons associated after the manner of monks or nuns, but without solemn vows. Some oblates are secular priests; others are without orders. The institute of oblates was one of the many reforms introduced in the diocese of Milan by St. Charles Borromeo toward the close of the sixteenth century. He made use of their services chiefly in the wild and inaccessible alpine districts of his diocese. The institute still exists.—The OBLATES OF MARY IMMACULATE are a congregation of regular clerks, founded in 1815 by Bishop Mazenod of Marseilles. They visit the poor and the prisons.—The OBLATE SISTERS OF PROVIDENCE are a sisterhood founded at Baltimore in 1825.

Obligation [from Lat. *obliga're*, oblige, liter., bind before or against; *ob*, against, before + *liga're*, bind]: in Roman and modern law, a legal relation in which one party, the obligee or creditor, has a claim against the other party, the obligor or debtor, who is burdened with a corresponding duty. The duty of the obligor is usually to do something; either to convey property or pay money (*dare*), or to render some service (*facere*). It may be, however, that the obligor is merely to refrain from doing a particular act (*non facere*). In the broadest sense, the claims of the state, of a husband, of a parent, and the corresponding duties of the citizen, the wife, the child, etc., may be regarded as obligations (the so-called obligations *ex re venientes*); but such rights and duties are mere incidents of pre-existing and more general relations, while obligations in the narrower and proper sense are special and independent relations. The term, moreover, is regularly confined to private law; and within this field, to relations of an economic character, when the *dare* or *facere* is of economic value to the obligee. Obligations, accordingly, are treated as a special class of property rights; property (*bona*, *biens*, *Vermögen*) consisting from a legal point of view partly of rights *in rem*, and partly of obligations or rights *in personam*. (See JURISPRUDENCE.) In the case of rights *in rem*, the object over which the right or power is exercised is a thing; in the case of obligations it is sometimes said to be the person of the debtor. The obligation, however, is rather a right against a person than over a person; it does not seize or cover the person of the obligor as rights *in rem* seize and cover things; it is simply a right to demand from the obligor a particular act or course of action. For this reason the Germans define the obligation as a power over the will of the debtor—a definition which is open to the objection that the law regards only his conduct.

In primitive society the remedial rights of the creditor—the means, that is, by which his claim was enforced—were rights over the person in the fullest sense; they could be pushed to the point of making the debtor a slave. In modern society, however, since the general abolition of imprisonment for debt, the ultimate sanction of the obligation is found in the possible seizure and sale of the debtor's property; and some jurists accordingly define the obligation as a right not over the person but over the purse or estate of the obligor.

Rights over things and claims *in personam* have often been brought under a single category by declaring that the obligation is a thing, an "incorporeal thing." Old German, French, and English law go a step further, and assign obligations or claims to the category of movable things. It is obvious that the word "things" in any such classification is used in the sense of property rights; and that when we declare a claim to be a movable, we merely mean that an obligation, when regarded as an asset or portion of an estate, is governed by the rules which govern personal property, and not by the rules which govern real property.

Establishment.—Obligations are called into existence by the law in consequence of various facts, the most important of which are the acts of individuals. Among these acts again the most important are agreements or contracts and wrongful acts or torts (*delicta*). The Roman lawyers, like the English, started with the idea that all obligations were either *ex contractu* or *ex delicto*; and as it became necessary to recognize obligations otherwise created, they treated them as analogous either to contractual or to tortious obligations (*obligationes quasi ex contractu*, *quasi ex delicto*), thus obtaining a classification which, if not wholly scientific, was at least convenient, and which has generally been retained in the modern European codes. One of the chief objections to this classification is that it confuses original and substantive rights created by legal acts with secondary and remedial rights resulting from the infringement of substantive rights—an error which English lawyers avoid by treating torts as a subject wholly distinct from contracts and quasi-contracts. On the other hand, the English habit of treating obligations principally if not exclusively under the head of contracts, and of devoting treatises on contracts mainly to the discussion of obligations, is somewhat confusing, since contract is a method of creating all kinds of private rights, not obligations merely, but also rights *in rem* and family rights. An extreme illustration of the way in which these various functions of contract may be confused is found in the declaration of the courts in the U. S., that to divest a person of title acquired by grant is to impair the obligation of contract.

Parties.—Every obligation has at least two parties, and may have more; there may be a plurality either of obligors or of obligees. In such cases the creditors may be partial creditors and the debtors partial debtors, each of the creditors having a right to demand his share and each debtor being held to pay his share and no more. In the Roman law, and in all the modern European codes except the Prussian, the presumption is that joint obligations are of this character (*nomina ipso jure divisa sunt*). It is possible, however, that each of the creditors may be entitled to demand, or each of the debtors bound to render full performance, and that when one creditor has secured or one debtor has rendered such performance the obligation is extinguished. In such a case the continental jurists call the obligation "solidary" (*obligation solidaire*, *Gesammtschuldverhältniss*). The majority of German writers draw a further distinction between "correal" obligations (Lat. *correi*, joint parties) where there is really but one obligation with a number of joint creditors or joint debtors (e. g. partners, principal and surety), and "merely solidary" obligations, where there is really a plurality of obligations, but when the content or object of all the several obligations is identical. Such a relation exists, as a rule, only between codebtors (e. g. joint tort-feasors). This distinction was unknown to the early codifiers, and is generally rejected in the new codes.

In declaring an obligation "solidary" the law defines the relations between the creditors on the one hand and the debtors on the other, but not the relation between the several creditors or debtors. Whether the single creditor who has obtained performance must divide with the other creditors, and whether the single debtor who has discharged the entire debt has recourse or regress against the other debtors, are distinct and independent questions. Most of the European codes lay down the general rule that such an adjustment shall take place unless it is excluded by the contract of the parties, or by a special rule of law. As between joint wrong-doers regress is denied in nearly all the German codes (including the imperial draft code) if the offense was a willful or malicious one (*delictum dolosum*), but permitted where the common liability was incurred by negligence (*delictum culposum*). The *Code Napoléon* permits regress in both these cases.

Content.—It is essential to the validity of an obligation that the act to be performed by the debtor (Germ. *Leistung*) shall be objectively possible (*impossibilium nulla obligatio*); that it shall be legally and morally permissible (immoral contracts are void *ipso jure*); and that the obligee or creditor shall have some interest in its performance. Whether the interest must be a pecuniary interest, i. e. an interest capable of pecuniary measurement, is disputed; but modern European theory and legislation incline to enforce all obligations where the creditor has even a sentimental interest in securing performance. When the debtor can be compelled to render specific performance, this rule is easy of application; but when such performance can not be secured the measurement of damages presents serious difficulties—difficulties which can be avoided, however, by previous stipulation of a definite penalty (*pœna conventionalis*) for breach of the contract.

Performance (*solutio*, *paiement*, *Erfüllung*).—An obligation need not in principle be fulfilled by the obligor; any person may fulfill it for him unless the creditor has a special interest in securing performance from his debtor, i. e. unless the performance of another is necessarily a different thing from performance by the debtor, which is never true of obligations *dare* and not always of obligations *facere*. That which the debtor is bound to do must be done, unless the creditor agrees to accept something else as an equivalent (*in solutum datio*). If the creditor chooses to take less than is due him, and takes it as full performance, the debt is extinguished, for Roman and modern European law have nothing precisely equivalent to the English doctrine of consideration. In the absence of special provision as to *time* of performance, the debtor may perform as soon as he will and must perform as soon as the creditor demands it. The designation of a time of performance does not, in principle, negative the former rule; the debtor may still anticipate the time unless the creditor has a demonstrable interest in its observance (*dies in dubio pro reo*); nor does the designation of a time necessarily exclude performance after the time has elapsed. The legal importance of a designated time is that non-performance regularly puts the debtor in default without demand or notice from the creditor (*dies interpellat pro homine*). If no *place* of performance is expressly or impliedly indicated, the debtor may perform wherever he finds

the creditor, and must perform (i. e. may be required to perform) in his own place of residence. The latter rule, however, is subject to two important exceptions. If the duty of the obligor is to transfer possession of a specific thing (*res certa*), he can not be required to transport it from the place where it was when the obligation was incurred. If, on the other hand, the obligation is to pay money, European custom and law regularly require payment to the creditor in his place of residence. If a place of fulfillment is expressly or impliedly indicated, the debtor can not free himself by performance elsewhere.

Default (*mora*, *demeure*, *Verzug*).—If the creditor refuses to accept or otherwise prevents performance at the proper place and time, he is in default (*mora creditoris*). The obligation is not extinguished, but the liability of the debtor is minimized. He has a counter-claim for any losses or expenses occasioned by the creditor's default; and if performance becomes impossible without fraud or gross negligence on his part, he is freed. On the other hand, the failure of the debtor to perform at the proper place and time puts him in default, and makes him liable for all resultant damage to the creditor. The latter's claim becomes a claim for performance plus damages for delay. If the creditor can not secure performance at all, his claim changes into a claim for a pecuniary equivalent. He is to be put into as good a position, economically, as if he had secured performance at the proper place and time. This claim is also termed a claim for the recovery of damages.

The rules regarding default are not applicable to the obligations *ex delicto*, for these are not claims for performance, but claims for damages. This was practically recognized by the Roman jurists in their statement that he who has dishonestly appropriated a thing is in default from the outset (*fur semper in mora*).

Damages (*quod interest*, *dommages-intérêts*, *Schadensersatz*) include not only direct loss (*damnum emergens*), but whatever the plaintiff can prove that he would have gained (*lucrum cessans*) if the contractual obligation had been duly performed, or if the tort had not been committed. When the action is based on a willful or malicious wrong (*delictum dolosum*) vindictive damages may be recovered.

Extinction.—Normally, of course, obligations are extinguished by performance. They are not extinguished by tender of performance; but if it is a sum of money or a specific article that is due, and if this be tendered and refused, the debtor may free himself by depositing it in a suitable place (*sequestratio*, *consignation*, *öffentliche Hinterlegung*). Obligations are extinguished when the creditor accepts something in lieu of performance; also by Novation (*q. v.*) and by release (*acceptilatio*, *remise*, *Erlass*). They are extinguished without the consent of the creditor by confusion (e. g. by the fact that the creditor becomes heir to the debtor, or *vice versa*), and by offset with a counter-claim (*compensatio*, *compensation*, *Aufrechnung*). In these last two instances the creditor, if not directly paid, is at least satisfied; he has secured an equivalent. Obligations may be extinguished without satisfaction by the discharge of the bankrupt debtor (see Bankruptcy) by Limitation (*q. v.*), etc. Some obligations, principally *ex delicto*, are extinguished by the death of one of the original parties.

Transfer.—Except in the case of inheritance the Roman law (like the English) was loath to recognize the possibility of transferring obligations to new parties. Ultimately, however, methods of transfer, *inter vivos*, were devised. See Mandate and Novation.

Natural Obligations.—This term was used by the Romans in a double sense: (1) To describe moral obligations to pay or do something without regard to the question whether the law attaches to such obligations a complete sanction, a partial sanction, or no sanction at all. In this sense the legal obligations constitute simply a special class of natural obligations. (2) To describe a moral obligation to which the law attaches some of the effects of a legal obligation, although it does not permit recovery by action. These are the natural obligations in the technical sense; they are imperfect legal obligations.

The recognition accorded to such obligations may vary greatly. Some of them, although not directly actionable, may be enforced as counter-claims; many of them furnish a sufficient basis for novation and for guaranty; most of them have no legal recognition except this, that payment voluntarily made can not be recovered as *indebitum*. Modern codifiers have shown little sympathy for the natural obligation, but they can not wholly escape it. Recovery of payment at least is regularly excluded, and that without any assumption that the payment is to be regarded as a gift or donation.

Cases in which a natural obligation is more or less fully recognized are, e. g., claims outlawed by limitation, claims void by reason of defective form of contract, claims against minors, and (less generally) play-debts. Munroe Smith.

Obligation, Moral: the fact that we recognize an "ought" or right in conduct as binding upon us. In consciousness, moral obligation appears as a sense of direct responsibility to conform to the moral law. We recognize, in Kant's phrase, a "categorical imperative" which is binding upon all men universally. There are three great theories of the origin and meaning of moral obligation: First, the *naturalistic* view, which holds that our sense of duty is the result of custom and experiences of utility; either individual custom, under the pressure of compulsory obedience, or race custom which has become a matter of nervous habit. So Hume, Spencer, Darwin, Bain, Sidgwick. Second, the *intuitive* view, according to which moral obligation is an innate sense of an external law of right, and of our duty to conform to it. (See Intuitionalism.) Among its advocates are Kant, Reid, Hamilton, McCosh, and the theologians generally. Third, the *idealistic* doctrine, that man's sense of obligation arises from the presence in him of the absolute, realizing itself through his mental and moral life, and thus revealing itself more and more as he advances in righteousness, and realizes his true principle of being. So Hegel, Green, Caird, etc. J. M. Baldwin.

Obligation of Contracts: an important topic of constitutional law in the U. S., by reason of § 10 of Article I. of the Federal Constitution, which declares that "no State shall . . . pass any . . . law impairing the obligation of contracts."

This term was not a common one when it was incorporated into the Constitution. It had not been employed in statutes, nor defined by courts. It did not appear in any of the original drafts of the Constitution. Its proposal and adoption excited but little discussion in the constitutional convention. (*Madison Papers*, pp. 1443, 1552, 1581.) It appears to have elicited no comment from any State convention, and the writers of *The Federalist* did not feel called upon to explain or defend it, save in the most general terms. (See Nos. 7 and 44.) It was suggested by the following clause in the ordinance of 1787 for the government of the Northwestern Territory: "No law ought ever to be made in said Territory that shall in any manner whatever interfere with or conflict with private contracts or engagements *bona fide* and without fraud previously formed"; and its unopposed adoption was induced by the state of things, which Madison thus describes in his introduction to the debates on the Constitution: "In the internal administration of the States a violation of contracts had become familiar in the form of depreciated paper made a legal tender, of property substituted for money, of installment laws, and of the occlusions of the courts of justice, although evident that all such interferences affected the rights of other States, relatively creditors, as well as citizens creditors within the State." (*Madison Papers*, p. 712.) Notwithstanding this clause became a part of the Constitution without serious challenge, it has proved a prolific source of litigation to suitors and of perplexity to courts. The questions it has raised are so manifold, and the number of judicial decisions resolving them is so great, that no attempt will be made in this article to do more than to give an outline of the principles which have been declared.

The Extent of the Prohibition.—In terms, the provision applies only to legislation by the States. Hence it is often asserted that the Federal Congress is at liberty to pass laws impairing the obligation of contracts, unless such laws conflict with other parts of the Constitution. (Cf. *Evans* vs. *Eaton*, Peters's Circuit Court Reports 322, and *Hepburn* vs. *Griswold*, 8 Wallace, p. 637.) The better view, however, is that of Chief Justice Chase, that a law of Congress, "not made in pursuance of an express power, which necessarily and in its direct operation impairs the obligation of contracts, is inconsistent with the spirit of the Constitution." *Hepburn* vs. *Griswold*, 8 Wallace, p. 623. Cf. *Legal Tender Cases*, 12 Wallace, pp. 501, 549, and 600; Cooley's *Constitutional Law*, 314.

The law of a State, in order to come within the constitutional prohibition, must be a statute enacted in the ordinary course of legislation, or a constitution established by the

people of a State as their fundamental law. This provision is not aimed at decisions of State courts which refuse to give effect to contracts; nor to the acts of administrative or executive boards or officers; nor to the ordinances of municipal corporations to which the State has not given the force of law; nor to the doings of other corporations or individuals. *New Orleans Water-works* vs. *Louisiana Sugar Co.*, 125 U. S. 18.

A State law which impairs though it does not destroy the obligation of a contract is unconstitutional; but not every statute which affects the value of the contract impairs its obligation. "It is one of the contingencies to which parties look now in making a large class of contracts, that they may be affected in many ways by State and national legislation." (*Hamilton Gas Light Co.* vs. *Hamilton City*, 146 U. S. 258.) Therefore, statutes which prescribe reasonable regulations for the exercise of contract rights are not prohibited. A railway company may be compelled to fence its track, to check the speed of its trains at specified places, or to maintain flagmen at street crossings, even though its charter does not impose any such burdens.

What Contracts are Protected.—The Supreme Court early established the doctrine that the provision applied to executed as well as to executory contracts. In the language of Chief Justice Marshall, "a contract executed as well as one which is executory contains obligations binding on the parties. A grant, in its own nature, amounts to an extinguishment of the right of the grantor, and implies a contract not to reassert that right." (*Fletcher* vs. *Peck*, 6 Cranch 87.) A contract to marry is within the protection of this constitutional provision, but the contract of marriage is not. Marriage is more than a contract; it is a status which can not be dissolved by the will of the parties, but is subject to the regulation and control of the State. It is therefore competent for a State to change its divorce laws at will. It may abolish old causes for divorce from marriage entered into before the enactment of the law, or create new ones without impairing the obligation of contracts. (*Maynard* vs. *Hill*, 125 U. S. 190; *Hunt* vs. *Hunt*, 131 U. S., appendix clxv.) It is often said that the clause in question covers all implied contracts; and a few State decisions support the proposition. (*U. S.* vs. *Williams*, 19 *Pacific Reporter* 288 (Mont.); *Butler* vs. *Rockwell*, 29 *Pacific Reporter* 458 (Colo.).) The later decisions of the U. S. Supreme Court, however, have distinguished contracts implied in fact from those implied in law or QUASI-CONTRACTS (*q. v.*), and have declared that the constitutional prohibition upon the States does not extend to the latter. This prohibition, it is said, "was intended to secure the observance of good faith in the stipulations of parties against any State action. When a transaction is not based upon the assent of the parties it can not be said that any faith is pledged with respect to it; and no case arises for the operation of the prohibition." (*Freeland* vs. *Williams*, 131 U. S. 405; *Morley* vs. *Lake Shore Ry. Co.*, 146 U. S. 162.) Hence a judgment, whether for a tort or upon a contract, is not a contract within this clause of the Constitution.

A statute is not a contract, ordinarily, and may be repealed or amended at the will of the State. It may, however, amount to a contract between the State and other parties, and thus fall within the constitutional prohibition. This was held for the first time in *New Jersey* vs. *Wilson*, 7 Cranch 164, where a statute of New Jersey, which provided for the conveyance to the Delaware Indians of certain lands which should not thereafter be subject to any tax, any law to the contrary notwithstanding, was declared to be a contract, and therefore not repealable by the Legislature after the adoption of the Federal Constitution. A few State courts have held that the power of taxation can not be surrendered by the Legislature, and that a statute undertaking to make such surrender is nugatory and does not give rise to the obligation of a contract. Such decisions have been overruled by the U. S. Supreme Court on the ground that "government was not organized for the purposes of taxation, but taxation may be necessary for the purposes of government. As such, taxation becomes an incident to the exercise of the legitimate functions of government, but nothing more. While a government can not surrender all power of taxation, it may in the exercise of a reasonable discretion surrender part." (*Stone* vs. *Mississippi*, 101 U. S. at p. 820.) In order that a statute be construed as exempting a party from taxation, its terms must be clear and unequivocal; and in order that it amount to a contract, a consideration must be furnished by the recipient of the immunity.

Statutes creating public offices and providing for the compensation of their incumbents are not contracts between the State and the officials. They provide merely for the proper performance of public functions. Hence State officers, in the absence of any provision in the State constitution, and Federal officers, in the absence of a provision of the Federal Constitution, hold their places subject to legislative change of tenure and salary at any moment. (*Butler* vs. *Pennsylvania*, 10 Howard 402.) This rule does not apply to a person who is engaged by the State under a statute to render certain services, not as an officer, but as an employee. *Hall* vs. *Wisconsin*, 103 U. S. 5.

Corporations.—The statutory charter of a public corporation is not a contract between itself and the State, so far at least as public duties and powers are concerned. It is created for the purpose of performing governmental functions, and must be subject always to legislative control and modification. (*East Hartford* vs. *Hartford Bridge Co.*, 10 Howard 533; Dillon *On Municipal Corporations*, 3d ed., §§ 60–79.) If it is organized not to exercise the functions of government, but primarily for the purposes of the corporators, though the public may be benefited indirectly, its charter may and generally does originate a contract obligation between itself and the State which can not be impaired by subsequent legislation. The leading case on this point is *Dartmouth College* vs. *Woodward*, 4 Wheaton 519, decided in 1819, reversing the decision of the superior court of New Hampshire, 1 N. H. 111, rendered in 1817. Two principal questions were involved: (1) Whether an educational college is a public or a private corporation; (2) whether the charter of Dartmouth College contained a contract between the State and the corporation. The court held that an educational corporation is private and not public, unless it is founded and maintained by the State as a part of its governmental machinery. The second question was decided in favor of the college also. Chief Justice Marshall's reasoning is briefly as follows: The objects for which a corporation is created are universally such as the government wishes to promote. They are deemed beneficial to the country; and this benefit constitutes the consideration and, in most cases, the sole consideration of the grant. The charter of Dartmouth was sought and granted for the purpose of perpetuating the application of the bounty of her donors to the specified objects of that bounty. This is plainly a contract, to which the donors, the trustees, and the crown (to whose rights and obligations New Hampshire succeeded) were the original parties. It is a contract made on a valuable consideration. It is a contract on the faith of which real and personal property has been conveyed to the corporation. It is then a contract within the letter of the Constitution.

This was one of the most momentous decisions ever rendered by the Supreme Court. While it has been severely criticised, it has been followed by the Federal tribunals, and with few exceptions by the State courts. Its doctrine, to use Justice Black's vigorous expression, "is sustained not by a current but by a torrent of authorities." (See Shirley's *Dartmouth College Causes*, St. Louis, 1879.) Sir Henry Maine has declared that it is this provision of the Constitution, as construed in the Dartmouth College case, "which has in reality secured full play to the economical forces by which the achievement of cultivating the soil of the North American continent has been performed; it is the bulwark of American individualism against democratic impatience and socialistic fantasy." (*Popular Government*, pp. 247–248.) The decision led to a radical change in State legislation relating to corporate charters. Thereafter the States, as a rule, either by general laws or by special provisions in the charters, reserved the right to amend or to repeal them. See *Greenwood* vs. *Freight Co.*, 105 U. S. 13.

Even where a charter amounts to a contract between the State and the corporation, the courts are unanimous in holding that no collateral agreements restricting State action will be implied. If any such are claimed by the corporation, they must be shown to have been stated expressly in the charter. (*The Charles River Bridge* vs. *The Warren Bridge*, 11 Peters 420; *The Binghamton Bridge Case*, 3 Wallace 51.) Although a State binds itself by an express collateral agreement, it does not thereby lose its right to exercise the power of eminent domain. Nor does the constitutional provision, under discussion, interfere with the fair exercise of the police power by a State. Hence State licenses to carry on particular trades or corporate charters for lotteries may be modified or annulled if, in the opinion of the Legislature, the license or franchise is inconsistent with the public

safety, health, or morals. "The governmental duty of self-protection can not be contracted away, nor can the exercise of rights granted, nor the use of property be withdrawn from the implied liability to governmental regulation, in particulars essential to the preservation of the community from injury." *New York Ry.* vs. *Bristol*, 151 U. S. 556.

State Insolvent Laws.—In the absence of a Federal bankruptcy law the States may provide by statute for the discharge of insolvents from debts contracted after such legislation, without impairing the obligation of contracts. The obligation of a contract is the duty of performing it, which is recognized and enforced by the law applicable thereto. In a State where an insolvent law exists, this obligation is conditional, not absolute; it is an obligation to pay the debt if not discharged therefrom in accordance with law. Such a statute, however, has no extraterritorial force, and does not relieve the debtor from liability to a creditor who is an inhabitant of another State, and does not become a party to the insolvency proceedings. *Ogden* vs. *Saunders*, 12 Wheaton 213.

State Laws Affecting the Remedy.—There has been much judicial confusion upon this topic, because of the frequent failure of the courts to observe the two senses in which the term remedy is used. It is applied to the mode of proceeding by which a legal right is enforced, and also to the law which gives or defines the right. Any State legislation which impairs the right of action upon a contract is prohibited, while that which affects only the procedure in an action is not. This distinction, though often lost sight of by the State courts, has been uniformly observed by the Supreme Court of the U. S. "In modes of proceeding and forms to enforce the contract, the Legislature has control, and may enlarge, limit, or alter them, provided it does not deny a remedy or so embarrass it with conditions or restrictions as seriously to impair the value of the right." (*Penniman's Case*, 103 U. S. 714.) Imprisonment for debt is held to be a relic of ancient barbarism, and a punishment rather than a remedy. Therefore a State law abolishing it even as to existing debts does not impair the obligation of contracts. FRANCIS M. BURDICK.

Obnos: the name given by Manetho to Unas, the ninth and last king of the fifth Egyptian dynasty. His reign, according to the Royal Turin papyrus, lasted thirty years, while Manetho gives him thirty-three years. In Manetho's account a new epoch seems to have begun with his successor, since the years from Menes to Unas are summed up as a complete period. Little is known concerning Obnos-Unas except that he built a pyramid at Saqqarah, which was opened in 1881, and found to contain passageways lined with alabaster, on which were inscribed writings. C. R. G.

O'boe [Ital., from Fr. *hautbois*], or **Hautboy** [from Fr. *hautbois*; *haut*, high + *bois*, wood. Named from its high tone]: a musical wind instrument of an elongated conical form and with a high piercing tone, ranging from C below the treble clef to G, the fourth line above the staff. Apparently it was at first used solely by military bands, but from the time of Bach it has been one of the most important wind instruments in the orchestra. Custom has led the A of this instrument to be considered the standard pitch.

O'Brien, CORNELIUS: See the Appendix.

O'Brien, FITZ JAMES: See the Appendix.

O'Brien, LUCIUS RICHARD: See the Appendix.

O'Brien, WILLIAM, M. P.: political leader; b. at Mallow, Ireland, Oct. 2, 1852; was educated at Cloyne Diocesan College and Queen's College, Cork; entered Parliament in 1883. He is a journalist, and was editor of *United Ireland*. He is leader of the National League; has been four times imprisoned under the Crimes Act of 1887; visited the U. S. twice; is one of the widest known leaders of the Irish party.

O'Brien, WILLIAM SMITH: political leader; b. at Dromeland, County Clare, Ireland, Oct. 17, 1803; son of a baronet of ancient lineage; was educated at Harrow and at Trinity College, Cambridge; entered Parliament for the borough of Ennis 1826. Though he at first supported the Tories, he was afterward returned as an advanced Liberal for the County Limerick, which he represented thirteen years; became the ally of O'Connell and worked earnestly to secure Catholic emancipation, but in the agitation for the repeal of the legislative union between Great Britain and Ireland he favored a resort to forcible measures if necessary, and as the head of the organization known as Young Ireland he ceased to be in accord with O'Connell. He went to Paris Apr., 1848, as a representative of the Irish confederation to solicit aid from the French republic; aided in convoking an Irish national convention (May), which was not allowed to meet; was tried for sedition in the same month, but acquitted; attempted a rising among the peasantry at Mullinahone, in the south of Ireland, July, but was compelled to flee; was captured at Thurles Aug. 5; tried and convicted by a special commission at Clonmel, with T. F. Meagher and MacManus, on a charge of high treason (Oct. 9); sentenced to be hanged; was transported for life to Tasmania, July, 1849; was pardoned 1856; traveled in the U. S. 1859. D. at Bangor, North Wales, June 17, 1864.

Obsequens, JULIUS: a Latin writer, probably of the fourth century, who compiled a record of prodigies (*prodigiorum liber*) happening between the years 249 and 12 B. C., the ultimate source being Livy. No manuscript of this work exists. The *editio princeps* was published by Aldus (Venice, 1508), a revised text by O. Jahn (Leipzig, 1863).

Obsequies: See FUNERAL.

Observan'tine Friars and Nuns [in Lat. name, *Fra'tres strictio'ris observan'tiæ*, liter., brothers of stricter observance]: a monastic order of the Roman Catholic Church. The primitive rule of St. Francis, like that of many other orders of monastics, having been modified by various popes on account of the extreme severity of its discipline, there arose within the order a new party desirous of returning to the austere rule of former days. Certain followers of the severe rule in 1368, under Paoletto di Foligno, were organized as a separate congregation, called Brethren of the Stricter Observance, or Observantines; these are now, as they have long been, far more numerous and influential than the Conventuals, or followers of the mitigated rule. The Capuchins and other congregations follow a still severer rule, and are called Brethren of the Strictest Observance.

Observatory: an establishment for the systematic observation, record, and study of natural phenomena, especially those which pertain to astronomy, meteorology, or magnetism. Establishments for scientific observation date from very ancient times. The celebrated museum of the Ptolemies at Alexandria included astronomy among its objects, and observations of importance to that science as then understood were made there. The Arabs of the Middle Ages also continued the work of the Greek astronomers, and many of their observations and writings have come down to us; but probably none of their establishments formed what we should now call an astronomical observatory.

Coming nearer to our own times, the first observatory celebrated in astronomical history is that of Tycho Brahe, founded in 1576. It was situated on the island of Hveen,

FIG. 1.—Tycho's observatory.

in the Sound, N. of Copenhagen, and was very appropriately named Uranienborg, the city of the heavens. The foundation-stone was laid with great ceremony, and the establishment was fitted with instruments designed by Tycho himself, larger and finer than any previously known. They

were mostly designed to measure arcs from one star to another in the heavens, a method of observation which has since been entirely superseded. Although Tycho's observations suffer, when compared with ours, in value from having been made just before the invention of the telescope, they are renowned for having afforded Kepler the material for establishing his laws of the motions of the planets. See KEPLER and ORBIT.

The century which followed Tycho Brahe was made celebrated by the discovery of the telescope and the foundation of several great observatories. A very natural belief was then current, which is prevalent even at present, that the instruments of an astronomical observatory should be as high as possible above the earth. Thus the observatory of Horrebow is pictured as eight stories high, and an immense building was erected at St. Petersburg as an observatory of the Academy of Sciences. Practically, however, it has been found that the loss is as great as the gain in mounting astronomical instruments at a great elevation above the ground. Although a clearer horizon is obtained, this advantage is slight, and is more than counter-balanced by the exposure to heavy winds, from which astronomical instruments should be thoroughly protected.

The decade 1661–70 is celebrated in the history of science, not only by the organization of the Royal Society of London and of the Academy of Sciences of Paris, but by the erection of the Greenwich and Paris observatories, both of which are still in existence. About that time also was introduced the greatest improvement ever made in the art of determining the apparent positions of the heavenly bodies by observation. The measurement of the angle between two heavenly bodies, as practiced by Tycho Brahe, was made difficult by the diurnal motion of the stars. In consequence of this motion no star would remain at apparent rest relative to the instrument, and it was therefore impossible to point two sights of the latter, or two telescopes, simultaneously at two stars. If pointed correctly on one the other would move away, or rather the instrument would be carried away by the rotation of the earth. To Roemer of Copenhagen, celebrated in connection with the determination of the motion of LIGHT (*q. v.*), occurred the idea of utilizing this very troublesome motion to determine the right ascensions of the heavenly bodies. Let the telescope move only in the meridian, and let the stars in succession pass through its field. Note the time of passage by a good clock regulated to sidereal time, and we have at once the means of determining their relative right ascensions. Thus arose the transit instrument, which is a most useful appliance of an astronomical observatory.

Ever since the time of Tycho men have taken delight in founding munificent establishments of the kind in question; but all that the astronomer really wants besides his office-rooms, library, etc., is something to shelter his instruments from the wind and weather. The more flimsy this shelter is, the better, for a reason not at first sight apparent. One of the first requisites to good astronomical observations is that the instrument and the air around it shall be as nearly as possible of the same temperature as the air outside, no matter how cold the weather may be. If this is not the case, the currents of warm and cold air around the instrument will cause irregular refraction, which will be multiplied as many times as the instrument magnifies, and thus destroy all accurate vision. The heavier and more massive the walls around his instrument, and the more closely it is protected from the outer air, the more difficult it is to fulfill this condition. Sheet-iron is therefore a favorite material for an observing-room, and all defects of construction which have no worse result than admitting cold air are readily forgiven.

From the astronomer's point of view, the most important feature of an observatory is found in the instruments with which it is fitted up. Of these the first in importance are the transit instrument and the EQUATORIAL TELESCOPE (*q. v.*). The former has two distinct uses. One is to determine the time or regulate the astronomical clock and fix its rate, which is necessary because nearly every astronomical observation requires a somewhat accurate statement of the moment at which it was made. The other is to determine the right ascensions of the heavenly bodies. The equatorial telescope is the instrument which most interests the public. It can be readily pointed at any visible object and so moved by clockwork that the object is kept within the field of view. If positions of the heavenly bodies are to be determined, a meridian circle is also a necessity. As this is formed merely by adding circles and other appliances to a transit instrument, the latter is not essential when the observatory possesses a meridian circle. Still it is convenient to have a separate transit instrument, because it can be used for determining the time independently of observations made with a more complex instrument.

Other instruments are of less universal application. The prime vertical transit, being mounted so as to move through the zenith in an east and west circle at right angles to the meridian, is quite limited in application, yet observations of extreme precision have been made with it at Pulkowa and elsewhere. This observatory is also supplied with a vertical circle, an instrument of somewhat peculiar construction for measuring altitudes on or near the meridian. The alt-azimuth is also found at two or three European observatories. It has over the meridian circle the apparent advantage that it can be pointed at any part of the heavens, so that the position of a heavenly body at any moment can be determined; but the very faculty of swinging around on a vertical axis, which such an instrument must always do, interferes with the precision of the observation, and is therefore a serious drawback. If an observer desires to find new comets a COMET-FINDER (*q. v.*) is a very necessary appliance.

The discovery and introduction of the spectroscope and consequent investigations on the constitution, temperature, and other peculiarities of the heavenly bodies, which were before impossible, have added greatly to the outfit of most great observatories. The application of photography to astronomy has resulted in the same way. These new methods of research have not, however, led to such changes in the construction of great instruments as might be supposed. An equatorial telescope is essential to the astronomical use of the spectroscope, which is simply fastened to its eye-end in order that the spectrum of any object in the focus may be examined. If a photograph is to be taken, an equatorially mounted telescope or something equivalent to it is also a necessity; but the ordinary visual telescope is not well adapted to take a photograph because the object-glass is not achromatized for the photographic rays. The telescope must therefore either have a special object-glass made for it, in which the flint glass shall be proportionately less powerful than in the optical telescope, or a so-called "corrector" must be put over the object-glass of the visual telescope so as to correct it for the photographic rays.

Every enlightened nation has one or more observatories of a national character, while several universities, both in America and Europe, possess them as part of their educational establishments. An exhaustive catalogue of the observatories now existing would mount up into the hundreds. We shall only mention those of each country which may be considered as scientifically most important, or which are celebrated for some work done or discovery made in connection with them.

Russia.—The great observatory of Pulkowa, founded by the Emperor Nicholas about the years 1838–40 as a monument of his reign, acquired such celebrity that it was once designated as the astronomical capital of the world. It owes its high reputation to its first director, W. Struve, one of the most renowned practical astronomers of his time, who not only devised superior instruments, but used them with a precision never before reached. Its principal work has been the determination of astronomical constants, especially those of nutation and aberration, and the preparation of more accurate catalogues of the principal fixed stars than were before made. Its work in these lines has set the standard for the world during nearly half a century.

Germany.—The University Observatory of Königsberg, founded early in the nineteenth century, is renowned for the work of Bessel, the greatest practical astronomer of his time. There is also a national observatory at Berlin, but the city has so grown around it that its work is seriously interfered with. At present the most noted national establishment of the kind in Germany is the astro-physical observatory at Potsdam, founded shortly after the Franco-German war as a noble way of expending a portion of the indemnity received from France. As its title implies, it is especially fitted up for spectroscopic and photo-metric studies. Its researches in these departments have given it a position worthy of German science. The researches of Vogel upon the spectrum and motions of the variable star Algol are an example of its activity. The work of making the most accurate possible determination of the magnitude of several thousand of the principal stars in the northern hemisphere is being carried forward to completion as rapidly as possible. The leading universities of Germany are also

supplied with observatories, among which that of Bonn is worthy of special mention as having afforded Argelander and his successors the means of cataloguing and studying the stars of the northern hemisphere. More recent yet is the Strassburg observatory, founded about 1873, and fitted up with the most modern instruments.

France.—Measured by the number of its astronomers and the amount of work done, the observatory of Paris is easily the first of Europe. Its activities cover every branch of astronomy, theoretical and practical. Its directors have been the most celebrated astronomers of France, beginning with the Cassinis, and including more recently such men as Arago and Le Verrier. In popular interest it is, however, outstripped by the observatory of Nice, already mentioned. This fine establishment is situated on the summit of Mont Gros, a hill some 1,200 feet in height, 2 or 3 miles N. E. of

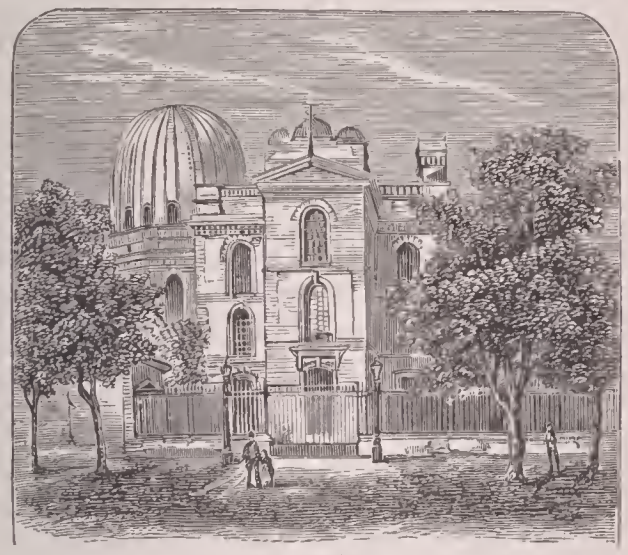


Fig. 2.—Paris observatory.

Nice. It commands a splendid view of the Mediterranean, and among the subjects for which it is noted is the discovery of small planets by photography and the study of the physical aspects of Venus and Mars. There are also observatories at Bordeaux, Lyons, and elsewhere, at which eminent French astronomers are seeking to add to the scientific laurels of their country.

England.—The Royal Observatory at Greenwich overshadows all other British observatories in importance. In the original warrant of Charles II., appointing Flamsteed astronomer-royal, it was prescribed that he should "apply himself with the most exact care and diligence to the rectifying the tables of the motions of the heavens and the places of the fixed stars, in order to find out the much desired longitude at sea for the perfecting the art of navigation." The most remarkable feature in the history of the Greenwich Observatory is the conscientious persistence with which the policy thus comprehensively outlined has been pursued for more than two centuries by a succession of men whose names stand high among those of the astronomers of their times. Without deviating in any way from this policy the scope of the observatory has been extended so as to include photographic and spectroscopic observations. The universities of Edinburgh, Cambridge, Oxford, and Dublin have also noteworthy establishments of the sort. Among Irish observatories the greatest interest, perhaps, centers around that of Lord Rosse, at Birr Castle, Parsonstown, celebrated for the largest telescope ever built.

The United States.—An enumeration of the observatories of this country is not possible. Many have been founded by private munificence, become known for a short time by the work of some astronomer, and finally disappeared from the sight of the scientific world. The old naval observatory at Washington was celebrated in its early years for the work of Sears Cook Walker in investigating the motions of Neptune, and for the part which it took in applying telegraphy to the determination of longitudes, and for the invention of the electro-chronograph. In 1873 it was supplied with a new equatorial telescope of 26 inches aperture, which at the time was the largest of the kind in existence. Four years later it acquired new celebrity by Prof. Hall's discovery of the satellites of Mars. More recently a new and magnificent establishment has been erected on an elevation N. of Georgetown, which in its buildings and outfit fairly rivals any in the world. The Cincinnati Observatory is one of the oldest in the country, having been founded by Prof. O. M. Mitchell. Its work has from time to time been interrupted, but its activity persists until the present day. The Dudley Observatory at Albany, though always suffering from want of the pecuniary support necessary to such an establishment, has in recent times acquired great importance by the work of Prof. Boss, its director and astronomer, in cataloguing a zone of stars. A new structure has recently been erected for it. Princeton College, the University of Virginia, and several other institutions, are also supplied with fine establishments of the sort, of which the work redounds to the credit of the U. S. At Princeton, Prof. Young has devoted himself very largely to spectroscopic work and the study of the sun. Although his telescope is not of the largest size, it was the first one after the Lick telescope with which the fifth satellite of Jupiter was actually seen. The observatory of Georgetown University, D. C., though among the more modest of institutions of the kind, is acquiring celebrity through the application of photography to the registration of transits and zenith distances. The remarkable feature of this work is that a star as it passes across the field of the telescope is made to photograph its image on a plate in the focus of the instrument, not continuously, but at intervals of one or two seconds, thus forming a row of dots on the plate. The same method is being applied to the determination of latitudes with the zenith telescope. The success of this work is due to the ingenuity of the director, Father Hagen, S. J., and his able assistants.

The Harvard Observatory dates from 1843, the great comet of that year being the immediate incentive to its foundation. Under the energetic management of its present director it has grown to be one of the greatest in existence. It was early celebrated for the work of the Bonds, and the discovery of the eighth satellite of Saturn; more recently its principal work has been the photometry of the heavens, the photographing of the constellations, and the study of the spectra of the fixed stars. The Lick Observatory in California is remarkable for the rapidity of its rise. (See Lick.) It was not completed until 1888, but has since risen into great prominence by the activity of its astronomers under the direction of Prof. Holden. The observations of Burnham on double stars, and of Barnard on the planets and satellites, are among its noteworthy contributions to science. The discovery of the fifth satellite of Jupiter, made by Barnard in 1892, is of especial interest. The observatories of Ann Arbor and Hamilton College are noted for the discovery of minor planets made by their former directors, Watson and Peters. In recent times the Madison Observatory has done excellent work with its meridian circle and equatorial telescope.

Magnetic and Meteorological Observatories.—The principal object of a magnetic observatory is to record the changes continually going on in the earth's magnetism. The outfit necessary for this purpose is quite modest, and in consequence such establishments do not fill so great a place in the public eye as astronomical observatories. The most noted in America is that of Toronto, Canada, where continuous observations have been kept up for a considerable period. The Greenwich Observatory has also a magnetic department, where similar records are made and kept.

A meteorological observatory, as its name implies, is devoted especially to records pertaining to the weather, the readings of the barometer, thermometer, etc. In a well-fitted modern meteorological observatory the conditions of the wind and weather are automatically recorded on sheets, so as to preserve a permanent record, available for study and comparison at any future time. S. Newcomb.

Obsid'ian [from Lat. *Obsidia'nus* (corrected reading *Obsia'nus*) *lapsis*, supposed to be obsidian, liter., the stone of *Obsi'dius* (corrected reading *Ob'sius*), name of the man said by Pliny to have found it in Ethiopia; Gr. *ὀψιανός*]: an acid volcanic glass formed by the very rapid cooling of molten material upon or very near the earth's surface. In chemical composition obsidian may correspond either to rhyolite, trachyte, phonolite, or andesite. Its practical identity with these rocks is often shown by a mass of any one of them passing gradually into obsidian at its edge, where the cooling has been most rapid, and the crystallization of individual minerals in this way prevented. Among the acid volcanic glasses obsidian is distinguished by its low percentage of water (generally less than 1 per cent.) and its vitreous luster from *pitchstone*, which contains 4 or 5 per cent. of water and has a resinous luster, though it is otherwise identical with obsidian. Obsidian is usually dark in color

and compact in texture. Frequently it is jet black from included microscopic crystallites of magnetite, and often also of a red color. The particles included in the glass very commonly show by their arrangement the flow movement which took place in the viscous mass before final solidification. If the obsidian has acquired a porous or spongy texture by escaping gases at the time of cooling, it is called *pumice*. If, on the other hand, the cooling was slow enough to allow of the separation of some crystals, the rock becomes an *obsidian porphyry* or *vitrophyre*. The glassy equivalents of the more basic volcanic rocks, like trap or basalt, are called *basalt obsidian* or *tachylite*. Because of the greater tendency of such basic masses to crystallize, their glassy forms are much rarer than the true obsidians and pitchstones.

Obsidian and its allied glasses occur in many volcanic regions. Some of the best-known localities are in the Lipari islands, Iceland, Mexico, Siberia, New Zealand, Peru, and the western parts of the U. S. Obsidian Cliff in the Yellowstone National Park has become well known through the researches of Prof. Joseph P. Iddings.

The perfect conchoidal fracture of obsidian, and the readiness with which it yields very sharp-edged fragments, have made it a favorite material among primitive people for the manufacture of arrow-points, axes, and knives. This was especially the case with the early inhabitants of Mexico, who named their principal source of supply Cerro de las Navajas, the hill of knives. Obsidian has also, both in ancient and modern times, been cut as a gem stone.

Pumice or spongy obsidian is extensively used in the arts for dressing leather or parchment, for polishing, and for toilet purposes. The supply of this is obtained largely from the Lipari islands. G. H. Williams.

Obstetrics, Obstetricy, or **Tocology** [*obstetrics* is from Lat. *obste'trix*, midwife, deriv. of *obsta're*, stand before; *ob*, before, against + *sta're*, stand; *tocology* is from Gr. τόκος, birth + λόγος, discourse, reason]: the branch of medical science embracing the knowledge of the processes accompanying the reproduction of the human species, the assistance to be rendered the mother before, during, and after labor, both natural and irregular, and the care to be taken of the child during the first weeks of its life; also called *midwifery*, particularly in Great Britain. Although nature has adapted woman to bring forth children without any other assistance than that afforded her by her own inherent powers, still, from the very earliest ages, it has been found agreeable and beneficial to a woman in labor to offer her sundry more or less important services in her hour of need, by which present discomforts might in a measure be removed or possible future accidents averted. The earliest records which we find of such assistance show it to have been rendered exclusively by women. Thus the Jews employed women, called *mejelledeth*; the Greeks first made use of old female nurses, who lived in the house and took care of the children. These nurses were called *mæa* (grandmother, nurse), and subsequently, when their practice rose to the dignity of a profession, they were known as *mæeutriæ*. A special tutelary divinity (Ilithyia or Artemis) protected the art. These women appear, however, to have been unlucky in their practice, for at an early period a law was passed in Athens prohibiting women from practicing physic in any of its branches. As early as the time of Hippocrates (about 400 B. C.) we therefore find men (*mæeutai*, *mæeuteres*) called in as assistants in difficult cases; and somewhat later, Herophilus is mentioned as a teacher of obstetrics at Athens. In the writings attributed to Hippocrates is found the first evidence of scientific research into and rational understanding of the phenomena of childbirth. Among the Romans, women (*obstetrices*) likewise assisted in confinements; but the Emperor Augustus is reported to have called the physician Antonius Musa to attend the Empress Livia in a difficult labor, and this precedent has been followed in many countries. At the time of Pliny the royal law (*lex regia*) already provided for the performance of Cæsarean section after the death of women during pregnancy and labor. Celsus and Rufus Ephesus, during the first century of the Christian era, and Galen, Ætius, and Paulus Ægineta in the second, fifth, and seventh centuries, respectively, wrote works on obstetrics. During the Middle Ages medical science remained at a standstill in Europe, but among the Arabs and Persians considerable progress was made in obstetrics, which was practiced by women alone, physicians being called in only as consultants. The writings of Rhazes of Bagdad (A. D. 800), Avicenna of Ispahan (A. D. 900), and Abulcasem (A. D. 1100) became celebrated, and were generally accepted throughout Europe as well as in the East. Up to the sixteenth century very indefinite ideas had existed as to the shape and capacity of the bony canal (pelvis) through which the child has to pass in order to be born; in 1543 Andrew Vesalius gave the first correct description of the normal pelvis, and 200 years later (1754) Levret in France and Smellie in England (1751) completed the description by stating the exact dimensions of the various diameters of the pelvic cavity. The great surgeon Ambroise Paré (1550) was, however, the first actual exponent of modern scientific obstetrics—"the famous restorer and improver of midwifery," as Smellie aptly calls him. He first recommended turning the child by the feet. His successors Guillemeau and especially Mauriceau, worthily developed and improved on the teachings of Paré. That most valuable of obstetrical instruments, the forceps, was invented by an Englishman, Paul Chamberlen, about 1647; it has since been greatly modified and improved. In Germany the first scientific work on obstetrics was published by Eucharius Rösslin in 1513; and in 1690 Justine Siegemund, court midwife at the electoral court of Brandenburg, became celebrated through her book on midwifery. Although numerous careful observations and studies had been made by Smellie and Onld (1742) in England, who described the manner of the entrance of the child's head into the pelvis, by Levret (1747), Solayrés de Renhac (1771), Baudelocque (1781), Madame Lachapelle (1795) in France, and Boër (1791) and Schmitt (1804) in Germany, Naegele the elder (1819) was the first to give a clear, systematic, and tolerably correct explanation of the mechanism of labor; that is, of the manner of passage of the various parts of the child through the pelvic canal. From him dates, in a great degree, the present advanced state of obstetrical science; for on the accurate comprehension of this mechanism depends in a large measure the correct appreciation of the means to be employed in abnormal cases. Among the more important improvements in the art and practice of obstetrics during the nineteenth century are the following: The use of the ear (auscultation) to detect the presence of a living child in the womb; the perfection of the knowledge of the mechanism of labor; the induction of premature labor; the more frequent use of the forceps and the less frequent employment of craniotomy (perforation of the child's head); the substitution of turning and extraction by the feet for forceps and craniotomy in many cases of pelvic deformity; the employment of anæsthetics in natural labor. Obstetrical science and practice have long been taught at all medical universities. Hospitals for the accommodation of women during the lying-in state—so-called lying-in hospitals—have been instituted in many cities of Europe, and in a less degree in the U. S. They are almost invariably connected with medical schools, and afford excellent opportunities for the study of the obstetrical art. The largest lying-in hospital at present is in Vienna, in which about 10,000 women are confined annually; others are at Paris, Berlin, Dublin, etc. Societies devoted solely to the advancement of the department of obstetrics exist in London, Berlin, Edinburgh, Dublin, New York, Philadelphia, Boston, and other cities. Journals containing only articles on obstetrical topics are published in Germany, France, Great Britain, and the U. S. On the European continent, and to a certain degree in Great Britain, women in labor are attended only by midwives, who are taught in special schools to perform the minor duties of an obstetrician, such as to separate the child from the mother by tying and dividing the umbilical cord, removing the afterbirth, and caring for the comfort of the mother and the child. Physicians are called in only in difficult cases. In the U. S., however, and among the better classes of Great Britain, the safer plan is followed of intrusting every confinement, whether natural or abnormal, to the care of an educated physician, who is assisted by a competent nurse, and who, in case of need, may be able to foresee and prevent accidents which the superficial and inferior teaching of a midwife would incapacitate her from perceiving or avoiding.

The study of obstetrics is divided into three chapters: 1. The anatomy of the organs taking part in the process of reproduction in the female; 2, the functions of those organs during reproduction: their physiology; 3, the disorders and diseases affecting these and other organs during the same period: their pathology.

1. *Anatomy.*—In the bony receptacle (pelvis) at the end of the trunk are situated the female generative organs, viz.,

the two ovaries, containing the female germs or ova: between them the womb or uterus, to which they are attached; on either side also the two Fallopian tubes, opening into the uterus; finally, the vagina or passage leading from the mouth of the womb to the external organs. The breasts, although coming into function only after the birth of the child, are generally included in this list.

2. *Physiology.*—The functions of these organs are menstruation, conception, gestation or pregnancy, labor or parturition, and lactation. They are limited to a certain period of life, generally beginning with the twelfth to the fifteenth year and continuing till the forty-fifth or forty-eighth year. The youngest authentic case of parturition on record occurred at the age of nine years, the oldest at fifty-four years. Menstruation and reproduction are generally coincident, although cases are reported in which repeated impregnation took place without menstruation having ever occurred. Conception having taken place, the impregnated ovum passes through one of the Fallopian tubes to the uterus, where it becomes attached and grows and develops (its nourishment being derived from the mother through a convolution of vessels called the afterbirth or placenta, from which a cord of vessels, the umbilical cord, runs to the abdomen of the child), until at the end of a period varying from 275 to 280 days it is ready to be expelled by the contractions of the powerful muscular fibers of the womb (labor-pains). In occasional rare cases the term of pregnancy may be prolonged to 300 or 306 days; but most statements of this kind by women are not reliable and usually depend on errors of reckoning. The signs of pregnancy are manifold. The chief symptoms are: Cessation of the menses, nausea, particularly in the morning, enlargement of the abdomen and the breasts, discoloration of the space around the nipple; later, the movement of the child (or fœtus) and the pulsations of the child's heart, audible only to a practiced ear applied to the abdomen. A physical examination of the abdomen and genital organs will at all times reveal the state of affairs; still, only in exceptional cases is it possible to decide upon the existence of pregnancy before the beginning of the third month. Enlargement of the abdomen from dropsy, ovarian and other tumors, may simulate pregnancy. The part of the child presenting itself at the mouth of the womb during pregnancy or labor is called the presentation. During pregnancy the child frequently changes its position; during labor, however, the part originally presenting generally remains. The most frequent position of the child in the womb is the longitudinal, corresponding with the long axis of the mother, and by far the most common presentation is that of the head (96 in 100), generally the crown or vertex, seldom the face (1 in 200); much less frequent is the presentation of the other extremity of the child, the breech or feet (3 in 100). A transverse presentation, when the long axis of the child crosses the long axis of the mother, is met with about once in 200 labors, and always requires artificial rectification. Labor or parturition is the act of delivery of the fœtus and its appendages (the placenta and the membranes inclosing the child) through the natural passages. It may be divided into three stages: 1. From the first pains till the complete dilatation of the mouth of the womb; 2, the birth of the child; 3, the expulsion of the afterbirth and membranes. *First stage.*—At the end of pregnancy labor is ushered in by so-called premonitory pains, resulting from the beginning contractions of the womb and lasting an indefinite time, several hours or days. A mucous, slightly bloody, discharge accompanies these pains, which gradually become more severe; the mouth of the womb becomes fully dilated, and the bag of waters (in which the child floats) is protruded. *Second stage.*—The bag ruptures, the waters are discharged, the pains become still more severe, the presenting part of the child passes through the pelvic canal, always adapting its longest diameter to the longest one of the pelvic cavity, and is expelled through the external orifice, being rapidly followed by the remainder of the child's body. The *third stage* comprises the delivery of the placenta and membranes, which generally takes place within thirty minutes. The average duration of labor in first confinements is twelve hours, although eighteen to twenty-four hours would not be considered abnormal; women who have had children are generally delivered more rapidly, within six or eight hours. After labor the lying-in state begins, during which the function of lactation is inaugurated, and the womb gradually returns to its natural size and configuration before conception, which latter event ordinarily takes place within six weeks. The child, having been separated from its connection with the mother by the ligation and division of the umbilical cord, is washed, dressed, and applied to the breast as soon as the mother has recovered from her exertions. By an early application of the child the febrile excitement known as "milk fever," ordinarily occurring on the third or fourth day, with the flow of milk into the breasts, is in a great measure avoided. The period which a woman after labor is confined to her bed varies in different countries; while in civilized communities seven to ten days is considered the proper time, in the East and among savage races the mother resumes her daily avocations immediately after delivery, and among the lower classes in Europe and the U. S. puerperal women very frequently leave their beds on the third or fourth day without evil consequences.

3. *Pathology.*—Pregnancy does not always last the stated time of 280 days, but often is interrupted at an earlier period, either by causes depending on diseases of the mother or of the fœtus and its appendages, or by accident or intention. Such interruptions may occur at any time, and during the first six months are called abortion or miscarriage, during the last three premature delivery. A fœtus born before the twenty-eighth week is ordinarily not viable, although several instances have occurred in which children born as early as the twenty-sixth week were by extraordinary care raised to maturity. The danger to the life of the mother from abortion may at times be great, either from uncontrollable loss of blood or from inflammation of the uterus or bowels (peritonitis). This is particularly liable to be the case when the abortion has been forcibly induced, as by sudden shock or with a criminal purpose. Tardieu relates thirty-four cases of criminal abortion, in which the death of the mother resulted in twenty-two. The danger is greatest during the third, fourth, and fifth months; during the first two months the impregnated ovum often escapes almost unperceived. A common cause of abortion is disease of the placenta. The physiological discomforts of pregnancy, such as nausea, neuralgic pains, constipation, may occasionally become so aggravated as to be actual sources of danger, and the pregnant woman is liable to dropsy, hæmorrhoids, congestion of the kidneys, and numerous other complaints. Occasionally the impregnated ovum does not pass into the uterus, but becomes attached in the Fallopian tube or drops into the abdominal cavity and develops there. This condition is called extrauterine pregnancy (tubal or abdominal), and generally ends fatally about the third or fourth month by rupture of the tube or peritonitis. In rare cases the child has been retained until term and removed by operation alive or dead, or it has died and been discharged piecemeal through the bowel, vagina, etc. The removal of the pregnant tube with the ovum intact by abdominal section has been successfully performed by Tait, of Birmingham, England, Veit, of Berlin, Mundé, and others during the early months of pregnancy; and numerous cases are reported where after rupture the abdomen has been opened, the bleeding tube ligated and removed, and the woman recovered.

Labor is either natural or preternatural—natural when nothing occurs to mar the progress of the unaided birth of the child and appendages, preternatural when the assistance of art, either manual or instrumental, is required. The causes of preternatural labor may lie either in the mother or the child. *The mother.*—Deformities of the pelvis or of the soft genital organs, rupture of the uterus, vagina, or the external parts (perineum), flooding (either during labor, when the placenta is situated over the mouth of the womb and is detached during dilatation of that orifice —placenta prævia—or after labor from the open vessels of the normal placental attachment), convulsions, inversion of the uterus. *The child.*—Too large size, monstrosity, abnormal presentation, transverse or oblique (requiring manual or instrumental interference), compression and protrusion of the umbilical cord (dangerous to the life of the child, but not to the mother, and not impeding delivery), too firm attachment of the placenta. The operations which may become necessary during pregnancy or labor are: The induction of abortion, when the preservation of the life of the mother renders it imperatively necessary that the pregnancy be interrupted, and of premature delivery, when the birth of a fully developed child at term is impossible on account of pelvic deformity; Cæsarean section, the removal of the child and appendages through an incision in the

abdomen and uterus, in cases where the pelvic deformity is so aggravated as to preclude the natural or instrumental delivery of even a mutilated child by the natural passages; the extraction of the child with the forceps; version or turning, and manual extraction by the feet, when it is desired to change the position of the child and accomplish rapid delivery; craniotomy, the perforation of the head and removal of the brain of the living or dead child to enable the passage of the diminished head through the contracted pelvis, thus sacrificing the child for the sake of the mother, etc. Of recent years the operation of Cæsarean section has been more successful both for mother and child, owing to increased experience in abdominal operations and careful antiseptic rules. A modification of the old operation was introduced by Prof. Porro, of Italy, and consists in removing the uterus and ovaries after extracting the child. It can hardly be said to have supplanted the original method. Of the dangers which assail the woman after delivery the most frequent are sore nipples and inflammation of the breasts and childbed or puerperal fever. The general mortality during parturition has decreased in consequence of the improvement in the study and practice of obstetrical science. According to a compilation by Winckel (*Path. and Therap. of the Puerperal State*, 1869) from more than a million labors, it averaged about 6 in 1,000 cases in private practice and 30 in 1,000 cases in lying-in hospitals, the large mortality in the latter institutions being mainly due to the epidemics of puerperal fever breaking out in them from time to time, the disease being rendered particularly virulent by the generally poor physical condition of the patients and the necessary crowding to which they were more or less subjected. The mortality from puerperal fever (which is now recognized to be simply blood-poisoning or septicæmia, the poison usually having been introduced from without, often in some mysterious manner) has so much decreased through the careful observance of the antiseptic rules now practiced in all surgical manipulations that even in maternity hospitals, where formerly the death-rate was the largest, the average percentage of deaths from this cause is less than 1 per cent. PAUL F. MUNDÉ.

Ocala: city (founded in 1851); capital of Marion co., Fla. (for location, see map of Florida, ref. 4–I); on the Fla. Cent. and Peninsular, the Fla. Southern, and the Savannah, Fla. and W. railways; midway between Jacksonville and Tampa. It is the center of the orange belt of the peninsula; contains 5 churches for white people and 6 for colored, 2 public-school buildings, industrial school, several private schools, 2 national banks, a State bank, and a daily and 4 weekly periodicals; and is principally engaged in orange and vegetable growing and phosphate-mining. Pop. (1880) 803; (1890) 2,904; (1900) 3,380.

EDITOR OF "BANNER."

Ocaña, ō-kaan'yăă: a town of the department of Santander, Colombia; 235 miles N. N. W. of Bogotá; 3,820 feet above the sea (see map of South America, ref. 1–C). It is the center of the trade between Lake Maracaibo and Venezuela on the E. and the Magdalena valley on the W.; the surrounding district is one of the finest agricultural regions of Colombia. Ocaña was founded in 1572. It was formerly the capital of Santander. H. H. S.

Oc'cam, or **Ock'ham**, WILLIAM OF: a Scholastic philosopher; b. at Occam, in the county of Surrey, England; d. in Munich, Bavaria, in 1347, at an advanced age. He was educated first at Oxford, and, after he became a Franciscan, in 1319, at Paris under the famous Duns Scotus. He rejected the realism of his master, and became the most eminent of Nominalists. Throughout his life, consistent with the strictest tenets of his order, he strenuously contested the pretensions of the pope to political power and secular possessions, first taking the side of Philip the Fair against Boniface VIII., and subsequently opposing John XXII., by whom he was summoned to trial before an ecclesiastical court at Avignon, whence he took refuge in 1328 with the Emperor Louis of Bavaria, just then in the midst of his struggle with the pope. He promised his pen in support of that monarch in return for his own protection (*Tu me defendas gladio, ego te defendam calamo*). Toward the close of his life he became desirous of making his peace with the pope, but he never signed the recantation demanded by him. No other scholar since the days of Abelard had applied himself so zealously to logic. His skill in handling logical weapons, his acuteness in making distinctions, his fertility in inventing reasons, gave him the name of *Doctor invincibilis*. His careful discrimination between the logical, real, and grammatical significance of terms enabled him to silence his opponents. The hypostatic entities of the Schoolmen before him were disposed of by his doctrine of the subjective nature of thought. His favorite principle was, "Entia non sunt multiplicanda præter necessitatem." In his *Centilogium Theologicum* the greater part of his hundred demonstrations attempt to prove that theological dogmas, such as the existence, unity, or infinity of God, the Trinity, creation, incarnation, transubstantiation, etc., involve contradiction of logical principles, are irreconcilable with reason, and to be accepted only by faith. This doctrine struck a fatal blow at Scholasticism. That form of philosophy had arisen solely out of the necessity which was felt of proving the rationality of the dogma. It had been seen that agnosticism would not only undermine rational theology, but also the faith in the dogmas themselves, because it would come to be held that they are inconceivable, and hence were words to which our minds attach no meaning; but in the triumph of Nominalism this older and more correct view was for a time eclipsed. If the objects of faith could not be proved by philosophy, nor even reconciled with reason, Scholasticism had no task to fulfill except the negative one of destroying what illusions it had already created. Its decline was rapid. The chief works of Occam are (*a*) *Tractatus Logices*, (*b*) *Quodlibeta Septem*, (*c*) *Super quatuor libros Sententiarum*, (*d*) *Expositio Aurea super totam Artem Veterum*. Besides these there were commentaries and polemics. WILLIAM T. HARRIS.

Occasional Causes, Doctrine of: a doctrine invented by the Cartesians to explain the action of mind and matter upon each other. Their theory was that God, the First Cause, on the *occasion* of certain volitions within the mind, produces certain actions or motions of the body; since, said they, the soul, a thinking substance, can not act upon matter, which is pure extension. This doctrine was first fully set forth by Geulinex, and it made necessary extensive and ingenious treatises on the part of Leibnitz, Malebranche, and other philosophers of that epoch to explain away the difficulties involved. Revised by W. T. HARRIS.

Occipital Bone: See OSTEOLOGY.

Oc'com, or **Occum**, SAMSON: an Indian preacher of the Mohegan tribe; b. at Mohegan, near Norwich, Conn., about 1723; was educated at the Rev. Ebenezer Wheelock's Indian school at Lebanon; in 1766 accompanied Rev. Nathaniel Whitaker, D. D., who was sent on a mission to Scotland, England, and Wales to raise funds for the establishment of schools for the education and Christianization of the North American Indians. Being the first preacher of these aboriginal tribes who had visited Great Britain, he created a sensation, and drew large audiences everywhere. He officiated in George Whitefield's chapel in Tottenham Court Road, London, and greatly contributed to the success of Dr. Whitaker's mission. The projected school subsequently became Dartmouth College, New Hampshire. After his return he continued in the ministry, preaching chiefly to the Indians. In 1786 he removed with a colony of Indians to what is now Oneida co., N. Y.; subsequently he lived among the Stockbridge Indians. D. at New Stockbridge, N. Y., July 14, 1792. He wrote an account of the Montauk Indians, published by the Massachusetts Historical Society (1st series, x., 106), and wrote the hymn, *Awaked by Sinai's Awful Sound*.

Occultation [from Lat. *occulta'tio*, a hiding, deriv. of *occulta're*, intensive of *occu'lere*, hide; *ob-*, intensive + *cela're*, hide]: in astronomy, the hiding of one heavenly body behind another. The most common cases of this phenomenon are the occultation of stars by the moon, several of which can usually be seen every month with the aid of a small telescope. Indeed, by closely scrutinizing the moon, when it is three or four days old, it will be found that scarcely an hour passes without some star being hidden behind the dark edge of her disk. Two important astronomical conclusions have been drawn from such occultations. One is that the apparent diameters of even the brightest stars do not exceed a small fraction of a second. This is shown by the fact that, when occulted by the dark limb of the moon, they retain their full brilliancy until the limb actually covers them, and then disappear completely with absolute suddenness, no matter how oblique may be the motion. There is never a visible fading away of the light, which would be the case if the star were of sensible magnitude, because then it would only be gradually covered by the moon.

Another conclusion is that the moon has no atmosphere, or at least none dense enough to exert any refraction upon the rays of light. Did such an atmosphere exist, the star, when near occultation, would be seen through it, and its light would suffer a certain amount of refraction. When a bright star is occulted it sometimes appears to be entirely projected upon the moon's limb before it disappears, as if the moon itself were transparent. This, however, is purely an effect of irradiation, which makes the moon's bright limb appear larger than it really is.

Observations of occultations are useful both for the determination of longitudes and for fixing the position of the moon. The best determination yet made of longitudes in Australia was made by Prof. Auwers from a great number of occultations of the moon observed in that region. The work of determination is, however, more laborious than that of a determination by the telegraph.

Stars are occasionally occulted by the planets. This occurrence is a comparative rarity, owing to the small size of the planets and the disappearance of the star at the approach of the brilliant body of the planet itself. S. Newcomb.

Occupancy: See Property.

Occupation [from Lat. *occupa'tio*, a seizing, deriv. of *occupa're*, seize, take possession of, occupy]: in Roman law, the act of taking possession. The possession thus acquired, if the law allowed, could end in full ownership. Thus, *occupaticius ager*, in one of the old Latin grammarians, denotes land deserted by its own cultivator and occupied or taken possession of by another. The principal objects which could by Roman law be thus taken possession of were—(1) wild animals, which in their free state were held to be without an owner, and wherever taken belonged to the *captor*. If, after being taken, they recovered their freedom, they again became without an owner and could belong to a new *captor*. (2) Things abandoned by an owner with the intention of giving up his ownership and without intending to transfer his right to another. (3) Treasure-trove belonged by Roman law to the finder in certain cases only, as where it had been hid in an unusual way and so long that the owner was not to be discovered. Where it was found by a man on his own ground or on ground without an owner, it belonged wholly to him. Where it was found on the ground of another, it went half to the finder, half to the proprietor of the soil; to the state if the land was public. (4) In war the foe was looked on as without rights, and thus his property was without an owner and capable of acquisition. Things taken from a public enemy during war, however, went first to the state, which could give rights over them to others, as to the captors.

Occupation as a Means of Acquiring Territory.—Discovery, exploration, and settlement resulting in beneficial use, found a valid claim to territory hitherto unoccupied. The third of these is the essential point. By beneficial use is meant any commercial use of the resources of the new country, by fishing or fur-trading stations as well as by cultivating the soil. The rights of a civilized discoverer are held to be paramount to those of prior savages, but the ownership of the latter should be extinguished by purchase. Where settlements of different nationality are made on the same coast, the territory is equitably divided between them. The extent of country which occupation in its early stage may found claim to is vast but indefinite, including generally the drainage areas of the rivers explored. The history of the U. S. claim to Oregon and of the formation and colonization of the Congo Free State may be read in illustration.

Military Occupation.—In the *Instructions for the Government of Armies of the United States in the Field*, issued in 1863, sec. i., it is declared that "a place, district, or country occupied by an enemy stands in consequence of the occupation under the martial law of the invading or occupying army." "Martial law is the immediate and direct effect and consequence of occupation or conquest," whether a proclamation to that effect has been made or not. It "consists in the suspension by the occupying military authority of the criminal and civil law, and of the domestic administration and government in the occupied place or territory, and in the substitution of military rule and force for the same, as well as in the dictation of general laws, as far as military necessity requires this suspension, substitution, or dictation. The commander of the forces may proclaim that the administration of all civil and penal law shall continue, either wholly or in part as in times of peace, unless otherwise ordered by the military authority." In 1874 at Brussels was held a conference of delegates of European powers to work over a code of the rules to be observed in civilized warfare. Their project, as modified by discussion, speaks as follows of military authority within the territory of an enemy: "A territory is considered to be occupied when it is found in point of fact placed under the authority of a hostile army. Occupation extends only to the territory where such authority is established and is in a position to be exercised.

"The legal authority being suspended and passing into the hands of the occupant, he will take all possible steps to reestablish and secure order and public business.

"With this in view he will maintain the laws in force in time of peace unchanged, except in case of necessity."

This code has never received governmental sanction; it simply represents the opinion of the delegates. There are two questions which interest us in this question of occupation: The first is, what is occupied territory? the second, what legal changes does occupation work? See Brussels Conference.

Without going into these questions at length, it is enough to say that occupation, being a result of military force, must depend upon the continuance of such force. This, however, does not imply that the presence of the invading army must be constant in a given district. It *does* require that the military power of the dispossessed sovereign shall be inoperative in it.

As to the second query, it is to be remarked that occupation is not completed conquest. Such change of sovereignty as is implied in conquests results only from a subsequent treaty of cession or from prescriptive possession. The original sovereign retains his rights, but temporarily they are suspended. Meanwhile the will of the occupant prescribes the laws of the occupied territory as a matter of military necessity and in recognition of a state of fact. Such necessity should be the limit of his exercise of this right. He should, and probably will, keep in force the former laws, so far as relates to local order and government. He will not exact any form of military service from the inhabitants. The taxes imposed upon them, except when in the nature of penalties, should be expended for their benefit. On the other hand, all unorganized opposition to the occupant is unlawful and in its graver forms criminal. What proceedings within the occupied district on the part of discontented inhabitants should be punished with severity it is not easy to define by general rules. Thus much, however, may be said—that guerrilla warfare by parties who have no uniform, or who put on and take off a uniform at pleasure, and are without any connection with the national army, is, and on account of the atrocity and insidiousness with which such warfare is apt to be carried on ought to be, punished with severity. Revised by T. S. Woolsey.

Ocean [from Lat. *oce'anus* = Gr. *ὠκεανός*, the river surrounding the habitable world; old preverb *ō-* + partic. of root *kei* (*κεῖμαι*), lie; cf. Skr *āçáyāna-*, lying around]: the vast body of salt water, occupying the greater depressions of the earth's surface. The ocean is sometimes spoken of as the hydrosphere, between the solid geosphere and the gaseous atmosphere. Its area is 150,000,000 sq. miles, or three-quarters of the earth's surface. Its average depth is about 2 miles (according to Krümmel, open oceans, 2,000 fathoms; all salt water, 1,800 fathoms); its volume is 300,000,000 cubic miles, or $\frac{1}{843}$ of the earth's volume; its mass is 13×10^{17} tons, or $\frac{1}{4540}$ of the earth's mass.

A marked characteristic of the ocean is its continuity, and the fact that the land areas which rise above it are mostly gathered into large continental masses, lying for the greater part in one hemisphere, instead of being scattered through the ocean in small islands. The hemisphere which has Southern England for its pole includes nearly all of the land, while the hemisphere having New Zealand for its pole includes the greater oceans. The oceans of the land hemisphere are the Atlantic with its Arctic gulf, the Indian, and a part of the Northern Pacific; the lands in the water hemisphere are Australia and the islands thereabouts, a part of South America and the Antarctic lands. The South Pacific and Antarctic Oceans may therefore be regarded as the great ocean area of the world, from which the North Pacific, the Indian, and the Atlantic-Arctic waters extend in the form of great arms, the first broad and blunt, the last long and relatively narrow.

Viewed from the standpoint of the earth's history, the ocean is that part of its mass which remains liquid at exist-

ing temperatures, but which was probably vapor or gases during the earth's early youth, when the earth was a glowing mass, and which will be frozen solid in the earth's old age. In the economy of the earth, the ocean is the great reservoir from which nearly all the circulating waters are derived by evaporation. Its vapors are carried by the winds, condensed to fall as rain or snow on the ocean again or on the lands; returning from the lands as rivers, bearing land waste in suspension or solution. The waves of the ocean beat on the shores of the lands and consume them. Thus the ocean gains contributions of all kinds of materials afforded by the lands, the coarser parts being deposited near shore, the finer suspended particles being strewn farther off shore, but seldom more than 200 or 300 miles away, while the dissolved parts remain in solution until abstracted by organic or physical process. The currents of the ocean are of extreme importance in determining the distribution of temperatures; the tides sweep the shores and bays. The level surface of the ocean is the standard of reference in all measures of the earth's form, and of the altitude of the lands.

Classification of the Ocean Areas.—The parts of the ocean are divided, first, according to depth; second, according to form. Soundings are now made with great accuracy even in depths of over a mile. Fine steel wire is used instead of rope, and the sinker is automatically detached on touching the bottom. Thermometers may be attached to the wire at various points, with automatic devices for registering the temperature at the greatest depth to which they descend. Samples of the bottom and of water from various depths are brought up. When dredging is attempted wire rope is used to haul the dredge. Soundings have shown that the great oceanic areas are all over 1,000 fathoms in depth, while the waters close around the continents are often less than 100 fathoms in depth for a considerable distance off shore. This shallow belt really belongs to the continent, although at present overflowed by the sea; it is called the continental shelf; nearly all the littoral islands are borne upon it (see ISLANDS), and it receives nearly all the waste from the adjacent lands. It is well developed along the Atlantic coast of the U. S., being over 500 miles wide in the N. E., where Newfoundland rises from it, and narrowing southwestward, but it is almost wanting along the Pacific coast. The shelf encroaches on the Gulf of Mexico, the deep basin of the Gulf being only about half the water area. Shelves occur along the northeast and southeast coasts of South America, but not on the western coast. A broad shelf extends from Europe across the North Sea and beyond Great Britain. Two extensive platforms of this kind stretch S. E. from Asia and N. from Australia, bearing many islands.

The deep oceans really constitute a single water body, with arms running between the lands; but we shall later see good reason for subdividing them according to their surface circulation. Partly set aside from the great ocean are the mediterraneans: the classic Mediterranean, the greatest example of the kind, the Caribbean Sea, the Gulf of Mexico, the Red, Celebes, Sulu, China, and other marginal Asiatic seas of less size. These are all of 1,000 or 2,000 fathoms depth, or more; but they communicate with the great ocean only by relatively narrow, or at least shallow, passages. It is noticeable that the ordinary geographical terminology of the oceanic areas gives no clew to their physical features. *Ocean* should never be applied to the waters on the continental shelf, as in the German Ocean. *Gulf* should be reserved for deep re-entrants, such as the Gulf of Guinea, and not applied to shallow bays, such as the Persian Gulf or the Gulf of St. Lawrence. *Sea* might advisedly be applied to mediterraneans, like the Caribbean or the Chinese Sea, and not to shallow waters, like the Yellow Sea or the North Sea, or to open gulfs, like the Arabian Sea. *Bay* should be reserved for shallow re-entrants, like Delaware Bay, Chesapeake Bay, and not given to deep gulfs, such as the Bay of Biscay or of Bengal. The ordinary use of these terms is in hopeless confusion.

The greatest depths thus far discovered are in the Pacific, N. E. of Japan, 4,655 fathoms, and in the Atlantic, N. of Porto Rico, 4,561 fathoms. The great oceanic depression sinks much deeper beneath the sea-level than the mean height of the land rises above it. The reason for this is primarily the great volume of the ocean, but various secondary causes should be considered: the strength of sunshine giving active evaporation, rapid atmospheric circulation, and plentiful rainfall; the chemical activity of the atmosphere in weathering rocks into soil; the relatively slow rate of continental and mountain upheaval—all these combine to permit the forces of degradation to reduce the greater parts of the lands nearly to sea-level. Only here and there on the earth, and only now and then in geological time, are great land elevations possible. Viewed in this way, it can be hardly accidental that the largest and driest continent has the highest mountains and plateaus.

The greater part of the deep ocean floor is smooth and monotonous, without the variety of relief that characterizes the lands. Excepting within a few hundred miles of the shore, it receives no significant share of mechanical land waste. Excepting volcanic cones, and excepting occasional inequalities near continents, not characteristic of the open oceans, the ocean floor is a gently undulating plain of calcareous or argillaceous mud or "ooze," the argillaceous ooze preponderating at depths greater than 2,500 fathoms. The ooze is derived for the most part from the disintegration of the skeletons of minute forms of life (chiefly Foraminifera which live near the ocean surface), with a small share of volcanic dust. The broad and gentle undulations of the bottom by which the shallower "swells" descend to the deeper "abysses" do not serve to break its monotony. All is cold and dark, without changes of days, weather, or seasons.

Composition of Ocean Water.—In 100 parts of ocean water, 3·5 parts are dissolved salts, whose composition as determined by Dittmar for the *Challenger Report* is:

Chloride of sodium	77·758	Sulphate of potassium	2·465
Chloride of magnesium	10·878	Bromide of magnesium	0·217
Sulphate of magnesium	4·737	Carbonate of calcium	0·345
Sulphate of calcium	3·600		

Besides these substances, many others exist in minute proportions, as bromine, iodine, fluorine, phosphorus, silicon, boron, gold, silver, lead, copper, zinc, cobalt, nickel, iron, manganese, aluminium, barium, strontium, etc. (*Forchhammer*).

It is noticeable that those minerals which are easily soluble make a considerable part of sea salt, even though relatively rare in the earth's crust, while the more common and less soluble rocks are faintly represented in the sea; yet two of the latter, silica and limestone, although occurring in very small proportion, are used as the framework of most marine animals. Atmospheric gases also occur in sea water: near the surface the proportion of oxygen to nitrogen is about one to three, but in deep water the oxygen is greatly diminished. Carbonic acid, believed to be loosely combined with certain of the salts, exists in much greater proportion than in the atmosphere, its source presumably being in volcanic vents, whence it must issue as a liquid under the great pressure of the deep ocean.

The salinity of the surface waters varies by small but significant amounts. The average density is 1·026, but it rises to 1·027 in the dry trade-wind belts of the open ocean, where evaporation is in excess of rainfall, and to over 1·028 in inclosed seas, like the Mediterranean and the Red Seas. A lower measure (1·026) is found around the equator under the moist air and heavy rains of the doldrums, where it is occasionally possible to gather water that is almost fresh at the surface after a heavy downpour; and also especially among islands, where the movement of the waters is retarded and the rainfall is increased, as about Java and Sumatra, where the density is 1·025. The sea surface is also slightly fresher in high latitudes, where evaporation is deficient, and in long arms of the sea (but not in trade-wind latitudes), as the Black Sea (1·021 to 1·014), the Baltic (1·023 to 1·004), and the Gulf of St. Lawrence. Large springs sometimes rise through the salt water near the shore, bringing water almost fresh to the surface.

The density of the ocean at the bottom is hardly greater than at the top, so little is water compressible, in spite of vast pressures exerted upon it, the ocean being unlike the atmosphere in this respect. According to Tait, an ocean 2 miles deep loses about 76 feet of depth by compression; the depression of the actual ocean surface in this manner being about 116 feet, thus laying bare about 2,000,000 sq. miles of coastal lowlands that would be submerged if the ocean should now assume a uniform density,

Although the water on the open ocean is remarkably transparent, it is believed that sunlight is practically extinguished at a depth of a few hundred fathoms. Under a clear sky mid-ocean water has a strong blue color, but under heavy clouds it becomes gray or leaden, and when streaked with foam under a heavy storm the water seems almost black. On "soundings" near shore the color generally becomes greenish; near large rivers it may be tinged

with yellow, even out of sight of land. Patches of red or whitish color are sometimes caused by swarms of minute animals or plants.

The mean temperature of the ocean surface varies with latitude and with the movement of its currents. The contrast of equatorial and polar temperatures is less in the ocean surface waters than in the air over the lands, being from about 85° to 30° in the first and from 90° to 10° or 0° in the second. This is because of the equalizing tendency of ocean currents. The annual variation of temperature is relatively small over all parts of the ocean surface, not only on account of the currents, but also because the temperature of the water is changed with great difficulty, by reason of its various physical properties. It warms slowly because of its reflecting power, by which much sunshine is thrown back; its transparence, by which much sunshine is allowed to penetrate beneath the surface and little is absorbed to warm the surface layer; its volatility, by which much sunshine is expended in warmer latitudes in supplying latent heat for evaporation; its mobility, by which the surface layer is frequently mixed with less warmed or cooled water from beneath; its currents, by which water now warmed is replaced by cooler water. Conversely, these physical properties all retard its cooling. It is on account of this conservatism with respect to temperature that the climate of the great south temperate oceanic zone is so inhospitable—not excessively cold in winter, not warm in summer, but always of a penetrating chill. The islands of South Georgia, no farther from the equator than Middle England, have snow in midsummer, with glaciers descending to the sea-level; this contrast not being due to any exceptional conditions in the southern islands, the climate of whose latitude they fairly represent, but to the exceptionally favorable condition of England, which lies to leeward of a large drift of warm and well-tempered ocean waters. The conservatism of the ocean as to temperatures affects the winds that blow over it, and these in turn affect the climate of leeward coasts; hence the milder climate of Western Europe, where the winds prevailingly blow from the ocean, in contrast to the severe climate of Eastern North America, where the winds prevailingly blow from the lands. See CLIMATOLOGY.

Salt water has its maximum density at its freezing-point, 28°, being in this respect strongly contrasted with fresh water, which is densest at 39°. The coldest waters of the ocean therefore accumulate at the bottom, but in freezing salt water expands and its ice floats. As the ice-crystals form, the salt is partially excluded from them. The floe-ice of polar seas is thus formed. When drifted by winds or currents two floes may collide, thus forming pack-ice. Unless melted by drifting into warmer latitudes, the ice may become heavier and heavier in successive winters; thus the paleocrystic ice-sheets or old heavy ice-floes of Arctic explorers are explained. Icebergs are shed into the sea from glaciers; they may float into sub-temperate latitudes; they sometimes carry bowlders and gravel, which are dropped to the sea-floor as the iceberg melts.

The distribution of temperature in the deeper oceans is dependent on their supply of cold polar water which creeps along the bottom toward the equator. In the polar oceans the variation of temperature with depth is slight, the whole mass being within a few degrees of its freezing-point; in the equatorial oceans the decrease is rapid until a temperature of 40° or 38° is reached at a depth of about 400 fathoms, then there is a slow cooling to a temperature of 34°; or 32° at the bottom. The mediterranean seas, inclosed by comparatively shallow barriers, can not receive a supply of deep cold waters; hence their bottom temperature is dependent either on their own coldest surface waters in winter or on the temperature of the open ocean water at the depth of their deepest inlet. Thus the Mediterranean, with a maximum depth of 2,170 fathoms, has a uniform temperature of 55° at all depths beneath 260 fathoms, this being the temperature to which the whole sea is reduced in winter. The Caribbean Sea and the Gulf of Mexico, with depths of 3,428 and 2,118 fathoms, have bottom temperatures of 39°. As this is much lower than the mean temperature of the surface in winter, the depth of the deepest inlet from the Atlantic, 710 fathoms, was predicted from the previously known depth at which 39° occurred in the adjacent open ocean. The Sulu Sea, inclosed by the Philippine islands, is remarkable in having great depth, 2,550 fathoms, yet its bottom temperature is 50·5°; hence its deepest inlet is thought to be about 200 fathoms. Before considering the cause of the movement of the cold polar waters toward the equator, other movements of the ocean must be examined.

Waves are produced by the winds blowing over the ocean surface. While the wave-form moves forward in the direction of the wind, the water particles describe orbital paths, moving forward at the crest, backward in the trough, falling and rising between. When little waves ride on the surface of larger ones, they are more exposed to the wind on the larger crests than in the troughs; hence while on the crests they are blown forward, and thus increase the orbital velocity of the particles in the larger wave, and in turn increase the movement of the larger wave. It is in great part for this reason that a film of oil, that spreads spontaneously over the water and prevents the formation of little waves, prevents also the increase in size and the combing or breaking of the larger waves; and hence in rough weather is of great service in decreasing the violence of wave-motion near a laboring vessel.

Strong gales and hurricanes produce waves of great size, but none of greater height than 30 or 40 feet have been carefully measured. When a great size is attained the progressive velocity of the wave may be as much as 60 or 80 miles an hour; the wave-length, or distance from crest to crest, a quarter to half a mile; hence such waves succeed one another in periods of fifteen or twenty seconds. While their velocity of progression is exceeded by the stronger blasts of wind in the gales that cause them, it is frequently the case that they outstrip the average gale, although in such cases the forward orbital velocity of the water particles in the wave-crest is much less than that of the wind. Once excited in a storm-area, the waves swing outward on all sides, diminishing their height, but preserving their length, velocity, and period, and gradually falling to a broad heaving of the surface, known as a swell. The winter storms of temperate latitudes thus cause a long, low swell across the doldrums of the equator, even into the hemisphere opposite to that of their source. When the swell runs ashore on a gently shoaling coast, its height increases, the length and velocity of the successive waves decrease; but their period remains unchanged; close to the shore they roll over and fall, and are hence called breakers or surf; they dash violently upon the beach, rushing forward in a sheet of foam, and returning under the next wave to form the dreaded undertow. When a strong wind blows on a steep coast over deep water, another effect is produced; here the waves attain great size, but instead of dashing against the shore they dance up and down in front of it. The stronger the wind, the deeper the on-shore water must be to manifest this motion.

Long flat waves are produced by earthquake shocks or volcanic explosions under or near the sea. The waves overwhelm the coasts near their source, causing great destruction. In the Strait of Sunda, after the explosion of the volcano Krakatoa, Aug. 26, 1883, the sea rose over 100 feet on the neighboring coasts, drowning over 30,000 persons. Waves thus excited swing far and wide across the ocean, like waves from storms, imperceptible in the open sea, but increasing considerably when running on a shoaling coast. Their velocity of progression is very great; the waves from the earthquake at Simoda, Japan, Dec. 23, 1854, were registered in San Francisco in twelve and a half hours; the waves from the earthquake at Arica, Peru, Aug. 13, 1868, were registered at Sydney, Australia, in twenty-three hours.

Storm-waves or destructive overflows of the sea are caused on low coast lands when violent on-shore winds conspire with a rising tide. The densely populated delta of the Ganges has repeatedly suffered in this manner; in the cyclone wave of Nov., 1876, it is reported that over 100,000 persons were drowned. Similar storm-waves occurred on the Louisiana coast in Oct., 1893, and on the low Carolina coast in August of the same year.

Ocean currents are of several kinds. The great surface currents are caused by the winds; the deep movement from the polar seas is due chiefly to difference of density resulting from difference of temperature; the opposed surface and bottom currents in certain straits are caused by difference of density; active alternating currents in estuaries and sounds are caused by the TIDES (*q. v.*).

Wind-made currents are caused by the brushing forward of water in wave-crests, whereby a general forward movement is communicated, first to the surface stratum, then to deeper layers. Where the winds are steady, as in the trade-wind belts, the currents are regular; where the winds

are frequently interrupted by stormy shifts, as in the temperate zones, the surface currents vary more or less with the winds, but the general drift of the sub-surface waters follows the prevailing direction of the wind. Where the winds vary periodically, as in the monsoon region of the Indian Ocean, the currents vary also, their time of change being a little later than that of the winds. The general winds of the world have an eddy-like circulation around each of the five chief oceans; but the ocean currents are much better hemmed in than the winds, and their circulatory movement gives good physical warrant for the division of the great continuous ocean into the parts generally recognized—the North and South Pacific, the North and South Atlantic, the Indian and the Antarctic Oceans. The great eddies of the northern oceans turn slowly from left to right; of the southern oceans from right to left, except that the Antarctic has a drift from left to right, or west to east, around the pole, which it shares with the three adjoining oceans. The Arctic should be regarded as hardly more than a great gulf at the end of the long Atlantic. The currents of the ocean eddies may be called drifts where they are broad and slow-moving, and streams where they are concentrated to narrow courses and rapid flow near coasts or through straits.

The circulation of the North Pacific is relatively simple and regular; its strongest movement is on the W., where the equatorial member of the eddy turns sharply from its westward course and flows N. E. past Japan, forming the Japanese current, or Kuro-siwo; there is a moderate backset or reversed eddy in the Alaskan bay, a small amount of leakage from the Arctic through Bering Strait, and some cold waters flowing southwestward past Kamchatka. The South Pacific eddy is less regular; it bears a vast volume of cooled water northward along the west coast of South America, forming the Humboldt or Peruvian current, and thus producing near the Galapagos islands the lowest temperatures in the equatorial ocean; but it loses distinctness among the many islands on its western side, it gives off branches through the Australasian archipelago to the Indian Ocean, and it is confluent on the S. with the great Antarctic eddy. The South Indian Ocean has a normal right to left eddy, but on the N. it is complicated by the alternating monsoon currents of the Bay of Bengal and the Arabian Sea. Very little if any water passes from the Indian Ocean around the Cape of Good Hope to the Atlantic. The South Atlantic eddy is confluent with the Antarctic on the S., and separated from Patagonia by a wedging current of cold water; but it is very peculiar in giving forth a great branching current across the equator, to join with the North Atlantic eddy off the coast of Guiana. The North Atlantic eddy receives the branch current just mentioned; it is complicated on the W. by the branches outside of the Antilles, as well as through the Caribbean and Gulf of Mexico. The strong stream issuing from the Gulf between Florida and Cuba, known as the Gulf Stream, is the most famous current of the world, running 80 or 90 miles a day in its narrowest part. As the North Atlantic is the only ocean communicating with Arctic waters, all their circulation is dependent on the great branch of the North Atlantic drift which splits off W. of France, passes northeastward along the coast of Norway, and, after making the round of the Arctic, returns on either side of Greenland to form the Labrador current, which wedges its way southward along the eastern coast of the U. S.

Within each oceanic eddy the more quiet waters about the center contain a greater or less amount of floating seaweed or *sargasso*, as it is called by the Portuguese, hence the name Sargasso Sea. Between the paired eddies of the North and South Pacific and Atlantic there are countercurrents of somewhat variable strength, somewhat N. of the equator, running from W. to E.; they are presumably caused chiefly by the southwest winds that occur here, particularly in the northern summer season. The latter are the extension of the southeast trade into the northern hemisphere, where it turns to a southwest wind. It is by a similar extension of the southeast trade of the Indian Ocean into the northern hemisphere, where it forms the southwest monsoon of the northern summer, that the currents there are reversed from the course that they maintain under the northeast monsoon of winter.

The very slow movement of the deep cold polar water toward the equator, proved by the distribution of temperatures already described, has by many geographers been referred to the reflux of an excess of surface waters, brushed by the winds toward the poles; but this excess is not proved. Moreover, the branch current that crosses the equator from the South to the North Atlantic should, if the winds were the only cause of the bottom movements, produce a north-to-south movement of the deep waters beneath the Atlantic equator; but the distribution of bottom temperatures there indicates that the deep movement under the equator in the Atlantic is chiefly from S. to N.; hence some other cause than surface winds must be inferred for the bottom movement. This cause is found in the greater density of the cold polar waters; the fact of greater density being doubted by no one, but its sufficiency to cause movement being often questioned. It appears, however, from calculation, that the effective equatorward force here applied is not much less than the force by which the tides are swung back and forth twice a day, as has been shown by Ferrel; and as the equatorward force acts perpetually, it should be regarded as the chief cause of the bottom movement.

Salinity currents are found well exhibited at the Strait of Gibraltar, where the less saline surface current is inward and the denser undercurrent outward; similarly in the Bosphorus, between the dense Mediterranean and the fresher Black Sea; at the strait of Bab-el-Mandeb; and at the entrance to the Baltic. The undercurrent in these various straits always moves from the denser to the less dense water body.

The distribution of life in the ocean has been much studied by the exploring expeditions of the nineteenth century. This life is extremely abundant and varied in the littoral waters of the torrid zone, and exists in remarkable variety even in much colder latitudes, both the vegetable and animal forms of the polar seas being much more numerous than those of Arctic lands. Besides those forms found along the shores in relatively shallow water, there are others which inhabit the open sea near the surface, hence called pelagic forms; and others again which inhabit the bottom of the deepest oceans, in spite of the intense pressure of the overlying water, of the monotony of the surrounding physical conditions, and of the absence of sunlight. From the fact that certain abysmal forms possess eyes and are marked by varied colors, it is inferred that light from some other source, such as phosphorescent animals, may cause a faint illumination there. The intermediate depths of the ocean have been imperfectly explored, but if they possess any characteristic fauna it is a very sparse one. The pelagic fauna of the surface is remarkable chiefly for the excessive abundance of minute, almost transparent, forms, chiefly of the lower orders of life. It is from the minute calcareous and siliceous skeletons of these animals that the ooze of the bottom is chiefly supplied. Although the plants and animals of the land are thought to have been evolved from more primitive forms that inhabited the seas, where the earliest forms of life presumably existed, yet the larger marine mammals, such as whales, walruses, etc., are believed to have been developed from land mammals.

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Ocean Grove: town; Monmouth co., N. J. (for location, see map of New Jersey, ref. 4–E); on the Atlantic Ocean, and the Cent. of N. J. and the Penn. railways; 1 mile from Asbury Park, 6 miles S. of Long Branch. It is a popular summer resort, and is widely known as the seat of the Ocean Grove Camp Meeting Association of the Methodist Episcopal Church. This association was organized in 1869 under the presidency of the Rev. E. H. Stokes, D. D., who still (1894) retains its direction. The first preaching-stand was erected in 1874, the congregation using seats of pine planks laid on trestles and without backs. The first permanent building, a frame structure covered with green pine boughs, was erected in 1875; an auditorium, seating 5,000 people and costing $10,000, was built in 1880; and a second auditorium, the largest audience-room for evangelistic services in the U. S., comfortably seating 10,000 persons and costing $75,000, was dedicated Aug. 9–12, 1894. The town has numerous hotels, boarding-houses, and summer cottages, and two weekly newspapers. Pop. (1890) 2,754; (1900) 4,251.

Ocea'nia, or **Oceanica**: a term of no precise application, used by various geographical writers to denote lands in

greater or less areas of the Pacific Ocean, some including only Polynesia, Melanesia, and Micronesia, and others adding Australasia and the East Indian Archipelago. Many leading geographers and map-makers do not now employ the term at all on account (1) of the confusion above noted; (2) because it has been made to include both oceanic and continental islands, though its use should be confined to oceanic islands; and (3) because it has been used to exclude a large part of the oceanic area to whose lands it would be in strictness equally applicable, as the Atlantic islands. C. C. Adams.

Ocellus [Lat., a little eye]: a name given to the smaller organs of vision, especially in the Arthropoda. In these the ocelli are small, simple organs, each with its own lens and retinal layer, and are contrasted with the larger compound organs of vision so typical of the group. See Entomology.

O'celot [from Mex. *ocelotl*]: one of the handsomest of the cat family found in America, the *Felis pardalis* of the naturalists. It is found from Southeast Texas to Patagonia, and formerly ranged to Louisiana. The color varies from tawny yellow to reddish gray, marked with numerous black spots, and dark stripes and blotches edged with black. There is

The ocelot.

almost always one of these stripes along the region of the shoulders, and there are two black stripes on each cheek. The under parts are whitish. The ocelot is extremely variable in its markings, and it is still an open question as to whether or not several distinct species have been combined under one name. The total length varies from 3 to 4 feet, the tail being 11 to 15 inches long. F. A. Lucas.

Ocher, o'ker [from Fr. *ocre* < Lat. *och'ra* = Gr. *ὤχρα*, yellow ocher, deriv. of *ὠχρός*, pale, pale yellow]: any one of certain pigments made of clays colored by hydrated peroxide of iron in variable proportions, varying in shade from pale yellow to deep orange. The term is also more broadly applied to any clay richly colored by peroxide of iron. Ruddle, or red chalk, is a variety of ocher consisting of decomposed *hematite*. In mineralogy, earth varieties of *hematite* or iron peroxide, if bright tinted, are known as red ocher, while argillaceous and decomposing *limonites*, or hydrated peroxides, give rise to brown ocher. Moreover, the term is used in that science, in combination, to express the earthy, pulverulent, decomposing oxides of other elements.

Ochino, *ō*-kee'n*ō*, Bernardino: preacher; b. at Siena, in the Papal States, 1487; joined the strictest branch of the Franciscan order, and afterward the still stricter order of the Capuchins, and acquired a great reputation as a preacher. Paul III. chose him for confessor, and other honors were heaped upon him. He was chosen in 1538 by the Capuchins to be their general; but in Naples he became acquainted with the Spanish mystic Juan Valdez, with Peter Martyr, and others, and from that time began to preach on justification by faith, on the futility of indulgences, etc. Suspicions arose with respect to his orthodoxy; and when, in 1542, he published in Venice his *Dialogi VII. Sacri.*, he was summoned to Rome to explain and retract. Fully aware of the danger, he fled to Geneva, where he published six volumes of Italian sermons (*Prediche*, 1542–44), of which twenty-five were translated into English (1548). From Geneva he went to Augsburg, and thence to Strassburg, London, Zurich, Cracow, etc., in each place preaching to the Italians, publishing a number of books, but leading a somewhat erratic life. D. at Schlackau, Moravia, 1565. In the first works he published after his flight from Italy he advocated Calvinistic views, but in the later Socinianism becomes more and more apparent, especially in his catechism, published at Basel (1561). See his *Life*, by Benrath (Leipzig, 1875; trans. into English, New York, 1877). Revised by S. M. Jackson.

Ochoa y Ronna, Eugenio, de: poet, critic, and scholar; b. at Lezo, Guipuzcoa, Spain, Apr. 19, 1815; d. Feb. 29, 1872. After studying at the College of San Mateo, and then in that of Santo Tomás at Madrid, he went in 1829 to Paris to study in the École des Arts et Métiers. He also essayed painting, but trouble with his eyes obliged him to abandon this. In 1834 he returned to Madrid, and began to write for the *Gaceta de Madrid*, which the famous Alberto Lista was then directing. The revolution of La Granja, however, forced him to return to Paris, where he occupied himself with editing works of the Spanish classic writers for the extensive *Colección de los mejores autores españoles* planned by Bandry, as well as with other literary undertakings. He brought out the first modern editions of the works of the Marquis of Santillana, *Hernán Pérez de Pulgar*, etc. In 1844 he returned to Madrid and became under-librarian in the National Library. In 1847 he was made director of the state printing establishment; and soon after chief of bureau in the ministry of Public Instruction. In 1844 he was elected a member of the Spanish Academy, and a little later of the Academy of History. Besides his work as editor, he made many translations from the English and French, among others of Hume's *History of England*; Napoleon III.'s *Jules César*; Scott's *Monastery* and *St. Ronan's Well*; Vergil's *Eclogues* (1879). He prepared for Rivadeneyra's *Biblioteca de Autores Españoles* an *Epistolario español* (vols. xiii. and xlii.). By commission of Louis Philippe he compiled an exhaustive catalogue of the Spanish manuscripts in the libraries of Paris (1844). Worthy of mention also are his play, *Incertidumbre y Amor* (1836); *París, Londres, y Madrid* (1861); *Miscelánea de Literatura, Viajes y Novelas* (1867). His poetical and critical contributions to periodicals were very numerous. A. R. Marsh.

Ock'ley, Simon: Orientalist; b. at Exeter, England, in 1678; studied at Queen's College, Cambridge, distinguishing himself by his attainments in the Oriental languages; took orders in the Church of England; became vicar of Swavesey, near Cambridge, 1705; published a Latin *Introduction to the Oriental Languages* (1706); a *History of the Jews* (1707), translated from the Italian of Rabbi Leon of Modena, with an original *Supplement concerning the Caraites and Samaritans*, and several translations from Oriental manuscripts; became Professor of Arabic at Cambridge 1711; published *The History of the Saracens* (2 vols., 1708–18). D. at Swavesey, Aug. 9, 1720.

Ocmul'gee River: a stream which rises in the central part of Georgia by several head-streams, flows in a generally S. S. E. course, and above Colquitt joins the Oconee to form the Altamaha river. Small steamboats ascend to Macon. Its lower course is through sandy pine woods; its upper, through a granite region, where there are many rapids. It is 300 miles long.

O'Con'nell, Daniel: patriot; b. at Carhen, County Kerry, Ireland, Aug. 6, 1775; the son of a gentleman of small estate, but of ancient family; was educated at St. Omer and Douay, and in 1794 began to study law at Lincoln's Inn; in 1798 was called to the bar; rose at once to distinction as a barrister, and very soon became prominent in Irish politics, addressing himself to the work of the emancipation of the Roman Catholics and of Ireland. In 1815 he was challenged by Alderman d'Esterre of Dublin, whom he mortally wounded; and a duel with Mr. Peel was soon after prevented by the police. In 1823 he founded the Catholic Association, which exerted a powerful influence in favor of the repeal of legislation unfavorable to Ireland, but the Government brought in a bill to suppress it, and it dissolved itself in 1825. In 1828 he was chosen to Parliament from County Clare, but was excluded by the Test oath; in 1829, however, the Roman Catholic emancipation took place, and O'Connell entered the House of Commons. His life-work was one of agitation, both among the people and in the House of Commons, for the repeal of the Union. In 1842 he began to hold monster meetings in Ireland, and in 1843 he was arrested on a charge of conspiracy and sedition, convicted, and heavily fined; but the Lords reversed the judgment Sept. 7, 1844. In the meanwhile the Young Ireland party,

falling under the control of more impetuous spirits, began to discredit the moral force policy of O'Connell and advocate more violent measures than he approved. In 1845 his influence was fast declining, and in 1846 his support of the Whig ministry tended to make him even more unpopular with the Irish party. In 1847, enfeebled by overwork and by anxiety for Ireland, where the famine had broken out, he started on a pilgrimage to Rome, but died at Genoa, May 15, 1847. He is buried at Glasnevin, Dublin. See *Life and Speeches of Daniel O'Connell*, by his son, John O'Connell (London, 1846); Cusack, *The Liberator, his Life and Times* (London, 1872); Justin McCarthy, *History of Our Own Times* (1879–80). Revised by F. M. COLBY.

O'Connor, RODERICK, popularly called RORY: the last independent King of Ireland; b. in Connaught in 1116; succeeded to the throne of Connaught on the death of his father, Turlogh O'Connor, 1156; disputed the supremacy for several years with the O'Neals and the O'Briens; assumed the title of King of Ireland 1166; assembled a parliament of lords and clergy at Athboy 1167; aided in the expulsion of Dermot, King of Leinster, 1168; defeated the English invaders under Strongbow in several engagements, but subsequently came to terms with them and reinstated Dermot in his kingdom; afterward carried on war with the English with varying success, until in 1175, after an interview with Henry II. of England, he acknowledged that monarch as lord paramount of Ireland, retaining for himself his ancestral kingdom of Connaught. His sons having revolted against him, Roderick retired in 1186 to a monastery, where he died in 1198.

O'Connor, THOMAS POWER, M. P.: journalist and politician; b. at Athlone, 1848; educated at Queen's College, Galway, and graduated at the Queen's University; became a journalist; entered Parliament 1880; became one of the most prominent leaders of the Parnellite party and of the Land League; lectured in the U. S. 1881; was elected president of the Irish National League of Great Britain 1883; was elected to the House of Commons for the Scotland division of Liverpool, for which he still (1894) sits, 1885; is the author of *Lord Beaconsfield, a Biography* (1876); *The Parnell Movement* (1885), and other works; editor of the *Cabinet of Irish Literature*; started *The Star* newspaper (1887), which he sold 1890, and started *The Sun*, 1893.
C. H. THURBER.

Oconomowoc: city; Waukesha co., Wis. (for location, see map of Wisconsin, ref. 7–E); on Oconomowoc creek and Lake Labelle, and the Chi., Mil. and St. P. Railway; 31 miles W. of Milwaukee. It is in an agricultural region, is surrounded by numerous beautiful lakes, has excellent drives, valuable mineral springs, and commodious hotels, and as a summer resort has been called the Saratoga of the West. Pop. (1880) 2,174; (1890) 2,729; (1900) 2,880.

O'Conor, CHARLES, LL. D.: jurist; b. in New York city, Jan. 22, 1804; son of Thomas O'Conor, who emigrated from Ireland to the U. S. for political reasons in 1801, and devoted himself largely to journalism and the writing of pamphlets on Irish and Roman Catholic questions. Charles O'Conor was admitted to the bar in 1824, and by his untiring industry and native talent became the recognized leader of the legal profession in New York. He first gained repute in *nisi prius* cases before juries, but the case which first gave him an established reputation was that of the fugitive slave Jack (1835). The most celebrated of his cases were the Lispenard will case (1843), the Forrest divorce case (begun in 1850 and finally disposed of in 1868), and the Parrish will case (1862). He deprecated the civil war, and, believing that its aim was inconsistent with the original principles of the confederation under the Constitution, he sympathized with the Southern States, and became senior counsel for Jefferson Davis when he was indicted for treason. He never held public office except that of district attorney for a few months during the administration of President Pierce and that of a member of the constitutional convention in 1864. In 1868 he was nominated for the presidency by the extreme Democrats, and received about 22,000 votes. He was noted for his integrity and simplicity of character. D. at his residence on the island of Nantucket, May 12, 1884. F. STURGES ALLEN.

Oconto: city; capital of Oconto co., Wis. (for location, see map of Wisconsin, ref. 4–F); on Green Bay, at the mouth of the Oconto river, and on the Chi. and N. W. and the Chi., Mil. and St. P. railways; 30 miles N. by E. of Green Bay. It is in a lumbering region, and contains a public park, a national bank (capital $60,000), flour and planing mills, iron-foundries, wagon-factories, and three weekly newspapers. Pop. (1880) 4,171; (1890) 5,219; (1900) 5,646.

Octahedron [from Gr. *ὀκτάεδρον*, liter., an eight-sided thing, neut. of *ὀκτάεδρος*, having eight sides or bases; *ὀκτώ*, eight + *ἕδρα*, seat, base]: a solid bounded by eight triangular planes. If regular, its faces are equilateral. It has twelve edges and six solid angles, each formed by four equal plane angles. Its solid contents are equal to the cube of one of its edges multiplied by ·4714045.

Octane: C_8H_{18}, the eighth of the marsh-gas series of hydrocarbons. It occurs naturally in American petroleum, and can be obtained from that portion of the oil that boils between 115° and 130°. It may be produced by the dry distillation of the lime-soap of menhaden oil, by passing the vapor of the thirteenth of the same series, tridecane, $C_{13}H_{28}$, through a red-hot tube, and also from octyl iodide, phthalic acid, indigo blue, acenaphthene, etc. By long-continued fractional distillation it may be separated into two hydrocarbons, having different boiling-points, but the same composition. IRA REMSEN.

Octa'via: sister to Augustus, Emperor of Rome. She was first married to C. Marcellus, and after his death to Mark Antony. She was a woman of remarkable beauty and great accomplishments, and her life reveals a conspicuous nobility of character. Her son, M. Marcellus, was adopted by Augustus, and it was expected that he would be his successor, but he died prematurely in 23 B. C. In 32 B. C. Octavia was divorced by Antony, but she continued to devote herself to his children, and even educated his children by Cleopatra. She died heart-broken in her fifty-fourth year in 11 B. C. Augustus pronounced the funeral oration.
Revised by G. L. H.

Octo'ber [from Lat. *Octo'ber*, originally the eighth month of the Roman year, deriv. of *oc'to*, eight]: the tenth month in the Julian and Gregorian years.

Octocoral'lia [Mod. Lat., from Gr. *ὀκτώ*, eight + *κοράλλιον*, coral]: a group of animals belonging to the SCYPHOMEDUSÆ (*q. v.*), order *Anthozoa*. They are marine polyps, the parts of which are arranged in eights. Thus there are eight feathered tentacles surrounding the mouth, while the central cavity of the body is partly divided into chambers by eight radiating partitions, which extend from the mouth region to the opposite end of the body. With very few exceptions the individuals or polyps form large assemblages or colonies, varying considerably in shape. The hard skeletal portions are of two kinds. The first, spicules of varying shape, occur in the flesh, and are the product of the middle body layer or mesoglœa. They are always present, and in dried specimens they form the bulk of the "bark" which covers the axial portion. This latter is not always present. When it occurs it is horny in character, and is frequently hardened, as in the precious coral, by the deposition of salts of lime. It arises from the outer layer or ectoderm of the body. The group, which is also known as Alcyonaria, contains about 700 species, the principal ones being arranged in four families. In the *Pennatulidæ*, or "sea-pens," there is a "root" (Fig. 1) which is buried in the mud or sand, while from the exposed portion the separate polyps, variously arranged, project. In some (e. g. *Pennatula*) the polyps occur on lateral outgrowths, so that the resemblance to a quill is strongly marked. In the *Gorgonidæ*, including the sea-fans and sea-whips, the colony is firmly fastened to some solid support, has a horny or calcareous axis, which like the colony itself may consist of simple whip-like branches, or stronger irregularly branching parts as in the red or precious coral of the Mediterranean, or lastly as in the sea-fans, of a broad flat network of interlacing branches. In the "organ-pipe corals" (*Tubiporidæ*) each polyp sits in a tubular calcareous sheath, the tubes of a colony being

FIG. 1.—*Kophoblemnon.*

united at regular intervals by horizontal platforms. In the *Alcyonidæ* (Fig. 2) or cork polyps, the sessile colonies lack any solid axis, and the polyps are inserted in tubes in a usually leathery basis. See Dana, *Zoöphytes of the United States Exploring Expedition* (1848); Kölliker, *Pennatulids of the Challenger Voyage* (1880); Wilson, *Embryology of Renilla*; and numerous papers by Verrill, Koren and Danielssen, Milne Edwards, and the older authors. J. S. KINGSLEY.

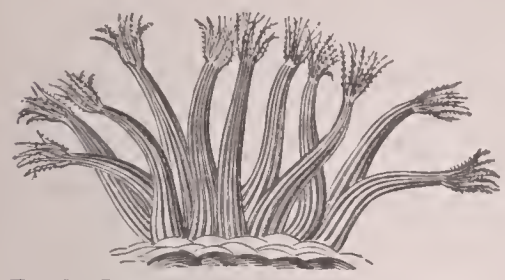


FIG. 2.—Part of a colony of *Anthelia lineata* (natural size).

Octop'oda [Mod. Lat., plur. of *Octo'pus*: Gr. ὀκτώ, eight + πούς, ποδός, foot]: a sub-order of Cephalopods or cuttlefishes, in which but eight arms (feet) are developed around the mouth; the body is sac-like, and no true shell is developed. In reproduction the peculiar HECTOCOTYLE (*q. v.*) is introduced. About fifteen genera and 100 species are known. *Octopus*, the principal genus, contains several large species, one of which, weighing in large specimens 60 lb., occurs in the Mediterranean, while an Alaskan species has a "radial spread of nearly 28 feet." The genus *Argonauta* contains the "paper-nautilus" or "paper-sailor," in which the female secretes a calcareous egg-case, which is the "shell" so familiar in cabinets. This is not a true shell, but is formed by one pair of arms of the female which are expanded and modified for the purpose. The stories about this form floating about on the surface of the ocean and raising its arms as sails to catch the breeze are now known to have no foundation in fact. J. S. KINGSLEY.

Octopus: See MOLLUSCA and OCTOPODA.

Odd Fellows, Independent Order of: a secret benevolent and benefit association which had its origin in London, England, about 1745. The earliest societies or lodges of Odd Fellows are described as assemblages mainly for social purposes, having an initiation ceremony, a collection being made to aid needy members. About the year 1800 the lodges in London and Liverpool were known as the London Order. In 1809 a member of a London lodge removed to Manchester and introduced the order into that city, where it was so favorably received that several lodges were speedily organized, and in 1814 the lodges in Manchester and vicinity were consolidated under the title of The Independent Order of Odd Fellows of the Manchester Unity. A grand lodge, composed of those who had filled the chair of noble grand (the presiding officer) a regular term in a subordinate lodge, was organized and assumed supervision of the subordinates. The London associations and other lodges throughout the kingdom refused to acknowledge the authority of the Manchester organization, and several other "Unities" sprang into existence. The Manchester adherents attained greater prosperity than any of their rivals, and the increase of lodges in Great Britain determined the Manchester authorities to organize an annual movable committee to take the place of the local grand lodge, the first meeting of which was held at Hanley, Staffordshire, May 19 and 20, 1823, and was attended by ninety-eight deputies, representing the several subordinate lodges. The early laws were crude and imperfect, and the receipts were inadequate to meet the authorized disbursements. The annual movable committee eventually established a system of rates based on the experience acquired, which enabled the subordinates to meet the relief requirements and accumulate an ample reserve fund.

The Manchester Unity, the most important body of Odd Fellows in Europe, has organized lodges in the United Kingdom, France, Turkey, Africa, North and South America, East and West Indies, and Australasia. There are many minor orders. In 1893 the Manchester Unity had 4,551 lodges, 722,725 adult and 90,057 juvenile members.

United States.—Societies or lodges of Odd Fellows were organized in New York and other cities of the U. S. as early as 1806, but had a brief existence. On Apr. 26, 1819, Thomas Wildey and four others, who had been members of Odd Fellows' lodges in England, organized a lodge in Baltimore, Md., calling it Washington Lodge No. 1. A member of a lodge at Preston, England, visited this self-instituted body in the latter part of the year 1819, and on his return to his home procured from the Duke of York Lodge of the Manchester Unity, located at Preston, a document dated Feb. 1, 1820, clothing the Baltimore organization with the powers of a grand as well as of a subordinate lodge under the title of "No. 1, Washington Lodge, the Grand Lodge of Maryland and of the United States of America." This action of a subordinate was confirmed by the grand committee of the Manchester Unity. On Feb. 22, 1821, Washington Lodge surrendered the English charter to a "body of past grands," and "the Grand Lodge of Maryland and the United States" was organized, the members of Washington Lodge receiving a subordinate charter from the new grand lodge. In 1823 the self-instituted lodges in Philadelphia, New York, and Boston were induced to recognize the Maryland organization, and that body immediately forwarded charters to the subordinates, as well as grand lodge charters for Pennsylvania, New York, and Massachusetts. On Apr. 15, 1824, it was deemed advisable to separate the powers of the national from the State organization, and the project was consummated Feb. 22, 1825, when the first meeting of the Grand Lodge of the U. S. was held. On Sept. 17, 1878, the name of the supreme body was changed to The Grand Lodge of the Independent Order of Odd Fellows, and on Sept. 18, 1879, the present title, The Sovereign Grand Lodge of the Independent Order of Odd Fellows, was adopted.

In 1826 Thomas Wildey, the presiding officer of the Grand Lodge of the U. S., known as the "grand sire," visited England and obtained from the grand committee of the Manchester Unity an independent charter, granting to the Grand Lodge of the U. S. authority "to conduct the business of Odd Fellowship without the interference of any other country, so long as the same is administered according to the principles and purity of Odd Fellowship." Intimate relations between the two grand bodies continued for several years, but in 1842, after fruitless efforts on the part of the heads of the order in Great Britain and the U. S. to reconcile, by correspondence, vital differences in the work which had arisen, James L. Ridgely, grand corresponding and recording secretary, and Isaac D. Williamson, grand chaplain of the Grand Lodge of the U. S., were commissioned as special deputies to the Manchester Unity to adjust the matters in dispute. The commissioners attended the meeting of the annual movable committee at Wigan, May 16, 1842, and after a conference continued through several days found that their efforts for harmonious co-operation were futile. The commissioners presented an elaborate report of their proceedings to the Grand Lodge of the U. S. in Sept., 1842, and that body adopted a series of resolutions on the subject. The hostilities of the Manchester Unity threatened in 1842, and consummated in 1843 by their attempt to institute lodges in the U. S., resulted in an entire severance of the existing relations.

The Objects of the Order.—The objects of Odd Fellowship are "to visit the sick, relieve the distressed, bury the dead, and educate the orphan." It seeks "to improve and elevate the character of man, imbue him with proper conceptions of his capabilities for good, enlighten his mind, enlarge the sphere of his affections, and lead him to a cultivation of the true fraternal relation designed by the great Author of his being." The motto "Friendship, Love, and Truth" was known and used in connection with the order in 1775. The organization for attaining these objects has two branches, closely connected, yet distinct—lodges and encampments.

In 1851 the ladies' degree, or degree of Rebekah, was adopted. Then only Scarlet degree members and their wives were eligible to membership; now the following are eligible to membership in a Rebekah lodge: All persons who have received the degree of Rebekah; all Odd Fellows in good standing and their wives; all unmarried white women who have attained the age of eighteen years, who believe in a Supreme, Intelligent Creator and Ruler of the Universe, and who are of good moral character. The female membership of this degree Dec. 31, 1893, was 108,732.

In 1882 a degree for Uniformed Patriarchs was adopted, and this was revised and became what is now termed "The degree of Patriarchs Militant," a military side of the encampment branch of the order. To be eligible one must be a Royal Purple degree member, in good standing in his lodge and encampment. The unit of the military organization is a "canton," which consists of at least fifteen members, called "chevaliers." The cantons are organized into battalions, regiments, brigades, and divisions. The grand sire is *ex officio* the head and commander-in-chief of the Patriarchs Militant, and his instructions are issued

through the adjutant-general and department commanders of the several jurisdictions. The grand secretary of the Sovereign Grand Lodge is adjutant-general.

Qualification for Membership.—To become a member of a lodge under the jurisdiction of the Sovereign Grand Lodge, the applicant must be a free white male of good moral character, who has arrived at the age of twenty-one years, and who believes in a Supreme Being, the Creator and Preserver of the Universe. No one but a member who has attained the third (previous to 1880, the fifth) or Scarlet degree in a lodge is eligible to membership in an encampment, and can remain a member of the encampment only so long as he continues in good standing in his lodge. This latter requirement is subject to the following exceptions: When he takes a withdrawal card from his lodge or is suspended by it for non-payment of dues, his standing in his encampment is not affected for a year thereafter, or if his lodge becomes extinct and he is aged and infirm he may still retain his membership in his encampment.

Charters for Subordinate and Grand Bodies.—Five or more members of the third or Scarlet degree holding withdrawal cards granted by legal lodges may apply for a charter for a lodge to the grand lodge of the State or Territory in which it is proposed to locate. Five or more members having the third or Royal Purple degree, and holding legal withdrawal cards, may petition the grand encampment of the State or Territory in which it is proposed to locate for a subordinate encampment. Application for a lodge in a State or Territory in which no grand lodge has been organized must be made to the Sovereign Grand Lodge, and the same rule applies to a petition for an encampment. On the petition of ten or more lodges the Sovereign Grand Lodge will issue a warrant for a grand lodge of the State, Territory, or province in which the petitioning lodges are located, or for a grand encampment on a like application by five or more subordinate encampments.

Powers of Subordinates.—A subordinate lodge is invested with the power to initiate and confer the initiatory and the three degrees on persons regularly proposed and elected residing within the district assigned to it. An encampment confers in like manner three degrees. Lodges and encampments have the power to regulate the fees for initiation, degrees, and weekly dues, and may determine the amounts to be paid for weekly benefits to sick or disabled members, funeral benefits, etc., but such amounts must not be less than the minimum prescribed by the grand body having jurisdiction.

The Sovereign Grand Lodge.—A grand lodge or grand encampment is composed of the past presiding officers of its subordinates, and the representatives of the several grand bodies constitute the Sovereign Grand Lodge. Each grand body is entitled to one representative if the membership in its jurisdiction is less than 1,000; if 1,000 or more, then to two.

Statistics.—The statistics from 1830 (previous to which they are incomplete) to Dec. 31, 1893, are as follows: Initiations, 1,947,711; members relieved, 1,809,045; widowed families relieved, 209,902; members buried, 176,320; receipts, $168,056,287.65; paid for sick and funeral benefits and the care of widows and orphans, $64,376,265.92. In 1900 the total membership of the 55 grand lodges in the U. S. and Canada was 862,723; the total membership of the order was 890,965, female members not included. The American organization is not in affiliation with the English order, the Manchester Unity of Odd Fellows, membership 900,668. The encampment branch numbers 129,564 members; Rebekah lodges, sisters 200,849, brothers 125,297; Chevaliers of the Patriarchs Militant, 15,274. Total relief paid during the year ending Dec. 31, 1899, $3,695,488.32; members relieved, 116,367; widowed families relieved, 6,212; paid for relief of members, $2,826,246.92; for widowed families, $141,646.10; for education of orphans, $50,540.55; burying the dead, $677,054.75.

The Sovereign Grand Lodge has organized grand lodges in every State and Territory of the U. S., the provinces of Canada, and independent grand lodges in the German empire, Denmark, Switzerland, and Australasia. Subordinate lodges have been organized in France, Holland, Sweden, Mexico, Cuba, Chili, Peru, Japan, and the Sandwich islands. Grand and subordinate encampments have been instituted in nearly every locality where lodges are established. Twenty-seven monthly, seven semi-monthly, and fourteen weekly periodicals are published—forty-one in the U. S., and one each in England, Germany, Denmark, Switzerland, Canada, Japan, and Australasia.

THEODORE A. ROSS.

Ode [via Fr. and Lat. from Gr. ᾠδή, song, ode, earlier ἀοιδή, deriv. of ἀείδειν, later ᾄδειν, sing]: in the modern use, a lyric piece of more dignified character than the song, and usually one in which profound feelings are expressed. The ancients originally included under this name all kinds of lyric verse. Pindar, Alcæus, Anacreon, Sappho, Simonides, and others among the Greeks, and Horace, Catullus, and others among the Romans, were writers of odes.

Revised by M. W. HUMPHREYS.

O'denheimer, WILLIAM HENRY, D. D., LL. D.: bishop; b. in Philadelphia, Pa., Aug. 11, 1817; graduated at the University of Pennsylvania 1835; took orders in the Protestant Episcopal Church 1838; became rector of St. Peter's, Philadelphia, 1840, and Bishop of New Jersey, Oct. 13, 1859. Author of *Jerusalem and Vicinity* (1855); *Origin and Compilation of the Prayer-book*; *The True Catholic no Romanist* (1842); *Thoughts on Immersion* (1843); *The Young Churchman Catechized*, i., ii. (1844); *The Devout Churchman's Companion*; *Private Prayer-book* (1851); *Bishop White's Opinions*; *Ringleburgius on Study*; with Rev. F. M. Bird prepared a collection of poems on the Holy Spirit; sermons, addresses, charges, etc. D. at Burlington, N. J., Aug. 14, 1879.

Revised by W. S. PERRY.

O'dense: town of Denmark; capital of the island of Fünen (see map of Norway and Sweden, ref. 14–C). It is an old and prosperous city, with good educational institutions and an active trade. It has a castle and a Gothic cathedral built 1086–1301, and is the seat of a Protestant bishopric. Several large sugar-refineries and iron-foundries are in operation. Pop. (1890) 30,277.

O'denwald, ō'den-văalt: a mountain region of Germany, occupying the southern part of Hesse-Darmstadt, and extending for a distance of about 45 miles from the Neckar, which to the S. separates it from the Black Forest, to the Main, which to the N. separates it from the Spessart Mountains. Its western declivities toward the plain of the Rhine are abrupt, but to the N. it slopes down through several terraces, and to the S. E. it gradually disappears in the level plains. Its highest peaks rise to about 2,000 feet. The mountains are covered with pine, oak, and beech, and the valleys with orchards and vineyards.

O'der: a river of Germany. It rises in Moravia at an elevation of 1,950 feet above the sea, enters Prussian Silesia, where it becomes navigable at Ratibor, traverses the provinces of Brandenburg and Pomerania, and, after a course of 550 miles, empties through the Stettiner Haff into the Baltic. Its navigation is difficult, and along its lower course expensive embankments are required to protect the surrounding country against inundation.

Odes'sa: fortified town and seaport of South Russia; in the government of Kherson; 46° 29′ N. lat. and 30° 41′ E. lon.; on a bay of the Black Sea, midway between the mouths of the Dnieper and Dniester (see map of Russia, ref. 13–C). When ceded by the Ottomans at the Treaty of Yassy (1791), its site was occupied by a miserable Tartar village called Hadji Bey. It is now in population and commerce the fourth city in Russia—surpassed only by St. Petersburg, Moscow, and Warsaw—and the most important port on the Black Sea, communicating by regular steamship lines with the chief ports of Europe. Founded in 1794 by Catherine II., it rapidly increased under its sagacious governor, the Duc de Richelieu (1803–15). In consequence of an insult to the British colors it was bombarded (Apr. 22, 1854) by the allied Anglo-French fleet, when the buildings nearest the water were destroyed. Alexander I. in 1817 declared it a free port for thirty years. The bay of Odessa is exposed to violent east winds, has a soft bottom, and is shallow in many places; hence the spacious modern double harbor, capable of accommodating 350 vessels, is largely artificial, and protected by long moles; it is frozen up part of the year. The summers are hot, with little rainfalls—the clouds of white dust are almost intolerable—and the winters are long and severe. The city stands on a plateau or succession of cliffs nearly 200 feet high, with a narrow belt of shore, occupied by barracks, bathing establishments, and shipping houses. Along the edge of the plateau runs an elegant boulevard, planted with trees and lined with palatial residences. Communication with the beach is afforded by a magnificent flight of stone steps. The city is well built and has broad, straight streets. In the environs are villas and orchards, beyond which stretches a barren steppe. It has many benevolent institutions, and is a great educational

center; has a university (formerly Richelieu Lyceum) with rich museum, observatory, and library. It is the headquarters of the Eighth Army-corps. The Bishop of Kherson and the governor of the province reside here. There are numerous breweries and manufactories, as of cordage, sailcloth, soap, and candles, but Odessa is specially important as the southern outlet for grain, which constitutes the greater part of the entire exports, valued (1891) at $62,391,100. The imports, principally raw cotton (1891), were valued at $15,747,730. Pop. (1897) 404,651, the majority Russians, but there are many Jews, Greeks, Armenians, Italians, Germans, Roumanians, and Tartars; also a considerable number of British residents. E. A. Grosvenor.

Odic Force [Germ.; cf. Gr. *ὁδός*, way, passage]: a term originally applied by Reichenbach to a peculiar iridescence which some people could see about the arms of a magnet. It was afterward the name for a mysterious force supposed to be transmitted from a hypnotist. (See Hypnotism.) It has received the synonym *psychic force* from Crookes, who performed several startling experiments with Home, the spiritualist, Sergeant Coxe, and others, which he asserted were due to its action.

Odin: in Scandinavian mythology, the father of gods and men. As such he is styled Alfather. He has a great number of names, one of which is Valfather—that is, "the father of the slain," since those who fall in battle go to his great hall, called Valhal—that is, "the hall of the slain." War is called Odin's amusement. The sword is called Odin's fire. He is one of the wisest of gods. He is described as a tall, long-bearded, one-eyed old man. In the dawn of time he pawned one eye for a drink of Mimer's fountain of wisdom beneath Ygdrasil. From his high seat Hlidskjalf he looks out upon all the world and sees all that is going on. On his eight-footed horse Sleipner he rides through the air and upon the waters, clad in his blue cloak and golden helmet, and wielding his spear Gungner. He needs no food. He lives on mead; the food set before him he gives to his two wolves, Gere and Freke. Two ravens, Hugin (thought) and Munin (memory), sit upon his shoulders and tell him all that they see and hear. At dawn he sends them out to gather news and they return to him in the evening. His servant is Hermod, the swift messenger. He possesses the gold ring Draupner, from which eight other rings of the same weight as the original drop every ninth night. Both the spear Gungner and the ring Draupner were made for him by the dwarfs. Odin invented the runes, the old Scandinavian alphabet. From the giant Suttung he secures, after a desperate struggle, the skaldic mead, which the giant kept concealed in a mountain cavern. Hence poetry is called Odin's drink, or the drink of the asas. Odin is found in all Teutonic countries, and by the name Vâta he can be traced back to India. The Anglo-Saxons and Old High Germans called him Wodan. In the Scandinavian tongues the *w* is dropped, hence Old Norse Óðinn. The Latin writers usually replace this divinity with the Roman Mercury, hence *dies Mercurii*, the fourth day in the week, became in Old Norse Óðins-dagr, in Dan. Onsday, in Anglo-Saxon Wodansdäg, in English Wednesday, etc. Odin was the progenitor of kings, and the greatest families, the Ynglings in Sweden, the Skjoldungs in Denmark, and the Hallygians in Norway, traced their pedigrees back to him. See Scandinavian Mythology and bibliography under the same. Rasmus B. Anderson.

Odoa'cer: King of Italy from 476 to 493 A. D.; descended from some one of the Germanic tribes along the Danube. At about the age of thirty he entered the service of the West Roman empire, and held a high position in the imperial guard when (in 475) Orestes, commander-in-chief of the army, deposed the emperor, Julius Nepos, and placed his own son, Romulus Augustulus, on the throne. The army, consisting of barbarian mercenaries, now demanded of Orestes that one-third of the soil of Italy should be given up to them for permanent settlement; and when Orestes refused, the soldiers chose Odoacer for their leader, and a war broke out which ended with the defeat and death of Orestes and the abdication and banishment of Romulus (Aug., 476). This date is assumed as marking the fall of the Western empire, for Odoacer did not assume the title of emperor, but that of King of Italy. He was acknowledged by Zeno, the Byzantine emperor, took up his residence at Ravenna, and governed with energy and moderation. For several years Italy enjoyed peace. The laws and institutions were maintained, the Church was respected, and several campaigns in Dalmatia and Noricum were successfully carried through. Meanwhile Theodoric, the King of the Ostrogoths, crossed the Alps, instigated and perhaps supported by Zeno, and in three great battles Odoacer was defeated, and finally shut up in Ravenna. Here he held out for more than two years, but capitulated on the condition that he and Theodoric should rule as joint kings. The agreement was confirmed by a solemn oath, but a few days afterward Theodoric put Odoacer to death, Mar. 5, 493. See Pallmann, *Geschichte der Völkerwanderung*.

Revised by G. L. Hendrickson.

Odobæ'nidæ: a family of mammals belonging to the order *Pinnipedia*, containing the walruses and related to the families *Phocidæ*, or true seals, and *Otariidæ*, or eared seals. The form is peculiar, but resembles that of the *Phocidæ* more than that of the *Otariidæ*; the hinder legs are flexible forward; no external ears are developed; the skull is oblong and truncated in front; the dentition is very peculiar, the canine teeth of the upper jaw being enormously developed and specialized as tusks, while those of the lower jaw are atrophied; the incisors, except the external of the upper jaw, are early lost; the molar teeth are $\frac{4}{4}$, but the posterior are generally cast in the adult; the anterior limbs are about as large as the posterior; in the anterior feet the toes decrease in a curved line, and are destitute of claws; in the posterior feet the five digits scarcely increase toward the inner, and all are provided with claws; the skin is very thick. The family is represented by the walruses or morses (see Walrus), which are found only in the high northern seas.

Revised by F. A. Lucas.

Odom'eter, or, more correctly, **Hodom'eter** [Gr. *ὁδός*, way, journey + *μέτρον*, measure]: an instrument by means of which the distance traveled by a carriage or other vehicle, or even a person walking, is registered. In the case of a carriage it is usually a train of wheelwork attached to the axle and one of the wheels of the carriage. It registers the number of revolutions of the wheel by moving an index on a dial. A similar instrument, called a cyclometer, can be attached to a bicycle or a tricycle. The name pedometer is usually given to an instrument for measuring walking distances. The mechanism depends upon the relative movement of a comparatively heavy suspended body accompanying each step. Thus the number of steps is measured, and the user must find the distance he walks in a given number of steps before he can interpret the reading of the instrument as applied to his own case.

Odona'ta [Mod. Lat., from Gr. *ὀδούς*, *ὀδόντος*, a tooth, in allusion to the long teeth on the labium]: that order of insects which includes the dragon-flies. (See Entomology.) These are insects which pass through an incomplete metamorphosis, which have strong biting jaws, and which have four membranous net-veined wings, the hinder pair about equaling the others in size. The dragon-flies lay their eggs in the water, and from these hatch out active, rapacious larvæ, remarkable for the peculiar apparatus (mask) which they have for seizing their food. The lower lip (labium), when not in use, is folded beneath the mouth, but on the approach of some other insect it can be extended some distance beyond the head, so that the sharp jaws which it bears can grasp the prey. With growth there are repeated moults, and gradually the wings appear as small outgrowths on the back. At last the larva or nymph climbs some reed, the skin splits down the back, and from the opening the adult dragon-fly appears. The adults prey upon insects and are of especial value in destroying mosquitoes. The numerous superstitions connected with these forms are without foundation. For American species, see Hagen, *Proceedings of the Boston Society of Natural History*, xviii. (1875).

J. S. Kingsley.

O'Don'nell, Leopold, Marshal, Duke of Tetuan, Count of Lucena: soldier; b. Jan. 12, 1809, at Santa Cruz in Teneriffe; entered the Spanish army; became a colonel, and for his services against the Carlists at Lucena (1839) was made a grandee and lieutenant-general. In 1840 he sided with the queen-mother and went to France, where he intrigued against his former ally, Espartero. In 1843, after the latter's fall, O'Donnell was made captain-general of Cuba, where he became moderately wealthy. In 1854 he became Espartero's war minister; succeeded him as prime minister in 1856, and was several times afterward a member of the cabinet. In 1859–60 he commanded in Morocco; captured Tetuan Feb. 6, 1860; retired from public life in July, 1866. D. at Bayonne, Nov. 5, 1867.

O'Donojú, ō-don-ō-hoo', Juan: last Spanish viceroy of New Spain (Mexico); b. about 1755. He attained the rank of lieutenant-general in the army, and had held high civil positions in the Peninsula when, in 1821, he was appointed captain-general and acting viceroy of New Spain. On his arrival at Vera Cruz he found that the revolution, led by Iturbide, had acquired such strength that his own authority was practically nullified. O'Donojú himself held liberal opinions, and under the circumstances he was convinced that the only sensible course was to treat with the insurgents. On Aug. 23 he met Iturbide at Córdoba and signed a treaty by which Mexico was recognized as an independent empire, and it was agreed to invite one of the Spanish Bourbon princes to reign over it; Mexico city was surrendered to the revolutionists. Pending advices from Spain, O'Donojú was elected one of the provisional regents. He died in Mexico, Oct. 8, 1821, before he could learn of the scornful nullification of his treaty by the Spanish Cortes. H. H. S.

Odontoglos'sæ [Mod. Lat.; Gr. *ὀδούς, ὀδόντος*, tooth + *γλῶσσα*, tongue]: a term applied by Nitzsch to an order of birds comprising the flamingoes only, on account of the tooth-like projections bordering the tongue. It is the equivalent of the *Amphimorphæ* of Huxley. F. A. L.

Odon'tophore: the rasping tongue of cephalopod and gasteropod Mollusca (*q. v.*).

Odontor'nithes [Mod. Lat.; Gr. *ὀδούς, ὀδόντος*, tooth + *ὄρνις* (plur. *ὄρνιθες*), bird]: a name applied by Prof. Marsh to a sub-class of birds containing all those provided with teeth. These are all fossil forms, as Ichthyornis and Hesperornis (*q. v.*), which so far have been found in the Jurassic and Cretaceous strata. F. A. L.

O'Dwyer, Joseph, M. D., LL. D.: pædiatrist; b. in Summit co., O., Oct. 12, 1841; graduated M. D. from College of Physicians and Surgeons, New York, in 1866; devoted himself to diseases of children, and invented the method of treating croup and diphtheria by intubation; received degree of LL. D. from St. John's College, Fordham. S. T. A.

Odyniec, od-in'yets, Antoni Edward: author; b. at Giejstuny, Poland; was educated by Basilian priests at Boruny; studied literature at the University of Wilna; published two volumes of his poems, *Poezye* (Wilna, 1825–26). At Warsaw, where he resided in 1826–29, he published two volumes of the almanac *Melitele* (1829, 1830; 3d vol. Leipzig, 1836), which contained contributions from the foremost poets of the romantic school, and a drama in verse, *Izora* (1829). In 1829, with his intimate friend Mickiewicz, he traveled in other parts of Europe; alone he visited Paris and London; in 1831–37 lived at Dresden. During his stay in foreign lands he wrote excellent translations from Byron, Moore, Walter Scott, and others (Leipzig, 1838–43, Wilna, and Warsaw, 1874, in 4 vols.). At the same time he was a regular contributor to a number of journals. In 1837 he returned to Lithuania, and for two years was editor-in-chief of a universal encyclopædia, *Encyklopedya powszechna* (Wilna and Warsaw). At Wilna he was for twenty years political editor of the *Kuryer Wileński*. His collected poems appeared at Wilna, in 1859, as *Poezye Ant. Edw. Odyńca* (3d ed. Warsaw, 1874). His dramas, *Felicita* (Wilna, 1849, Poznań, 1858), *Barbara Radziwiłówna* (Wilna, 1858), and *Jerzy Lubomirski* (Wilna, 1861), are more lyrical than dramatic. In 1865 he removed to Warsaw where, in the *Kronika Rodzinna*, he published a series of masterly letters, *Listy z podróży* (Letters of Travel; separate ed. Warsaw, 1875–78), descriptive of his travels with Mickiewicz, which mark him as the greatest Polish letter-writer. D. at Warsaw, Jan. 15, 1885. J. J. Král.

Odys'seus (in Gr. *Ὀδυσσεύς*, in Lat. *Ulixes*): King of Ithaea, son of Laertes and Anticlea, a daughter of Autolycus. The name means *the hater*, and was interpreted in various ways (cf. *Od.* 19, 400–412, and 1, 62 ff.). He won as his wife Penelope, the daughter of Icarius of Sparta, in return for suggesting to Tyndareus the oath taken by the suitors of Helen (*q. v.*). When his son Telemachus was a babe, Odysseus was prevailed upon by a ruse of Palamedes and Nestor to join the expedition against Troy, whither he sailed with twelve ships. At Troy he was distinguished for bravery, pertinacity, eloquence, and cunning. He therefore took part in expeditions that required a spy's cool and skillful work. The arms of Achilles were awarded to him after that hero's death, a fact which drove Ajax mad. At the close of the Trojan war he was driven by the ill-will of Poseidon to various parts of the world. The story of his return is told by Homer in the *Odyssey*. Finally, after ten years' wanderings and twenty years' absence from home, he reached Ithaea in safety, and with the help of his son Telemachus and a few faithful servants he slew the suitors of Penelope. In works of art he is usually recognized by his conical sailor's cap. See the article *Odysseus* in Baumeister's *Denkmäler*. J. R. S. Sterrett.

Œcolampa'dius, Johannes, whose true name was Hans Hussgen: theologian; b. at Weinsberg, Suabia, in 1482; studied first jurisprudence at Bologna, then theology at Heidelberg, subsequently Greek under Reuchlin at Stuttgart, where he also learned Hebrew from a baptized Spanish Jew, and received an appointment as preacher in 1516 at Basel, where he assisted Erasmus in his edition of the Greek New Testament. Luther's writings made a very deep impression on him. In 1518 he became preacher in the principal church of Augsburg; from 1520 to 1522 was an inmate of the convent of Altenmünster, near Augsburg. In 1522 he returned to Basel as preacher and Professor in Theology, and after the disputations at Baden (1526) and Bern (1528) he succeeded in introducing the Reformation in Basel and Ulm. In the controversy between Luther and Zwingli concerning the Lord's Supper he gradually adopted the views of Zwingli, which he maintained in his *De genuina verborum Domini, "Hoc est corpus meum," Expositione* (1525), and in his disputation with Luther at Marburg in 1529. His gentleness of character procured for him the name of the "Swiss Melanchthon." D. at Basel, Nov. 24, 1531. Besides the above-mentioned dissertation he wrote *De ritu paschali*; *Epistola canonicorum indoctorum ad Eccium*, and several commentaries and introductions to the books of the Old Testament. There are biographies of him by Hess (Zurich, 1791), Herzog (Basel, 1843, 2 vols.), and Hagenbach (Elberfeld, 1859). Revised by S. M. Jackson.

Œcumenical Councils: See Councils, Œcumenical.

Œde'ma [Mod. Lat., from Gr. *οἴδημα*, swelling, tumor, deriv. of *οἰδεῖν*, swell]: in pathology, a condition in which a tissue or organ is puffed or swollen with fluid exuded from the blood. It is most frequent in the loose tissues under the skin, and here constitutes the condition called "dropsy." When widespread throughout the organism, the name anasarca is applied. Œdema may be caused by obstruction to the circulation, causing distension of the veins and capillaries; it may be due to a watery condition of the blood, or to changes in the blood-vessels. Where stasis of the blood in the veins is at fault a cyanotic hue of the skin is noted, while in cases due to watery blood or diseases of the blood-vessels the skin may be wholly normal in appearance.

Œdema of the glottis is a condition in which the epiglottis and tissues of the larynx are inflamed and œdematous. It occasions great obstruction to breathing, and, unless relieved promptly, will cause death by suffocation.

Œdema of the lungs is often the immediate cause of death in heart disease, Bright's disease, and other chronic affections. William Pepper.

Oe'denburg (Hung. *Soprony*): town of Western Hungary; near the Lake of Neusiedl; 37 miles S. E. of Vienna, with which it communicates by railway (see map of Austria-Hungary, ref. 5–F). It is a prosperous and handsomely built town, with a large trade in wheat, wine, and cattle, and manufactures of sugar and soap. Its old fortifications have been demolished, with the exception of a huge watch-tower, the highest in Hungary; remains of the Roman time are also found. Pop. (1890) 29,543.

Œd'ipus [= Lat. = Gr. *Οἰδίπους*]: in Grecian mythology, a son of Laius, King of Thebes, and Jocasta, who was exposed by his father on account of an ill-boding oracle, but was saved by a shepherd and brought to Corinth. Misunderstanding another oracle, he left Corinth and went to Thebes. On the way he slew his father unawares and at Thebes married his mother. She bore him two sons, Eteocles and Polynices, and two daughters, Antigone and Ismene; but the hidden horrors of his life were subsequently revealed to him. Jocasta hanged herself; between Eteocles and Polynices there was a deathly hatred, and they slew each other; Œdipus put out his own eyes and wandered blind, guided by Antigone, from Thebes to Colonus in Attica, where he died in the grove of the Eumenides. The legends of Œdipus, of which the two baneful oracles and his meeting with the Sphinx, whose enigma he unriddled, form the mystical but singularly suggestive center, were often treated by the Attic tragedians, and there still exist

two tragedies on this subject by Sophocles, *King Œdipus* and *Œdipus at Colonus*. See the article *Oidipus* in Baumeister's *Denkmäler*. J. R. S. STERRETT.

Œhlenschläger, ö'len-shlā-ger, ADAM GOTTLOB: poet; b. in Frederiksberg, a suburb of Copenhagen, Denmark, Nov. 14, 1779. His parents, who were of German extraction, were in moderate circumstances, and until his twelfth year the future poet received no regular instruction. At that time he attracted the attention of Edvard Storm, by whom he was placed in school, where he remained four years. On his leaving school it was at first determined that he should become a tradesman, then he began to prepare for the university, and finally appeared on the stage with but slight success. In 1800, with the assistance of the brothers Oersted, he entered the university as a student of law, but his natural love for poetry made his professional studies distasteful to him. In 1802, after a sixteen hours' conversation with the Norwegian critic Steffens, who had returned from Germany filled with the ideas of the new romantic school, he came to a full realization of what poetry was for him. In the symbolical poem *Guldhornene*, the motive of which was taken from the theft of the Old Norse gold horns from the museum in Copenhagen, he made the declaration of his poetic faith. His legal studies were relinquished and a collection of poems in his early style, already in the printer's hands, was destroyed and other poems written hastily in their place, among these *Sanct Hansaften-Spil*. This new poetic departure roused much opposition among the members of the old school, and stamped Œhlenschläger as the undisputed leader of romanticism in Denmark. In 1805 he received a Government stipend and spent the succeeding four years in travel. Six months were spent in Halle with Steffens, three in Weimar in intimate companionship with Goethe, and a year and a half in Paris, where he was little influenced by the life about him. In Switzerland he visited Madame de Staël, at whose home he met many of the leading writers of the day. Soon after his return to Copenhagen he was appointed Professor of Æsthetics at the university, a position for which he was not specially fitted. During this period Œhlenschläger's popularity was enormous, one of his warmest admirers being Baggesen, but on the latter's return to Copenhagen in 1813 the relations of the two poets became strained. Œhlenschläger was painfully lacking in self-criticism, and this induced him to publish many works that were wholly unworthy of his genius. Baggesen's unfavorable criticisms of these angered their author and his friends. Twelve of the latter, among them Paul Möller and Hauch, formed themselves into a bodyguard called *Tylvten*, and challenged Baggesen in Latin to defend his position. To this Grundtvig and others replied, and the controversy continued until 1819, to be renewed later by Johan L. Heiberg. The criticism of the latter is of real value, distinguishing clearly the faults and virtues of Œhlenschläger, his wonderful richness of vocabulary, his lack of dramatic instinct, the epic-lyric character of his works, and their genuine nationality. It was this latter quality that induced Tegnér in the summer of 1829 to crown Œhlenschläger in the Cathedral of Lund as the northern king of singers. His position in Danish literature is best shown by the fact that his statue shares with Holberg's the place of honor before the National theater. Among his works may be mentioned *Poetiske Skrifter* (2 vols., 1805); *Hakon Jarl* (1807); *Baldur hiin gode* (1807); *Palnatoke* (1809); *Axel og Valborg* (1810); *Correggio* (1811); *Hagbarth og Signe* (1815); *Nordens Guder* (1819); *Dronning Margreta* (1833); *Dina* (1842). D. Jan. 20, 1850. See *Œhlenschlägers poetiske Skrifter, udg. af. F. L. Liebenberg* (32 vols., Copenhagen, 1857–62); *Erindringer* (4 vols., Copenhagen, 1850–51). D. K. DODGE.

Oehler, GUSTAV FRIEDRICH, von, D. D.: theologian; b. at Ebingen, Würtemberg, June 10, 1812; educated at Tübingen, where he became Professor of Old Testament Theology 1852, and where he died Feb. 19, 1872. He was orthodox, conservative, yet progressive. His fame rests upon his *Old Testament Theology*, a posthumous work, made up from his lectures by his son (2 vols., Tübingen, 1873–74; 2d ed. 1882; English trans., 2 vols., Edinburgh, 1874–75; revised by Prof. G. E. Day, New York, 1883). It is the leading book in this department, though many prefer the more modern, H. Schultz (1892). His *Lehrbuch der Symbolik*, edited by Johann Delitzsch, appeared in Tübingen 1876 (2d ed., by T. Hermann, Stuttgart, 1891). See his *Life*, by Josef Knapp (Tübingen, 1876). S. M. JACKSON.

Œnan'thic Ether [*œnanthic* is from Gr. *οἰνάνθη*, the first shoot of the vine, vine blossom; *οἴνη*, the vine + *ἄνθη*, bloom]: a name given by Liebig and Pelouze to a substance existing in all wines, giving them their characteristic odor. It remains behind as an oily liquid when large quantities of wine are distilled; obtained in larger quantities by distilling winelees after mixing with half their bulk of water. It consists essentially of capric, caprylic, and a very little butyric acids, partly free, mostly in the form of ethereal salts of isoamyl and ethyl alcohols. A solid substance called œnanthic ether is manufactured in Bavaria and used for flavoring inferior wines. Revised by IRA REMSEN.

Œnop'ides (in Gr. *Οἰνοπίδης*): a Grecian astronomer and philosopher of Chios, who is commonly supposed to have been a contemporary of Anaxagoras; is named among the Greeks who visited Egypt and became acquainted with the learning of the Egyptians; is said to have claimed the discovery of the obliquity of the ecliptic; invented a cycle for bringing into agreement the solar and lunar year, which invention he inscribed on a brazen tablet and set up at Olympia. He proposed also a theory of the rise and fall of the waters of the Nile, and an explanation of the Milky Way as the original pathway of the sun.
Revised by J. R. S. STERRETT.

Œnothera: See PRIMROSE.

Oersted, ör'sted, ANDERS SANDOE: the greatest of Danish jurists; b. in Rudkjöbing, Denmark, Dec. 21, 1778; brother of Hans Christian Oersted. In 1810 he became a judge of the Supreme Court, a position which he held only three years. He occupied various positions in the king's cabinet and in the Diet, and in 1853 he became Prime Minister of Denmark. Oersted's chief fame rests on his services to Danish jurisprudence, which in its present condition may be regarded as the result of his labors. He was a man of remarkable industry, learning, and clear insight, and all these he brought to bear on a thorough revision of the system of jurisprudence. Among his most important works are *Haandbog over den danske og norske Lovkyndighed*, a manual of Danish and Norwegian jurisprudence (6 vols., 1822–33), and *Eunomia* (4 vols., 1815–22). His last work was *The History of my Life and Times* (Af mit Livs og min Tids Historie, 4 vols., 1851–57). His contributions to the periodical literature of his time are very numerous. D. May 1, 1860.
RASMUS B. ANDERSON.

Oersted, HANS CHRISTIAN: physicist; b. at Rudkjöbing, in the Danish island of Langeland, Aug. 14, 1777. His father was an apothecary, and in the shop he made his first studies and experiments. In 1794 he entered the University of Copenhagen. In 1799 he took the degree of doctor of philosophy, after presenting a thesis entitled *Architectonics of Natural Metaphysics*. After traveling from 1801 to 1803 in Holland, Germany, and France, he was appointed Extraordinary Professor in Natural Philosophy at the University of Copenhagen in 1806, and his lectures soon attracted attention on account of their popular form and their enthusiasm. To awaken the interest of his countrymen for the study of nature was the aim of his life, and he succeeded in establishing a polytechnic school in Copenhagen, of which he was director from 1829, and in introducing natural science as an element of instruction in the Latin schools. During a scientific journey in Germany in 1812 and 1813 he wrote an essay on the identity of chemical and electrical forces, in which he for the first time shadowed forth his ideas of the unity of electricity and magnetism which he had entertained since 1800, but his great discovery on this point was not made until 1819, and was communicated to the world in a little pamphlet in 1820, *Experimenta circa efficaciam conflictus electrici in acum magneticam*. The discovery was immediately accepted, and honors were showered on the discoverer. His other writings comprise a large number of minor essays, most of which were translated into German, and two larger works, *Naturlärens mechaniske Deel* (Manual of Mechanical Physics) and *Aanden i Naturen*, which has been translated into English by Miss Horner under the title *The Soul in Nature*. The Danes are very proud of Oersted's name. There are two monuments in his honor in Copenhagen, and Oersted Park is named for him. D. in Copenhagen, Mar. 9, 1851.

Oertel, JOHANNES ADAM: See the Appendix.

Oertel, ör'tel, MAX JOSEPH, M. D.: physician; b. at Dillingen, Bavaria, Mar. 20, 1835; studied medicine in the University of Munich, graduating M. D. in 1863; was assistant

at Pfeuffer's clinic for four years, subsequently studying laryngology with Czermak. He paid special attention to diseases of the heart and lungs, and invented a system of graduated exercise in hill-climbing for the treatment of certain respiratory and circulatory disturbances. In 1876 he was made professor extraordinary in the Munich university. He contributed several monographs to von Ziemssen's *Cyclopædia of Practice and of Therapeutics*. Other important works are *Ueber Terrain-Curorte* (Leipzig, 1886); *Die Pathogenese der epidemischen Diphtherie* (Leipzig, 1887). D. in Munich, July 19, 1897. S. T. ARMSTRONG.

Oe'sel: an island in the Baltic, belonging to the government of Livonia, Russia. Area, 1,000 sq. miles. Pop. 53,120. Wheat, rye, oats, and barley are raised, cattle, sheep, and horses are reared, and considerable fishing is carried on. It was governed by the Teutonic Knights for a long period; passed into the possession of Denmark in 1559; was ceded to Sweden in 1645, and finally ceded to Russia in 1721. The population is principally Esthonian.

Œsoph'agus [Lat. = Gr. *οἰσοφάγος*; *οἰσο-* etym. obscure, commonly but probably erroneously connected with *οἴσω*, the fut. of *φέρειν*, bear + *φαγεῖν*, to eat]: the gullet, that part of the alimentary canal that leads from the pharynx to the stomach. In the adult man it is 9 inches long, extending in a nearly vertical line from the fifth cervical vertebra through the posterior mediastinum and through the œsophageal foramen of the diaphragm, ending in the cardiac orifice of the stomach. It has an outer or muscular coat, containing an outer layer of longitudinal muscle-fibers, and another of similar annular fibers, the upper fibers being chiefly striped and partly voluntary in the upper parts, but entirely involuntary and non-striated in the lower portion. The middle or cellular coat abounds in glands which open by long ducts. The innermost or mucous coat is lined by scaly epithelium. In caliber the œsophagus is the smallest part of the alimentary tube. In the lower animals the œsophagus has several modifications, the most remarkable of which is that singular dilatation which is called the *crop*, and which is observable in gallinaceous and vulturine birds, etc. Most articulate and many molluscous organisms have also a so-called œsophagus. See HISTOLOGY (*The Digestive Organs*).

Ofan'to: a river of Southern Italy, called by the ancients *Aufidus*. It rises 6 miles E. of Monte Marano, enters the Adriatic 4 miles N. W. of Barletta, after a course of 75 miles. The battle of Cannæ was fought on its right bank near its mouth.

Of'fa: King of Mercia; reigned in the latter half of the eighth century; greatly extended the boundaries of his kingdom, but is especially famous as the builder of the so-called Offa's dike, which for several centuries was the boundary between England and Wales. He established an undisputed suzerainty over the Heptarchy; murdered Ethelbert, King of East Anglia, and took possession of his kingdom 792; founded the abbey of St. Albans; drew up a code of laws. D. in 796.

Offenbach, *ō'fen-bäk'h*: town; in the grand duchy of Hesse-Darmstadt, Germany; on the Main; 5 miles S. E. of Frankfort (see map of German Empire, ref. 5–D). It has extensive manufactures of carriages, musical instruments, jewelry, carpets, hosiery, paper, tobacco, and pipes. Pop. (1890) 35,064.

Offenbach, JACQUES: composer; b. at Cologne, Germany, June 21, 1819, of Jewish parentage; studied from 1835 to 1837 at the Conservatory of Paris; played afterward the violoncello in the orchestra of the Théâtre Comique; became in 1847 leader of the orchestra of the Théâtre Français; established in 1855 the Bouffes-Parisiens, and composed a great number of burlesque operas and scenes, of which *La Fille de Madame Angot*, *Barbe bleue*, *Orphée aux Enfers*, *La Belle Hélène*, and *La Grande Duchesse* were the most applauded. D. in Paris, Oct. 4, 1880.

Office Found: See INQUEST OF OFFICE.

Offices and Officers [from Lat. *offi'cium*, performance, service, duty, official duty; *opus* or *ops*, work, toil + *facere*, do; cf. *officī'na*, workshop. Derivation from *ob* + *facere* is unlikely, as *officere* has the sense of to hinder]: in general, a public office is understood to be a right or a duty conferred or imposed by law on one or more persons to act in the execution and application of the law; while officers are those persons upon whom an office has been conferred or imposed. It is necessary to distinguish carefully between office and employment. For as the government may enter into both public legal and private legal relations, it may have both officers and employees. The term officer is a term of the public law; the term employee is a term of the private law. It has been said that the former "embraces the idea of tenure, duration, emolument, and duties." (*United States* vs. *Hartwell*, 6 Wallace 385.) An office finds its sources and its limitations in some provision of public law; an employment is based upon a contract. An office not being a contract, it is held that it may be terminated at any time, and that the salary, if any, attached to it may be diminished during its term without violating the provisions of the Federal Constitution, preventing a State from impairing the obligation of a contract. (*Butler* vs. *Pennsylvania*, 10 Howard 402.) Where, however, a salary has been attached to an office, it is held that if the salary has been earned it becomes a claim against the Government in the nature of a contract which may be enforced by suit against the Government where the Government may be sued, and may not be diminished in amount even by a State Legislature. (*Fisk* vs. *Police Jury*, 116 United States 131.) This fact that an office finds its sources and limitations in the public rather than the private law has a great influence over all contests which may arise relative to the duties and to the rights of officials, the courts holding very strictly to the rule that the provisions of the private law are not to be applied to this public legal relation. *Fitzsimmons* vs. *Brooklyn*, 102 New York 536; *Andrews* vs. *Portland*, 79 Maine 484.

Offices differ in the way in which they are organized. Thus an authority may consist of one person or more than one person. The first method is known as the single-headed system; the second is usually called the board system. Each of these methods of organizing offices has its advantages. The single-headed system is generally chosen for all offices whose duties require energy, rapidity of action, and a well-defined responsibility; the board system for all branches in which carefulness of deliberation and impartiality of decision are necessary. The former method of organizing offices is therefore usually chosen for all executive and administrative offices; the latter for judicial offices.

Officers, like offices, may be variously classified. In many states there is an important distinction between professional and honorary offices. The first are those who devote their entire time to the discharge of their duties; the latter are those who merely employ a part of their time in the discharge of public functions, relying on some other occupation as the means of their livelihood, and generally having short terms and receiving no or a very small salary. A system of administration relying mainly upon these honorary officers is called a self-government system, while a system relying upon professional officers is known as a bureaucratic system. In the U. S. the rule is that the administrative organization is based upon the self-government system, while upon the continent of Europe the organization is usually bureaucratic. At the same time, in certain branches of administration in the U. S., e. g. in the municipal administration, the bureaucratic system is being adopted on account of its greater efficiency, and, notwithstanding the fact that salaries are paid, its greater economy. It has, however, the disadvantage of preventing the people as a whole from accustoming themselves to the discharge of public duties and of fostering the development of an official class which has the monopoly of government.

The official relation is usually formed in either one of two ways, by election by the people or by appointment by some governmental authority. Originally the method of filling offices in the U. S. was by an executive appointment, the only exception being found in the case of the purely local, such as the town offices; but as a result of the partisan use of the power of appointment, and as a result of the increasingly democratic character of the people throughout the States, the method of election grew more popular, and most of the important offices are filled by popular election. In the Federal Government, which was formed before this democratic spirit had so fully developed, the Constitution provides that most of the offices shall be filled by appointment. The tendency, however, in the U. S. would seem to be toward the adoption of the appointive system. This tendency is particularly marked in the cities where the application of the principle of popular election of all important officers had led to a diffusion of responsibility and to inefficient administration. Originally in the English and U. S. system of administration acceptance of office was regarded as oblig-

atory, and we find cases in the early English reports where those persons who have refused to accept office have been indicted, and also where they have been forced by the courts to assume the burdens of the office; the duty to serve as officer of the Government being regarded just as obligatory as the present duty to serve upon the jury. In the course of the nineteenth century, however, this obligation to serve as officer has been in many cases abolished, and to fill the various Government offices reliance is placed upon the well-known desire of most persons to serve in official capacities.

The law generally provides certain qualifications for office; the power to hold office being regarded not as a right belonging to every individual, but as a privilege which is granted only to those who are qualified to perform official duties. These qualifications differ somewhat in the case of elective and appointive offices, being more stringent in the case of the latter than in the case of the former. For elective offices the qualifications consist usually in the possession of citizenship or the right to vote, the attainment of a certain age, and the possession of good character; to the majority of offices men only are eligible. In the case of purely local offices residence in the locality in which the duties of the office are to be performed, or some equivalent therefor, is generally required, while in some cases the possession of real property or the payment of a certain amount of taxes is required. In the case of appointive offices, in addition to these requirements, the law often provides quite stringent requirements, which are to insure the possession by the incumbent of the office of the necessary intellectual qualifications. The possession of these intellectual qualifications is to be shown in either one of two ways. In the case of offices, the performance of whose duties requires the possession of technical knowledge, it is usually provided that no one is qualified who has not received a thorough course of training to be evidenced by the possession of some diploma or certificate. Such is the case generally for judges and the law officers of the Government, who must be admitted to the bar and must have practiced for a certain time. Such is also the case for the engineering service of the Government, where the incumbent must be a qualified engineer or surveyor. In the case of the great majority of appointive offices where the duties are largely of a clerical nature, the civil service reform movement has resulted in the adoption of less stringent but, at the same time, of rather important educational and intellectual qualifications, usually to be shown by examinations. These are either competitive in character or ordinary pass examinations, where it is merely required of the candidate who presents himself for appointment that he must have passed the examination at a certain standard. For a further consideration of this matter, see CIVIL SERVICE AND CIVIL SERVICE REFORM.

All officers have by law certain rights upon which they may insist, and also certain duties which they may be compelled to perform. Among the rights possessed by officers may be mentioned the right to exercise the functions of the office. Any one who has been properly appointed or elected may, by appeal to the courts, force the granting to him of the office which he has been chosen to fill. In the second place the criminal law offers a special protection to all officers who come in contact with the people, as bearers of a direct command of a competent authority to do or not to do some particular thing. In such a case they may use force to execute their orders, and any resistance offered to them is made a crime. Where the law specifically provides that officers shall receive a salary, they have also the right to such compensation, which may be enforced by an action in the courts, but inasmuch as the official relation is a relation of public and not of private law, the claim for salary can not be based upon the fact that services of an official character have been rendered, but is to be found solely in the fact that the law has stated that a compensation shall be attached to a given office. As has been said, the compensation is governed entirely by the rules of the public law. Thus the fact that a person does not discharge the duties of the office has no effect upon his right to obtain salary; he will not lose the right to the salary from the fact that by sickness he has been unable to perform his duties, so long as he has not been actually removed. (*O'Leary* vs. *Board of Education*, 93 New York 1.) The salary of officers is enforced by suit against the Government where suit is allowed, or by application to the proper court for a *mandamus* to force the accounting officers to grant the salary. In some cases in addition to the salary there is a civil pension attached to the office, though this is not common in the U. S. outside of the judicial service and the police and fire services of the various municipalities.

Among the duties imposed upon officers may be mentioned the requirement to take the oath of office before beginning to perform its functions, the giving of an official bond, and in general the faithful performance of the detailed duties assigned to the office by the statutes providing for it. The performance of the duties of the office is insured by a threefold responsibility. In the first place, if anybody is injured by the negligence of an officer in the performance of his duties, in many cases he may recover damages from such officer. In the second place, the law often punishes as a crime the non-performance of official duties. In the third place, the violation of duties where the administrative system is at all centralized, and where the superior administrative officers have a strong disciplinary power, will result in an administrative responsibility. Thus in many cases the superior officers have the power to impose fines and to suspend and even to remove delinquent officers. In the U. S. Federal Government the disciplinary power is very strong, but in the States very generally, the system being so extremely decentralized, we find very few examples of this disciplinary power. The only possible exception to this statement is to be found in the cities where, as a result of recent development, the disciplinary power of the mayor over the rest of the city officers has been very largely increased.

The official relation is terminated in various ways. In the first place the law often provides a fixed term for an office. In this case the expiration of the term renders the officer incapable to perform his duties except where it is provided, as it often is, that he shall hold over until his successor enters the office. Further, in order to prevent an official interregnum, the courts often hold that an officer will be regarded as an officer *de facto* after the expiration of his term, and that his acts may not be questioned collaterally in the courts in an action to which such officer is not a party. The term of office is usually fixed in the U. S. at from two to four years. The attempt has been made, however, to do away with this fixed term for all offices whose duties are not of the highest importance, in the hope that the tenure will become one practically during good behavior. (See on this point the article on CIVIL SERVICE AND CIVIL SERVICE REFORM.) As a general thing also the official relation may be terminated by the resignation of the officer. This is absolutely true except in the cases where the office is obligatory, and the statutes provide that an officer shall hold over until his successor shall enter upon the performance of his duties. In such a case resignation by the officer will have no effect upon his duty to continue the performance of official duties. (*Badger* vs. *United States*, 93 United States 599.) Again, loss of qualifications generally entails loss of office. Thus the attainment of a certain age, which in the U. S. often vacates the office, sometimes renders one holding an office unqualified to perform its duties. In these cases, however, of loss of qualifications it is usually provided that the loss of qualifications must be determined by the courts, and all persons dealing with officers are not required to find out whether they have become disqualified, inasmuch as the principle applicable to *de facto* officers will be applied in these cases of loss of qualifications. The official relation may also be terminated by removal. Where the office is filled by election it is usually held by the courts that unless the statute so specifically provides the officer may not be removed, but that where an officer is appointed and there is no provision made by the law as to his term, he may be removed by the appointing officer, the power of removal being held to be incident to the power of appointment. (See *Ex parte Hennen*, 12 Peters 230, 239.) In a great many cases, however, the power of removal of an appointing officer is limited to the case where cause presents itself. In such a case the removal may be reviewed by the courts, it being held by the courts that what is cause is a question of law over which they have jurisdiction. (See *People* vs. *Fire Commissioners*, 73 New York 437.) In these cases of removal for cause the courts also insist that the individual removed shall be given an opportunity to be heard in his defense; and the proceedings for the removal take on somewhat the character of a regular trial. (*Dullam* vs. *Willson*, 53 Michigan 392.) Finally the official relation may be terminated by the action of the Legislature, which has the power, as a result of the fact that the official relation is a relation of public law and is not in the nature of a contract, to ter-

minate the official relation by abolishing the office, by shortening the term, by declaring the office to be vacant, or by transferring the duties of one office to another, or finally also by means of impeachment. *State* vs. *Douglas*, 26 Wisconsin 428, and *Augusta* vs. *Sweeny*, 44 Georgia 463.

FRANK J. GOODNOW.

Offset: in surveying, a short distance measured at right angles to a straight line in order to locate the position of a point. The method of determining the position of an irregular line by means of offsets is to run a straight course in the general direction of the line, and at suitable points of this course to measure offsets to the line in question; then, knowing the distance of each offset from the origin of the course, the length of each offset, and its direction, whether to the right or left, the corresponding points of the irregular line may be plotted. The method of offsets is particularly valuable in filling in the outlines of a topographical survey, and especially in tracing the courses of roads, streams, and coast-lines.

Ofterdingen, ŏf'ter-ding-*en*, HEINRICH, von: the name of a supposed minnesinger who is mentioned in the Middle High German poem *Saengerkrieg auf der Wartburg*, but of whom we have no further reliable accounts. Despite the latter fact he became the favorite hero of the romantic school (Novalis), and was at one time even supposed to be the author of the *Nibelungenlied*. J. G.

Ogam: See IRISH LANGUAGE AND LITERATURE.

Ogar'ev, NIKOLAĬ PLATENOVICH: author; b. on his father's estate in the government of Pensa, Russia, in 1818; d. 1877. During a trip to the Caucasus in 1838 he made the acquaintance of the banished poet Prince Odoevskiĭ, with whom he became intimate and to whom he addressed some of his earliest verses. His first poems to be printed appeared in the *Otechest vennyĭa Zapis ki* (Annals of the Country) in 1840, and for a number of years after this he continued to contribute to various journals. In 1848 Ogarev settled in London, where he took an important part in editing *Kolokol* (the Alarm Bell) and other revolutionary publications of Hertzen, his friend from college days. A third edition of his poetical works appeared in 1863. A. C. COOLIDGE.

Ogden: city; capital of Weber co., Ut. (for location, see map of Utah, ref. 3–L); at the confluence of the Ogden and Weber rivers, the mouth of Ogden cañon, and the foot-hills of the Wasatch Mountains; on the Union Pac., the Central Pac., and the Rio Grande West. railways; 37 miles N. of Salt Lake City. It derives excellent power for industrial purposes from the rivers, has an abundant supply of water from mountain springs and good natural drainage, and is in an agricultural, fruit-growing, iron, salt, lime, building-stone, and coal region. The main and branch railway connections give it importance as a commercial receiving and shipping point. It contains Ogden Academy (Congregational), a military academy, 12 public schools, public-school property valued at $250,000, various manufactories, 3 national banks, a State bank, an incorporated bank, a loan and trust company, and a semi-weekly, a monthly, and 3 daily periodicals. Pop. (1880) 6,069; (1890) 14,889; (1900) 16,313. EDITOR OF "STANDARD."

Ogdensburg: city (known as the "Maple City," founded in 1749, incorporated in 1868) and port of entry; St. Lawrence co., N. Y. (for location, see map of New York, ref. 1–H); at the confluence of the St. Lawrence and the Oswegatchie rivers; on the Central Vt. and the Rome, Watertown and Ogdensburg railways; opposite Prescott, Canada, with which it is connected by steam-ferry; 175 miles N. N. W. of Albany. It is well built, has handsome maple-shaded streets, and obtains power from the river, which serves many manufactories. The city is the headquarters of a line of screw steamers plying between Chicago and intermediate lake ports, and annually handles a large amount of grain and lumber, besides general lake and river freight. There are a U. S. Government building, a Roman Catholic cathedral, several public parks, public-school property valued at $100,000, large grain elevators and warehouses, 2 libraries containing together about 15,000 volumes, a national bank, a State bank, and 2 daily and 4 weekly newspapers. Pop. (1880) 10,341; (1890) 11,662; (1900) 12,633.

EDITOR OF "JOURNAL."

Oge, ō'zhā', JACQUES VINCENT: one of the forerunners of Haitian independence; b. at Dondon about 1755. He was a light mulatto of a wealthy family; was educated in Paris, and served in the army of one of the German electors. When the French Revolution broke out he was chosen deputy for Haiti to the Constituent Assembly, where he was a prominent member of the Amis des Noirs society. In 1790 he organized a secret expedition in the U. S. with the object of freeing the slaves of Haiti; landed at Cape Français, Oct. 23, with 250 men, and at first gained some partial successes; but he was soon after defeated, and gave himself up on condition that his life should be spared. Notwithstanding this he was broken on the wheel at Cape Français Feb. 26, 1791. His death excited the colored population to fury and led to the massacre of the whites soon after. H. H. S.

Ogham, Ogam: See IRISH LANGUAGE AND LITERATURE.

Ogilvie, CLINTON: See the Appendix.

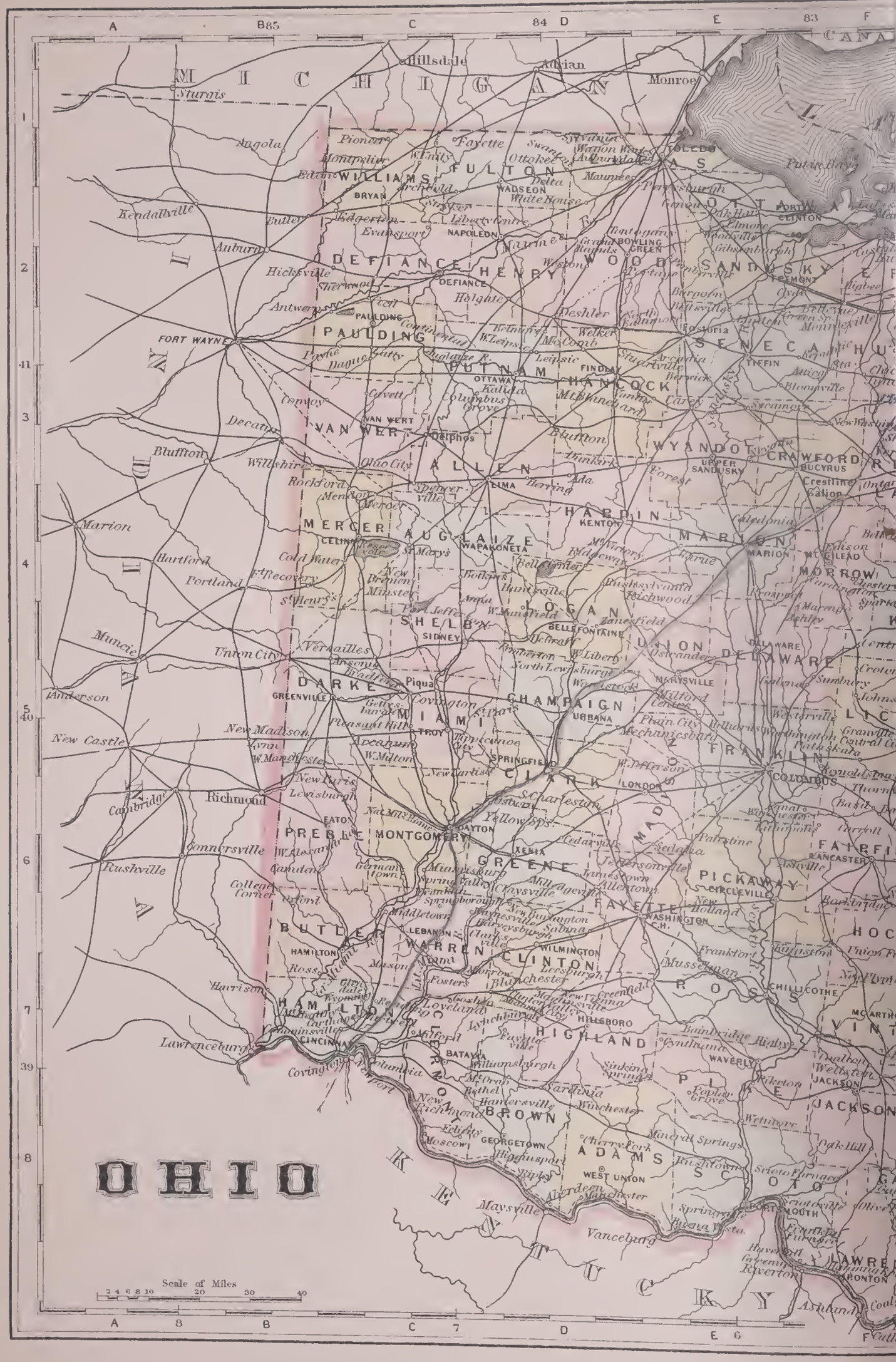
Oglesby, RICHARD JAMES: soldier; b. in Oldham co., Ky., July 25, 1824; left an orphan at the age of eight years, he removed to Decatur, Ill., in 1836; learned the carpenter's trade, which with farming occupied his time until 1844, meanwhile studying law, and in 1845 was licensed and began practice at Sullivan. In 1846 he returned to Decatur, and was commissioned first lieutenant in the Fourth Illinois Regiment (Col. E. D. Baker's), with which he participated at Vera Cruz and Cerro Gordo. Resuming his practice at Decatur in 1847, he pursued a course of study at the Louisville Law School, graduating in 1848; in 1849 he journeyed overland to California and engaged in mining until 1851, when he again resumed his residence and practice at Decatur. In 1858 he was defeated for Congress, but was elected to the State Senate in 1860, which seat he resigned, and accepted the colonelcy of the Eighth Illinois Volunteers: commanded a brigade at capture of Forts Henry and Donelson; was made brigadier-general Mar. 21, 1862, remaining in command of brigade until the battle of Corinth, where he was severely wounded and disabled until Apr., 1863, when he returned to duty, having meanwhile (Nov., 1862) been promoted to be major-general, and was assigned to the Sixteenth Corps. Resigned May, 1864, and in November of that year was elected Governor of Illinois (1865–69); re-elected in 1872, but chosen U. S. Senator Jan., 1873, and served through the term ending 1879; was Governor of Illinois 1885–89. D. in Elkhart, Ind., Apr. 24, 1899.

Oglethorpe, JAMES EDWARD: founder of the State of Georgia; b. in London, Dec. 21, 1698; entered the army about 1712; studied at Oxford for a short time; served under Prince Eugene and Marlborough 1715–18; entered Parliament in 1722 for Haslemere; obtained a charter in 1732 and a grant for the founding of Georgia and the colonization of poor debtors in that province: founded Savannah 1733; received the Protestant emigrants of Salzburg 1734, and soon after revisited England, but returned to Savannah with John and Charles Wesley in 1735. In 1738 he took a regiment of troops thither, and after war was declared between Great Britain and Spain he commanded the Georgia and South Carolina forces in an invasion of Florida. He made an unsuccessful attack on St. Augustine 1741, and in 1742 repelled by stratagem the attack of the Spaniards upon Georgia; returned finally to England 1743; served against the Pretender 1745, and was court-martialed for misconduct 1746, but acquitted. In 1765 he retired as a general upon half pay. D. at Cranham Hall, Essex, Jan. 30, 1785. See biographies by Harris (Boston, 1841), Wright (London, 1867), and Bruce (New York, 1890).

Ogowe: one of the largest rivers of Western Africa; rises between 2° and 3° S. lat., near 14° E. lon., and after a general N. W. course for about 300 miles turns S. W. near the equator, then W., and enters the Atlantic through many streams, forming a large delta extending nearly 50 miles along the coast a little S. of the equator. Many attempts to explore the Ogowe were defeated by the natives, but Savorgnan de Brazza (beginning in 1876) revealed its entire course, which is considerably impeded by cataracts. In its upper reaches the Ogowe traverses wide savannas, but lower down runs mostly through dense forests. There are many large islands in the lower part, where the river is very wide and shallow. A large part is navigable in high water by light-draught vessels; many European trading-posts are on its banks; the native population is numerous; and the river is the most important natural factor in the work of developing the French Congo territory. C. C. A.

O'Grady, STANDISH: See the Appendix.

Og'yges (in Gr. Ὠγύγης and Ὤγυγος); in Greek mythology, the first King of Thebes, whose oldest gate was called, after him, the Ogygian. During his time the waters of Lake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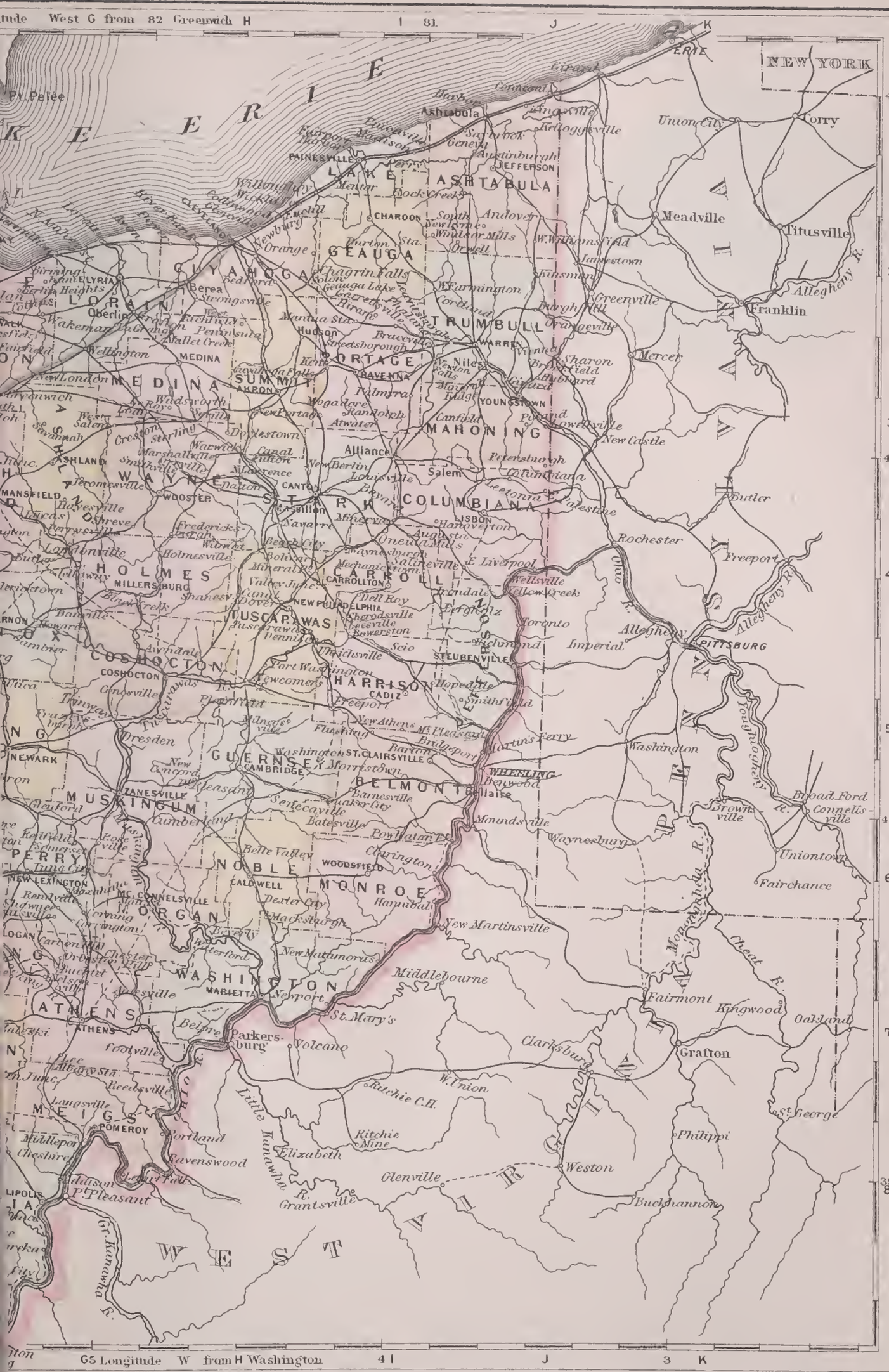
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Copais rose above its banks and inundated the whole valley of Bœotia. An Ogygian deluge is also spoken of in Attica, and Ogyges himself is sometimes represented as a Bœotian autochthon, sometimes as an Egyptian king, and was brought into manifold connections with the earliest legendary history of Greece. Revised by J. R. S. STERRETT.

O'Hara, THEODORE: soldier and poet; b. at Danville, Ky., Feb. 11, 1820. He served in the army during the Mexican war, and afterward practiced law at Washington, D. C. On the outbreak of the civil war he took part with the South and became a colonel in the Confederate army. D. near Guerryton, Ala., June 6, 1867. He is remembered chiefly by his very popular poem *The Bivouac of the Dead*, written to commemorate the Kentuckians killed at Buena Vista during the war with Mexico. H. A. B.

O'Higgins: an interior province of Chili, S. of Santiago, from which it was separated in 1883. Area, 2,524 sq. miles. The eastern portion is included in the Andes; the western part is in the "valley of Chili" and is very fertile, producing wheat, wine, fruits, etc. Near Rancagua, the capital, there are celebrated hot springs. Pop. (1891) 92,892.

O'Higgins (Span. pron. ō-ee'gĕens), AMBROSIO: administrator; b. in County Meath, Ireland, about 1730. His real name was Ambrose Higgins, and he was of a poor and respectable family. His uncle, a priest in Cadiz, Spain, took charge of his education, eventually gave him a small outfit of goods, and sent him to trade in South America. He landed at Buenos Ayres and made his way over the Andes to Chili, where for many years he was a trader and peddler in a small way. Eventually he obtained a commission in the army, distinguished himself in the Araucanian wars, rapidly rose in rank, and in 1788 was made captain-general of Chili; before this time he had changed his name to O'Higgins, as a more aristocratic form. His rule was very successful; he was created Marquis of Osorno, and in 1796 was nominated Viceroy of Peru, a position which he retained until his death at Lima, Mar. 18, 1801. H. H. SMITH.

O'Higgins, BERNARDO: soldier; illegitimate son of Ambrosio O'Higgins; b. at Chillan, Chili, Aug. 20, 1776. He was educated in England, where he associated with Miranda and other prominent Spanish-American republicans; returned to Chili in 1802, joined the revolutionists in 1810, and soon attained prominence as a military leader. On the deposition of Carrera from the command of the army (1813) O'Higgins was chosen to fill his place. The violent opposition of Carrera and his faction divided the country into two hostile camps; civil war was impending, when the arrival of a Spanish army from Peru forced the rivals to combine their forces against the common foe. Relying on the aid promised by Carrera, O'Higgins encountered Osorio at Rancagua; Carrera—intentionally, as was charged—did not re-enforce him, and he was disastrously defeated Oct. 2, 1814. Chili was deserted to the Spaniards, and the patriot leaders fled over the Andes. O'Higgins joined the army of San Martin at Mendoza, and in the patriot invasion of Chili (1817) was his principal lieutenant; his charge decided the victory of Chacabuco Feb. 12, 1817, and the consequent occupation of Santiago. San Martin declined the office of supreme director of Chili, and on Feb. 15 it was given to O'Higgins with dictatorial powers. O'Higgins governed for nearly six years, during which the last Spaniards were driven from Chili, and the country was rapidly developed; his steady support of San Martin did much to secure the overthrow of the Spaniards in Peru. His efforts to form a popular representative government were less successful; the opposition of the aristocratic party and of the old adherents of Carrera at length led to a revolution, and O'Higgins was forced to resign Jan. 28, 1823. He went to Peru, and died at Lima, Oct. 24, 1842. HERBERT H. SMITH.

Ohio: one of the U. S. of North America (North Central group); the fourth State admitted into the Union; popularly known as the "Buckeye State."

Location and Area.—It lies between lat. 38° 27′ and 41° 57′ N., and lon. 80° 34′ and 84° 49′ W.; is bounded N. by Michigan and Lake Erie, E. by Pennsylvania and West Virginia, S. by West Virginia and Kentucky, and W. by Indiana; greatest length from E. to W. about 215 miles, greatest breadth from N. to S. about 210 miles; area, 41,060 sq. miles, of which 300 sq. miles are water surface.

Physical Features.—The surface consists of an undulating plain, from 450 to 1,550 feet above the sea-level. The highest point is near Bellefontaine, in Logan County, which has an altitude of 1,550 feet. The highest extended portions are in the central part, while the watershed separating the St. Lawrence system from the Mississippi valley system runs from N. E. to S. W. across the State, attaining an average height of from 1,100 to 1,300 feet. This dividing range enters the State in Ashtabula County but a few miles from Lake Erie, and crosses irregularly to the central western border, passing thence S. W. into Indiana. The northern side of this watershed is naturally smaller and the rivers are shorter, though the descent from the high central tableland is more gentle than in the southern slope. In the northwestern part the lands were originally swampy. There are a few small lakes in some of the western counties. The rivers in the northern or St. Lawrence system emptying into Lake Erie are the Maumee, Sandusky, Huron, Vermilion, Black, Rocky, Cuyahoga, Chagrin, Grand, Ashtabula, and Conneaut. In the southern system as tributaries of the Ohio are the Mahoning, the Walhonding, and Tuscarawas, which unite to form the Muskingum, the Scioto, Little Miami, and Great Miami. Of these only the Maumee is navigable, and that for only about 20 miles from Lake Erie.

Seal of Ohio.

Geology.—The entire geological series of Ohio consists of stratified rocks of Palæozoic time, having an aggregate thickness, if the average of the different strata be reckoned, of about 3,500 feet. The important geological feature is the Cincinnati axis or anticlinal. The main fold extends N. W. from Southwestern Ohio into Indiana, and thence an offshoot extends N. E. across Ohio to the islands of Lake Erie. From this Cincinnati axis the strata dip gently on the two sides in a W. and S. E. direction. The Trenton limestone underlies Northern and Western Ohio at a depth of from 1,000 to 2,000 feet, whence it has been traced to the extreme southwestern part, where it shows an outcrop. The Utica black shale, which overlies this in the N. W., shows an outcrop nowhere in the State. The Hudson River group underlies the entire State, and covers in the outcrop about 4,000 sq. miles in the S. W. It consists of alternate layers of limestone and shale. The Medina shales (red or yellow non-fossiliferous shales) and the Clinton limestone occur as outcrops only in the southern and southwestern part. The Clinton limestone yields small quantities of petroleum, at a few points is the source of gas, and occasionally contains hematite ore, but not in workable quantities. The Niagara group, shales and limestones, occupies about 3,000 sq. miles in its outcrop in the W. and S. The Lower Helderberg limestone occupies a large area, though it is covered for the most part by drift deposits. The outcrop of the Devonian limestone (Upper Helderberg or Corniferous) is found in a narrow strip running from the center of the State to the N. and including the islands in Lake Erie, also in a similar belt through the northwestern counties. The Ohio shale overlies the preceding in Central Ohio, and in its outcrop stretches in a belt from 10 to 20 miles across the center of the State. The natural gas and the petroleum of Northeastern Ohio come from these shales. Passing from the Devonian system, the Subcarboniferous system brings in the Waverly group of shales and sandstones, which show a broad belt across the State, immediately E. of the Devonian shale outcrop, and forms the western rim of the coal-basin which occupies all of the eastern and southeastern parts. Of the five strata making up the Waverly group the most important is the Berea grit, which is a source of fine building-stone and of grindstone grit, and where it dips beneath the surface is the repository of invaluable supplies of petroleum, gas, and salt water. The Carboniferous system, including the Conglomerate series and the coal-measures, form the surface of about one-quarter of the State, extending from the Waverly group to and beyond the southeastern boundary. The Conglomerates and the lower coal-measures con-

tain thirteen distinct seams of bituminous coal, while in the upper coal-measures there are ten seams, less valuable than those in the lower measures. The different seams vary widely in character, but embrace all varieties of bituminous, steam, coking, gas, and cannel coal. The seams range in thickness from a few inches to 13 feet. The lower measures furnish the greater portion of the coal mined in the State. The amount of coal in this district is estimated by Prof. Orton at 20,000,000,000 tons, or, at the ordinary rate of consumption, sufficient to supply the demand for 1,000 years. These seams in all the coal-measures occur in interstratification with shales, limestone, fire-clays, and iron ore. The glacial drift covers about two-thirds of the State with sand, gravel, and clay to the depth of from 25 to 300 feet.

Mineral Productions.—The mineral resources of Ohio are such as to give her a prominent place among the States. While the variety of her mineral products is not large, they represent a vast amount of capital, and the volume and value of the productions are annually increasing in nearly every line. She ranked fifth among the States in value of mineral productions for the census year 1889–90, which is given as $26,653,439. In the production of iron ore there has been a marked falling off, the output in 1886 being 344,484 tons; in 1889, 252,409 tons; and in 1899, 53,221 tons. In 1859 the first well was drilled in the U. S. for petroleum. Ohio had a fairly conspicuous part in the great economic movements resulting from this beginning, and has made several unique contributions to the subject. The oil-field of Mecca, Trumbull County, is one of these. It yields a heavy lubricating oil of great excellence from wells only 30 to 50 feet deep, the oil being drawn by buckets as in ordinary water-wells. The Macksburg oil-field of Noble and Washington Counties was the first in the State to attain large proportions. Better than its oil production is the knowledge that it has yielded of the laws of petroleum accumulation. In its best year, 1885–86, it yielded fully 750,000 barrels. In 1873 the inflammable gas that always accompanies oil was first turned to account in a large way. An iron-mill in Pittsburg was supplied with gaseous fuel brought in by a pipe line from a well 10 or 12 miles distant. This led to the drilling of deep test-wells in almost every county in Ohio, and one of these wells, drilled in Findlay in Nov., 1884, led to the most surprising discovery ever made in the economic geology of the State, namely, that the Trenton limestone of Lower Silurian age is, under certain conditions, a prolific source of gas and oil. The surface rocks of Northwestern Ohio, which are Upper Silurian limestones, hold at a depth of 1,000 to 1,500 feet reservoirs of oil that yield not less than 5,000 barrels to the acre, and volumes of gas, under a pressure of 400 to 600 lb. to the square inch, flowing out at a rate of 10,000,000, 20,000,000, or 30,000,000 cubic feet a day. The Trenton limestone also furnishes by far the largest portion of the illuminating oils of the U. S. The natural gas of Ohio is used to a large extent in manufacturing, especially glass-making; also for domestic fuel, both in and out of the State. (See NATURAL GAS.) The gas used in Columbus, Newark, and Lancaster is derived from the Clinton formation of Upper Silurian age, and the fact that this stratum is petroliferous is another contribution of Ohio to the knowledge of this class of products. Of crude petroleum the annual output has increased over three hundredfold since 1880. The nature and amount of the mineral productions of Ohio for the year 1899, as reported by the U. S. Geological Survey, together with her rank in each, are shown in the following table:

MINERAL PRODUCTS.	Amount.	Rank.
Petroleum, barrels	21,142,108	1
Natural gas, consumers' receipts	$1,866,271	4
Coal (bituminous) tons	16,500,270	4
Sandstone, value	$1,775,642	1
Limestone, value	$1,793,604	4
Portland cement, barrels	480,982	4

In 1899 the production of coke was 83,878 tons, valued at $255,129. The fire-clays constitute a resource which is already the basis of a large industry that seems destined to become one of the foremost in the State. Ninety-eight per cent. of all the grindstones produced in the U. S. are from Ohio. The State ranks second in number of stone quarries of all kinds and in value of their products.

Soil and Productions.—In the southeastern portion the soils are formed directly from the underlying and outcropping rocks, while in the rest of the State, above the line of the terminal moraine, the soil is of foreign origin, being derived from the clay and gravel of the drift, a mixture of the various formations lying in the path of the glacial ice. These drift-soils fall into three classes—the limestone soils in the western part of the State, the clay of the uplands, and the swamp lands, especially of the northwest. Of these the first two are the best, and are excellently adapted to agriculture. The uplands are especially suited to the cultivation of wheat, and every cereal product which the latitude permits is raised in the State. In the northeastern part dairy products constitute the great staple. Of the soils outside the drift-covered area, the limestone in the extreme eastern and southeastern counties are among the best in the State. Many of the soils are well adapted for fruits and berries, which are raised in great abundance. The grape is largely cultivated.

The native trees embrace eighty-eight known varieties, the most common of which are the oaks, hickories, maples, elms, the ash, poplar, and beech. Fourteen varieties of oaks are found, including the white (the most common tree in the State), red, black, yellow, burr, swamp Spanish, and swamp white; four varieties of maple; six of hickory; three of elm; white, red, green, blue, and black ash; papaw; basswood; buckeye; yellow and honey locust; catalpa; butternut; black walnut; three varieties of birch—cherry, yellow, and red; chestnut; beech; five varieties of poplar, including the quaking ash, cottonwood, and balsam poplar; five varieties of pine; hemlock; and tamarack. The flora of the State embraces a wide variety and large number of species, but none peculiar to Ohio.

Agriculture has always been the leading occupation, though the value of the land has decreased in common with that of immediately neighboring States. This fact, due in great measure to the opening of the trans-Mississippi lands, is beginning to produce its effects in changing the character of Ohio agriculture. While the cereal products still continue far in the lead, fruit and truck farming are receiving increasing attention. Ohio is the foremost State in the number of sheep and the amount of wool produced, while dairy farming, especially in the Western Reserve, constitutes one of the most flourishing and extensive occupations.

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	247,189	251,430	*1·7
Total acreage of farms	24,529,226	23,352,408	†4·8
Value of farms, with buildings and fences	$1,127,497,353	$1,050,031,828	†6·9

* 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	2,888,924	106,890,188 bush.	$36,342,664
Wheat	1,420,646	8,523,876 "	6,051,952
Oats	1,061,593	40,340,534 "	10,488,539
Rye	30,905	513,023 "	282,163
Barley	23,058	622,566 "	267,703
Buckwheat	9,227	147,632 "	85,627
Tobacco (1896)	32,012	23,688,880 lb.	1,066,000
Potatoes	165,284	12,561,584 bush.	5,024,634
Hay	1,559,242	1,652,797 tons	18,263,407
Totals	7,190,891	.....	$77,872,689

On Jan. 1, 1900, the farm animals comprised 640,429 horses, value $35,222,931; 16,883 mules, value $979,911; 780,939 milch cows, value $25,224,330; 674,619 oxen and other cattle, value $20,702,044; 1,389,073 sheep, value $4,972,882; and about 1,500,000 swine, value $15,000,000—total head, 4,001,943; total value, $102,102,098.

Climate.—The location of the State subjects it to the climatic conditions of both the lake region and the Ohio-Mississippi valley, and hence to a wide range in temperature and rainfall. Not only is the annual range great, but the changes are often sharp and sudden, especially in the central part. The summers are extremely warm in the southern part, the thermometer not infrequently reaching 100°. In the central section the heat is rarely so intense, while in the north it is materially tempered by the presence of the large body of water on the boundary. The winters are quite variable, seldom rigorous in any part of the State, but occasionally severe in the northern part, where the snowfalls are also often heavy. In general, the climate is healthful, and has proved itself conducive to vigorous animal and vegeta-

ble growth. The following table presents the important facts as to temperature and rainfall, and is based on the observations of the Ohio Weather and Crop Service, extending over a period of years:

MONTHS.	TEMPERATURE.			PRECIPITATION.		
	Mean.	Max.	Min.	Mean.	Max.	Min.
January	26·0°	76°	−34°	3·13 in.	8·33 in.	0·64 in.
February	31·3	80	−18	3·97	10·38	0·42
March	35·3	87	−17	2·85	9·58	0·33
April	49·8	95	10	3·09	9·49	0·20
May	59·6	99	21	4·60	11·67	0·76
June	69·9	102	34	4·08	10·83	0·63
July	72·9	108	40	3·37	10·83	0·07
August	69·9	104	33	3·20	11·53	0·10
September	64·2	100	23	2·90	10·25	0·25
October	51·6	99	12	2·62	8·39	0·11
November	40·5	80	−8	3·06	8·00	0·68
December	32·5	78	−32	2·48	6·52	0·50
Year	50·1	108	−34	39.35	....	....

Divisions.—For administrative purposes the State is divided into eighty-eight counties, as follows:

COUNTIES AND COUNTY-SEATS, WITH POPULATION.

COUNTIES.	* Ref.	Pop. 1890.	Pop. 1900.	COUNTY-SEATS.	Pop. 1900.
Adams	8-D	26,093	26,328	West Union	1,033
Allen	3-D	40,644	47,976	Lima	21,723
Ashland	3-G	22,223	21,184	Ashland	4,087
Ashtabula	1-J	43,655	51,448	Jefferson	4,087
Athens	7-G	35,194	38,730	Athens	3,066
Auglaize	4-D	28,100	31,192	Wapakoneta	2,915
Belmont	5-I	57,413	60,875	St. Clairsville	1,210
Brown	8-D	29,899	28,237	Georgetown	1,529
Butler	6-C	48,597	56,870	Hamilton	23,914
Carroll	4-I	17,566	16,811	Carrollton	1,271
Champaign	5-D	26,980	26,642	Urbana	6,808
Clark	5-D	52,277	58,939	Springfield	38,253
Clermont	7-C	33,553	31,610	Batavia	1,029
Clinton	7-D	24,240	24,202	Wilmington	3,613
Columbiana	3-J	59,029	68,590	Lisbon	3,330
Coshocton	4-G	26,703	29,337	Coshocton	6,473
Crawford	3-F	31,927	33,915	Bucyrus	6,560
Cuyahoga	2-H	309,970	439,120	Cleveland	381,768
Darke	5-C	42,961	42,532	Greenville	5,501
Defiance	2-C	25,769	26,387	Defiance	7,579
Delaware	4-E	27,189	26,401	Delaware	7,940
Erie	2-F	35,462	37,650	Sandusky	19,664
Fairfield	6-F	33,939	34,259	Lancaster	8,991
Fayette	6-E	22,309	21,725	Washington C.-H.	5,751
Franklin	5-E	124,087	164,460	Columbus	125,560
Fulton	1-D	22,023	22,801	Wauseon	2,148
Gallia	8-G	27,005	27,918	Gallipolis	5,432
Geauga	2-I	13,489	14,744	Chardon	1,360
Greene	6-D	29,820	31,613	Xenia	8,696
Guernsey	5-H	28,645	34,425	Cambridge	8,241
Hamilton	7-C	374,573	409,479	Cincinnati	325,902
Hancock	2-D	42,563	41,993	Findlay	17,613
Hardin	3-D	28,939	31,187	Kenton	5,623
Harrison	4-I	20,830	20,486	Cadiz	1,755
Henry	2-D	25,080	27,282	Napoleon	3,639
Highland	7-D	29,048	30,982	Hillsboro	4,535
Hocking	6-F	22,658	34,398	Logan	3,480
Holmes	4-G	21,139	19,511	Millersburg	1,998
Huron	2-F	31,949	32,330	Norwalk	7,074
Jackson	7-F	28,408	34,248	Jackson	4,672
Jefferson	4-J	39,415	44,357	Steubenville	14,349
Knox	4-F	27,600	27,768	Mt. Vernon	6,633
Lake	1-I	18,235	21,680	Painesville	5,024
Lawrence	8-F	39,556	39,534	Ironton	11,868
Licking	5-F	43,279	47,070	Newark	18,157
Logan	4-D	27,386	30,420	Bellefontaine	6,649
Lorain	2-G	40,295	54,857	Elyria	8,791
Lucas	1-E	100,296	153,559	Toledo	131,822
Madison	5-E	20,057	20,590	London	3,511
Mahoning	3-J	55,979	70,134	Youngstown	44,885
Marion	4-E	24,727	28,678	Marion	11,862
Medina	2-G	21,742	21,958	Medina	2,232
Meigs	7-G	29,813	28,620	Pomeroy	4,639
Mercer	4-C	27,220	28,021	Celina	2,815
Miami	5-C	39,754	43,105	Troy	5,881
Monroe	6-I	25,175	27,031	Woodsfield	1,801
Montgomery	6-C	100,852	130,146	Dayton	85,333
Morgan	6-H	19,143	17,905	McConnellsville	1,825
Morrow	4-F	18,120	17,879	Mt. Gilead	1,528
Muskingum	5-G	51,210	53,185	Zanesville	23,538
Noble	6-H	20,753	19,466	Caldwell	927
Ottawa	1-E	21,974	22,213	Port Clinton	2,450
Paulding	2-C	25,932	27,528	Paulding	2,080
Perry	6-G	31,151	31,841	New Lexington	1,701
Pickaway	6-E	26,959	27,016	Circleville	6,991
Pike	7-E	17,482	18,172	Waverly	1,824
Portage	3-I	27,868	29,246	Ravenna	4,003
Preble	6-C	23,421	23,713	Eaton	3,155
Putnam	2-D	30,188	32,525	Ottawa	2,322
Richland	3-F	38,072	44,289	Mansfield	17,640
Ross	7-E	39,454	40,940	Chillicothe	12,976
Sandusky	2-E	30,617	34,311	Fremont	8,439
Scioto	8-E	35,377	40,981	Portsmouth	17,870
Seneca	2-E	40,869	41,163	Tiffin	10,989
Shelby	4-C	24,707	24,625	Sidney	5,688
Stark	3-H	84,170	94,747	Canton	30,667
Summit	2-H	54,089	71,715	Akron	42,728
Trumbull	2-J	42,373	46,591	Warren	8,529
Tuscarawas	4-H	46,618	53,751	New Philadelphia	6,213
Union	4-E	22,860	22,342	Marysville	3,048
Van Wert	3-C	29,671	30,394	Van Wert	6,422
Vinton	7-F	16,045	15,330	McArthur	941
Warren	6-C	25,468	25,584	Lebanon	2,867
Washington	7-H	42,380	48,245	Marietta	13 348
Wayne	3-G	39,005	37,870	Wooster	6,063
Williams	1-C	24,897	24,953	Bryan	3,131
Wood	2-D	44,392	51,555	Bowling Green	5,067
Wyandot	3-E	21,722	21,125	Upper Sandusky	3,355
Totals	.....	3,672,316	4,157,545		

* Reference for location of counties, see map of Ohio.

Principal Cities and Villages, with Population for 1900.—Cleveland, 381.768; Cincinnati, 325,902; Toledo, 131,822; Columbus, 125,560; Dayton, 85,333; Youngstown, 44,885; Akron, 42,728; Springfield, 38,253; Canton, 30,667; Hamilton, 23,914; Zanesville, 23,538; Lima, 21,723; Sandusky, 19,664; Newark, 18,157; Portsmouth, 17,870; Mansfield, 17,640; Findlay, 17,630; East Liverpool, 16,485; Lorain, 16,028; Steubenville, 14,349; Marietta, 13,348; Chillicothe, 12,976; Ashtabula, 12,949; Piqua, 12,172; Massillon, 11,944; Ironton, 11,868; Marion, 11,862; Tiffin, 10,989.

Population and Races.—1860, 2,339,511; 1870, 2.665,260; 1880, 3,198,062; 1890, 3,672,316 (native, 3,213,023; foreign, 459,293; males, 1,855,736; females, 1,816,580; white, 3,584,-805; colored, 87,511, comprising 87,113 persons of African descent, 183 Chinese, 22 Japanese, and 193 civilized Indians); 1900, 4,157,545.

Industries and Business Interests.—Ohio is among the foremost States in variety and amount of industrial products. In 1890 it ranked third in the number of manufacturing establishments; fifth in amount of capital invested, value of product, and wages paid; and fourth in number of persons employed. The total number of establishments was 28,673, employing 331,548 persons. The capital invested was $402,793,019; wages paid, $158,768,883; cost of material used, $341,016,464; and value of products, $641,-688,064. The following table includes the chief industries in 1890:

INDUSTRIES.	Capital.	Persons employed.	Value of product.
Agricultural implements	$29,399,930	8,326	$14,333,258
Boots and shoes, factory product	3,176,318	5,991	8,489,728
Brick and tile	6,212,838	9,301	5,813,437
Carriages and wagons	13,952,571	10,504	18,777,866
Clothing, men's, factory product	13,106,296	16,357	20,604,134
Clothing, women's, factory product	2,056,455	2,636	4,352,098
Coffee and spice, roasting, etc	1,417,728	608	7,806,763
Flouring and grist mill products	13,472,455	4,296	39,468,409
Foundry and machine-shop products	32,589,798	26,628	43,617,072
Furniture	7,255,804	6,408	8,780,689
Glass	4,094,677	6,651	5,649,182
Iron and steel	31,865,847	21,373	57,134,110
Iron and steel, nails and spikes	3,723,812	2,654	7,929,912
Leather	4,380,015	1,569	6,701,670
Liquors, distilled	2,109,879	484	12,033,884
Liquors, malt	21,491,924	3,494	15,899,629
Lumber, planing-mill products	7,908,742	5,938	12,910,538
Paints	3,906,580	824	4,528,764
Paper	7,581,536	3,042	7,209,750
Petroleum-refining	15,871,138	2,281	16,343,493
Printing and publishing	11,442,602	10,791	17,015,401
Saddlery and harness	2,694,665	3,208	6,340,355
Ship-building	2,950,811	2,822	3,804,838
Slaughtering and meat-packing	3,582,540	1,633	17,012,198
Tobacco (chewing, snuff, etc.)	2,105,848	1,940	5,991,177
Tobacco (cigars and cigarettes)	2,729,275	6,575	7,024,748

Finance.—The assessed valuation of property in 1900 was: Real estate in cities and villages, $674,525,676; real estate not in cities and villages, $599,678,045; personal property, $559,849,507—total, $1,834,053,228.

The receipts during the fiscal year ending Nov. 15, 1900, were $8,031,817.72, and the expenditures $7,712,567.32. The funded State debt, Nov. 15, 1900, was $701,665, all of which is to be paid by July 1, 1903. The aggregate local debt is $96,193,513.94, of which $77,606,261.40 are municipal debts, and $10,521,247.58 debts of counties.

Banking.—On Sept. 5, 1900, there were 276 national banks with combined capital of $46,515,760, surplus and undivided

profits of $20,074,842.98, and deposits of $157,917,698.20; on June 30, 71 private banks, capital $1,509,220; surplus and profits $485,114, and deposits $10,019,076; and on April 2, 164 State banks, capital $14,223,600, surplus and profits $4,861,798, and deposits $85,157,634, and 4 mutual savings-banks with surplus and profits of $2,539,901 and $39,738,121 in savings deposits from 86,181 depositors.

Post-offices and Periodicals.—On Jan. 1, 1901, there were 3,362 post-offices, of which 235 were presidential (12 first-class, 64 second-class, 159 third-class) and 3,127 fourth-class, with 1,562 money-order offices, and 77 money-order stations. Of newspapers and periodicals there were 168 daily, 5 tri-weekly, 40 semi-weekly, 793 weekly, 6 bi-weekly, 14 semi-monthly, 178 monthly, 4 bi-monthly, and 10 quarterly publications; total, 1,218.

Means of Communication.—In Jan., 1894, there were in the State 8,634·18 miles of railway, owned by 88 corporations and operated under 54 systems. In 1900 the mileage was 8,691. The Baltimore and Ohio system operated the lines of 12 distinct corporations within the State, and the Pennsylvania Company 10 lines. The State is crossed by five of the great east and west trunk lines, viz.: the Pennsylvania, the Baltimore and Ohio, the Lake Shore and Michigan Southern, the New York, Lake Erie and Western, and the New York, Chicago and St. Louis. The Cleveland, Cincinnati, Chicago and St. Louis, the Columbus, Hocking Valley and Toledo, the Cincinnati, Hamilton and Dayton, the Columbus, Sandusky and Hocking, the Norfolk and Western, and others traverse the State from N. to S., and afford with many smaller lines thorough facilities for the distribution of Ohio's products and especially those of the coal districts. The earnings were, in 1900, $86,049,117.88, and the Ohio dividends aggregated $6,367,746.04.

There are four canals, built, owned, and operated by the State, having an aggregate length of 697 miles, distributed as follows: Ohio Canal (from Lake Erie at Cleveland to the Ohio river at Portsmouth), including feeders, 334 miles; Miami and Erie Canal (from the Ohio river at Cincinnati to Lake Erie at Toledo), including branches, 282 miles; Hocking Canal (branch of the Ohio Canal), 56 miles; Walhonding Canal 25 miles. The total cost of construction was $14,340,572.99; the total expenditures for superintendence and repairs to Nov. 15, 1892, were $10,068,747.12; total receipts, $15,878,875. For many years the earnings were largely in excess of the expenses, and the canals added many times their cost to the value of commodities produced, in lessening the cost of transportation to the markets, but for several years they have been operated at a loss.

Churches.—The Roman Catholic Church has an archdiocese, Cincinnati, and two dioceses, Cleveland and Columbus; and the Protestant Episcopal Church divides the State into the dioceses of Ohio and Southern Ohio. The census of 1890 gave the following statistics of the religious bodies having a membership in the State of 5,000 and upward:

DENOMINATIONS.	Organizations.	Churches and halls.	Members.	Value of church property.
Roman Catholic	586	591	336,114	$7,395,640
Methodist Episcopal	2,340	2,335	240,650	8,749,970
Presb. in the U. S. of America	618	647	82,444	5,754,350
Baptist, Regular	616	632	57,685	2,543,888
Disciples of Christ	475	475	54,425	1,462,250
United Brethren in Christ	745	725	47,678	1,198,870
Reformed Church in the U. S	294	288	35,846	1,128,275
Congregational	247	260	32,281	2,044,525
German Evan. Synod of N. A	107	107	31,617	836,200
Lutheran, Joint Syn. of Ohio, etc.	191	201	31,261	839,272
Christian	273	265	25,952	392,500
Methodist Protestant	234	233	18,931	441,000
Lutheran, General Synod	189	185	18,437	1,039,950
Protestant Episcopal	166	191	17,454	2,069,787
Lutheran, General Council	118	114	15,915	483,100
Lutheran, Synodical Conference	54	55	15,440	409,975
United Presbyterian	136	140	14,710	697,550
Evangelical Association	216	216	14,673	491,975
German Evan. Protest. of N. A.	22	23	11,793	438,800
Friends, Orthodox	95	97	10,884	202,250
African Methodist Episcopal	111	114	10,025	318,250
Brethren, or Dunkards, Conservative	95	133	8,490	153,365
Baptist, Free-will	128	127	6,982	149,350
Jews, Reformed	17	17	6,576	636,225
United Brethren in Christ, Old Constitution	250	254	5,822	237,940

Schools.—Ohio was the recipient of the first gift of land from Congress for the support of public education, and also received the first grants of land from Congress for the establishment of a college or seminary of learning, through which grants the idea of a State university became firmly fixed in the public mind as an essential part of the educational system of every Western State. When the State was admitted into the Union the control and disposal of these lands passed to it, with the single restriction that whatever the manner of that disposal might be only the income should be used for the purposes specified. The State at first leased the lands for long periods, but after 1827 the policy of selling was adopted. The proceeds, borrowed by the State, have been constituted a permanent irreducible debt on which the State pays 6 per cent. interest. Nearly all of the original grant of 704,488 acres has been sold, producing a fund the income of which is $203,696.56. The unsold lands are leased. In addition to this income there is levied annually a tax of 1 mill on the dollar of all taxable property for the maintenance of a State common school fund, which is distributed annually to each county in proportion to school enumeration. Since 1821 the townships and school districts have had authority to levy taxes for the further support of schools. Finally, fines for many petty offenses are by law payable to the townships for school purposes. Since 1889 a compulsory education law has been in force. In 1899 there were 1,209,735 children of school age, of whom 828,500 were enrolled in the public schools, with an average daily attendance of 613,337. There were 13,077 schools and 25,712 teachers—10,556 male and 15,156 women; average monthly salaries, men $50, women $40. Value of school property, $41,446,838; revenue for school purposes, $13,112,824; expenditure, $12,671,798; expenditure per pupil, based on average daily attendance, $20.66.

The land given by Congress in 1787 for a seminary of learning in the Northwest Territory passed in 1803 to the Ohio University at Athens. Miami University at Oxford became in like manner the beneficiary of a similar grant in the Symmes purchase of lands in the Miami valley. Like the Ohio University, its trustees are nominated by the Governor, and both institutions receive small annual appropriations from the State treasury. The Ohio State University at Columbus was established by the State to receive the Congressional land grant of 1862. In 1901 it had 106 professors and 1,450 students. The value of land, buildings, and apparatus was $2,500,000, and the total endowment $553,893.62. In 1891 a permanent annual levy of one-twentieth of a mill on the taxable property of the State was granted to this university. In the number of colleges Ohio outranks any other State. Among them are several well-known denominational institutions. In 1890–91 there were 37 colleges, with 727 professors and instructors, and 12,030 students in all departments. Among the best established of these colleges are Adelbert, Kenyon, Marietta, Oberlin, Ohio Wesleyan, Cincinnati, and Wooster. There are several medical colleges, 3 law schools, and numerous commercial colleges in the State.

Libraries.—According to a U. S. Government report on public libraries of 1,000 volumes and upward each in 1891, Ohio had 193 libraries, containing 1,320,099 bound volumes and 171,977 pamphlets. The libraries were classified as follows: General, 39; school, 37; college, 47; college society, 12; law, 5; theological, 9; medical, 7; public institution, 7; State, 1; Y. M. C. A., 4; social, 12; scientific, 5; historical, 3; I. O. O. F., 2; mercantile, 1; historical and scientific, 1; historical and theological, 1.

Charitable, Reformatory, and Penal Institutions.—The care of the insane, deaf and dumb, and blind is enjoined upon the State by the constitution, and systematic provision has been made for these and other dependent classes, as well as for the delinquent classes. The general organization of these institutions is the same. The affairs of each are managed and officers and employees selected by a separate board of trustees. These boards usually consist of five members appointed by the Governor and so arranged that the term of one member expires each year. There are five State hospitals for the insane, and the erection of a sixth one, near Massillon, was provided for in 1893. Those in operation are at Athens, Cleveland, Columbus, Dayton, and Toledo. The State also in part supports the Longview Asylum at Carthage. An asylum for epileptics, on the cottage plan, near Gallipolis, was authorized in 1890. For the training of other defective classes there are institutions for feeble-minded youth, the deaf and dumb, and the blind—all at Columbus. The State has also provided homes for the permanent or protracted residence of certain classes of its citizens as follows: Working Home for the Blind, at Iberia; Soldiers' and Sailors' Orphans' Home, at Xenia; and Soldiers' and Sailors' Home, at Sandusky. The State re-

formatory institutions consist of a boys' industrial school, at Lancaster, and a girls' industrial home, at Delaware. A State reformatory at Mansfield has been authorized, which will occupy an intermediate position between the industrial homes and the State penitentiary at Columbus. In addition there are children's homes in forty of the counties, and an infirmary in every county. A State board of charities and correction, consisting of six members appointed by the Governor, is charged with the duty of investigating the whole system of public charities and correctional institutions, and of examining into the condition and management of prisons, jails, infirmaries, public hospitals, and asylums. In 1899 the expenditure of public money for charitable, reformatory, and penal purposes was $3,477,208.38.

Political Organization.—The government of Ohio, while conforming to the general type of State governments, presents a few peculiarities. The legislative power is vested in a General Assembly of two branches, chosen biennially and meeting in even-numbered years; but since 1854 there has always been an adjourned session in the intermediate year. The normal number of Senators is 35, of Representatives 100, but by a peculiar system of apportionment the whole number is generally a little larger or a little smaller (as, in 1901, Senators 29, Representatives 110). The apportionment is made decennially by the Governor, auditor, and secretary of State. The concurrence of a majority of all members of each house is necessary to the enactment of a law, but the approval of the Governor is not necessary. The executive department is vested in the Governor and the usual State officers. All elected State officers are chosen for two years, except the auditor, chosen for four years, and the school commissioner and members of the board of public works, whose terms are three years. These officers are divided into two groups, elections for which occur in alternate years, thus necessitating State elections each year. The Governor is commander-in-chief of the military forces, grants reprieves and pardons, and exercises such appointing power as may be conferred on him by law. He does not possess the veto power, and as his relation to the appointive offices is dependent on the Legislature, his power in the government is less than that of the Governor of most States. The judicial system embraces a Supreme Court, circuit courts, and courts of common pleas. The Supreme Court consists of six judges chosen, one each year, for terms (since 1892) of six years. The State is divided into eight circuits with three judges in each, chosen, one every two years, for terms of six years. The judges in each circuit sit as a single court. There are ten common pleas districts, nine of which have three subdivisions each, with one judge in each subdivision, and more if the Legislature so provides. The common pleas judges are elected for five years. The elective franchise is limited to sane male citizens of the U. S. over twenty-one years of age who have resided in the State one year, in the county thirty days, and in the precinct twenty days. Those who have been convicted of infamous crimes are excluded from voting or holding office. The local government is a mixture of the county system of the South and the township system of New England. The greater share of local powers is exercised by the county. The county commissioners construct and care for the public works and buildings of the county, and have the power to levy taxes for these purposes. They may create new and change the boundaries of old townships. All other county officers report to them annually. Their term of office is three years. The county treasurer receives all taxes within the county—State, county, and local (township, city, village, or district).

History.—The territory embraced within Ohio was discovered and explorations were begun by the French under La Salle about 1670. The French possession of the territory till the middle of the eighteenth century was undisturbed, though by charters of James I. and Charles II. Virginia and Connecticut were granted jurisdiction over the region. About 1748 and 1749, when the English began to establish trading-posts and to plan for the settlement of the Ohio region, disputes arose with the French resulting in war. In 1763 the Treaty of Paris established the English possession. No attempts at settlement beyond temporary trading-posts were made before the war of independence. During that period several battles were fought with the Indians on this territory, and disputes arose between the States as to the ownership of the western lands. Massachusetts, Connecticut, New York, and Virginia laid claim to the northwestern region, while the other States regarded the land as the joint possession of the thirteen. Maryland's refusal to accede to the Articles of Confederation unless the individual States gave up their claims brought about a cession to Congress of the title to the lands in question, save that Connecticut reserved a tract (popularly known as the Western Reserve) along Lake Erie, W. of Pennsylvania, containing 3,666,291 acres, and Virginia reserved a similar tract, to pay her land bounties, between the Miami, Scioto, and Ohio rivers, containing 3,709,848 acres. In 1785 provisions were made by Congress for the survey and sale of western lands, and in 1787 the famous ordinance for the government of the territory N. W. of the Ohio, forbidding slavery in the entire region, was passed. In the same year the Ohio Company, an association formed in Boston, purchased a large tract on the Muskingum, and in Apr., 1788, the first settlement was made at Marietta, by a colony from Massachusetts. In July of the same year the territorial government was formally organized. In December a settlement was made in Cincinnati. During the next four years the settlers were disturbed by Indian raids, but in 1794 Gen. Anthony Wayne won a victory over the Indians on the Maumee, and the treaty of Greenville in 1795 secured peace for the territory. Settlements followed rapidly, and in 1799 the second stage of territorial life was entered upon, when a legislature was elected which met at Cincinnati. Ohio was admitted to the Union as a State on Feb. 19, 1803. The constitution was revised by a convention in 1850–51, and the revision was so complete as practically to make a new constitution. It was ratified in June and went into effect in September of the same year. Another revision was made in 1873, but the constitution was rejected in 1874. Chillicothe was the State capital in 1800–10 and 1812–16, Zanesville in 1810–12, and Columbus has been the capital since 1816. During the war of 1812 the State suffered from British and Indian raids, and during the civil war it was twice invaded by Confederate troops. The history of Ohio has been in the main that of a peaceful industrial development.

GOVERNORS OF OHIO.

Territorial.	
Arthur St. Clair..	July, 1788–1802
C. W. Byrd (acting)	1802–03
State.	
Edward Tiffin	1803–07
Thomas Kirker (acting)..	1807–08
Samuel Huntington	1808–10
Return Jona. Meigs	1810–14
Othniel Looker (acting)..	1814
Thomas Worthington	1814–18
Ethan Allen Brown.....	1818–22
Allen Trimble (acting)....	1822
Jeremiah Morrow.....	1822–26
Allen Trimble	1826–30
Duncan McArthur.....	1830–32
Robert Lucas.....	1832–36
Joseph Vance	1836–38
Wilson Shannon.....	1838–40
Thomas Corwin	1840–42
Wilson Shannon.....	1842–44
T. W. Bartley (acting)....	1844
Mordecai Bartley.....	1844–46
William Bebb	1846–49
Seabury Ford	Jan., 1849–50
Reuben Wood.....	1850-July, '53
William Medill (acting),	July, 1853–Jan., '54
William Medill	1854–56
Salmon P. Chase	1856–60
William Dennison.....	1860–62
David Tod.....	1862–64
John Brough*.....	1864–65
C. Anderson (acting).....	1865–66
Jacob Dolson Cox.....	1866–68
Rutherford B. Hayes.....	1868–72
Edward F. Noyes.....	1872–74
William Allen....	1874–76
Rutherford B. Hayes.....	1876–77
Thomas L. Young (acting)	1877–78
Richard M. Bishop	1878–80
Charles Foster	1880–84
George Hoadly.....	1884–86
Joseph B. Foraker	1886–90
James E. Campbell	1890–92
William McKinley, Jr....	1892–96
Asa S. Bushnell.....	1896–1900
George K. Nash.....	1900–

AUTHORITIES.—Geology: *Geological Survey of Ohio*, especially the volumes by Edward Orton, State geologist. Statistics: *Census Reports* and *Bulletins* (1890); *Ohio Statistics*, compiled annually by the secretary of State; *Ohio Weather and Crop Reports*; *Executive Documents.* Education: Knight and Commons, *History of Higher Education in Ohio.* History: Hinsdale, *The Old Northwest*; King, *Ohio*; Ryan, *Ohio*; Short, *Ohio: a Sketch of Industrial Progress.*

GEORGE W. KNIGHT.

Ohio River: the largest of the affluents of the Mississippi in respect to its discharge of water, which averages 158,000 cubic feet per second, that of the Missouri being but 120,000 feet. The Ohio originates at Pittsburg, Pa., in the confluence of the Allegheny and Monongahela rivers. Its length below Pittsburg is 975 miles; total length to its ultimate source, 1,265 miles. A straight line from Pittsburg to Cairo, Ill., at its mouth, measures 615 miles. Its drainage area is 202,400 sq. miles, according to Ellet, or 214,000, according to Humphreys. Its elevation at Cairo is 322 feet; at Pittsburg, 1,021 feet. Its mean fall is ·72 of a foot to the mile. Its mean rate of flow is about 3 miles an hour. Its mean rise in flood is some 30 feet above extreme low water; occasionally, as in July, 1884, the rise exceeds 60 feet. Above Cincinnati it is in many places fordable at

low water for six or eight weeks; but during the rest of the year it is navigable throughout its length for flat-bottomed steamboats. It has two classes of islands: one kind is fertile, and the other mere sandbanks, called "tow-heads" by boatmen. With its numerous tributaries (some of them navigable the year through), it has fully 5,000 miles of high-water navigation. It has no important rapids, except at Louisville, Ky., where it falls 22½ feet in 2 miles. It was discovered in 1669 by the French under La Salle, and called by them La Belle Rivière (the beautiful river).

Revised by Reuben G. Thwaites.

Ohio State University: an institution of learning at Columbus, O., where it owns and occupies 337 acres of land within the city. It is founded on the congressional land grant for education made in 1862, and was opened in 1873. Its land is worth at least $1,250,000; it has eight buildings for instruction worth $330,000; other buildings worth $45,000; a laboratory equipment worth $75,000; agricultural and horticultural equipment worth $15,000; museums worth $50,000; and a library of 30,000 volumes. Its cash endowment is $553,065. Annual income (1899): Interest on endowment, $33,065; proceeds of State tax, $176,058; congressional appropriation, $24,000; fees and rents, $44,450—total, $277,573. It offers courses of study for degrees in arts, three in philosophy (the Latin, the modern language, and the English), science, agriculture, horticulture and forestry, civil, mining, mechanical, and electrical engineering, pharmacy, and veterinary medicine; also a two-year course in agriculture and one in mining. Military instruction and training are given by an officer of the U. S. army. A law department was opened in 1891, and a school of industrial arts and manual training in Sept., 1893. The university has (1894) 67 professors, associates, and assistants, and 800 students. W. H. Scott.

Ohio University: a coeducational institution at Athens, O., projected in 1787 in the purchase made from the Government of the U. S. by the Ohio Company. By a contract between these two parties two townships of land were set apart and placed under the care of the Legislature of the State. The university was organized under an act of the Legislature passed in 1804. Instruction began to be given as early as 1809, and the first graduate was the well-known Thomas Ewing, whose diploma bore date 1815. The regular faculty was organized in 1822, and the first president was elected in that year. Owing to adverse legislation the original endowment fund was very much reduced, and the income is consequently small. For several years the Legislature has supplemented the income of the institution by an annual appropriation varying from $5,000 to $20,000. The trustees are appointed by the Governor of the State, who is an *ex officio* member of the board. Charles W. Super, Ph. D., LL. D., became president in 1883. The present (1900) faculty consists of 10 professors, 5 associate professors, and 6 instructors. The number of students in 1900 exceeded 400, of whom 110 were in the collegiate department. The institution is non-sectarian. Charles W. Super.

Ohio Wesleyan University: a coeducational institution at Delaware, Ohio; organized under the auspices of the Methodist Episcopal Church in 1844. The grounds embrace University Campus, Monnett Campus, Barnes Hill, and Merrick Park. Upon University Campus is a famous sulphur spring and an arboretum consisting of over 600 varieties of trees and shrubs. There are eight buildings, including University Hall, erected at a cost of $175,000. The total value of grounds and buildings is estimated at $525,000. The endowment is $744,000, of which $255,000 still pays annuities to donors. The presidents have been Edwin Thompson, D. D., LL. D., Frederick Merrick, D. D., L. D. McCabe, D. D., LL. D., Charles H. Payne, D. D., LL. D., and since 1889 James W. Bashford, D. D., Ph. D. The university embraces graduate, collegiate, preparatory, musical, art, and commercial departments. The number of students enrolled in 1900 was 1,319. These came from thirty States and Territories and ten foreign countries. About 33 per cent. of its graduates have entered the ministry, and a large number have become missionaries. J. W. Bashford.

Ohl, ōl, Jeremiah F., Mus. Doc.: clergyman, b. in Northampton co., Pa., June 26, 1850. Studied in Muhlenberg College, Allentown, Pa., and Theological Seminary, Philadelphia; was pastor at Quakertown, Pa., 1874–93; director of Deaconess Institute, Milwaukee, Wis., and Professor of Liturgies and Church Music in Lutheran Theological Seminary, Chicago, Ill., since 1893. He has published *School and Parish Hymnal* (Philadelphia, 1892), besides numerous musical contributions in sheet and pamphlet forms.

H. E. Jacobs.

Öhlenschläger, Adam Gottlob: See Œhlenschläger.

Ohm: the unit of resistance in Electricity (*q. v.*). The *practical ohm*, which was till lately in use, is a resistance equal to that of a certain standard coil of wire made of German silver. It was constructed by a committee of the British Association for the Advancement of Science in 1863. The *legal* or *congress ohm*, adopted by the International Electrical Congress in Paris in 1884, is defined as the resistance, at a temperature of 0° C., of a column of pure mercury, 106 cm. in length and 1 sq. mm. in cross-section. These are close approximations to a certain theoretical ohm which is 10^9 C. G. S. units of resistance. R. A. Roberts.

Ohm, ōm, Georg Simon: physicist; b. at Erlangen, Bavaria, Mar. 16, 1787; studied in his native city, and was appointed Professor in Physics in 1817 at the Jesuit College of Cologne, director of the Polytechnic School in Nuremberg in 1833, and professor in 1849 at Munich, where he died July 7, 1874. He discovered the so-called Ohm's law (see Electricity) set forth in his *Galvanische Kette, mathematisch bearbeitet* (Berlin, 1827), which was translated into English in Taylor's *Scientific Memoirs* (vol. xi., London, 1841), and was rewarded with the Copley medal by the Royal Society of London. Besides his principal work, *Beiträge zur Molecularphysik* (Nuremberg, 1849), he wrote, among others, *Bestimmung des Gesetzes, nach welchem die Metalle die Contact-Elektricität leiten* (1826).

Ohm's Law: See Electricity.

Oidium: an old name for the first stage (conidial) of the powdery grape-mildew. See Mildew.

Oil-cake: the residue which is left, after the expression of fixed oils from crushed or ground seed of any kind. It is used both as food and as a direct fertilizer. The cake is frequently pulverized before using, and is then called *oil-meal*. Linseed-oil cake is valuable for fattening cattle. It is largely exported from the U. S. to Great Britain. *Cotton-seed meal* is used for feeding cattle, and is a valuable manure. Rape-cake and colza-cake are fed to sheep or applied directly to the land. Bean-cake is similarly used by the Chinese.

Oil City: city (incorporated as a borough in 1862 and as a city in 1870); Venango co., Pa. (for location, see map of Pennsylvania, ref. 3–B); at the junction of the Allegheny river and Oil creek; on the Allegheny Valley, the Erie, the Lake Shore and Mich. South., and the West. N. Y. and Pa. railways; 8 miles E. N. E. of Franklin, the county-seat, 18 miles S. of Titusville. It is in the center of the great petroleum-oil district, and in its early days was wholly dependent on that industry. It contains several large oil-refineries, pipe-works, iron-foundries, engine and boiler works, and other manufactories; and has street-railways, electric lights, city hospital, public library, an oil exchange, public-school property valued at over $100,000, a national bank, a State bank, 3 private banks, and a semi-weekly, a weekly, and 2 daily periodicals. From Clark's Summit, near the city, a splendid view of the region is had. Pop. (1880) 7,315; (1890) 10,932; (1900) 13,264. Editor of "Derrick."

Oil-cloth: See Carpets.

Oil-engine: See Gas-engine.

Oil Islands: See Chagos Archipelago.

Oil of Tar: See Tar.

Oil of Turpentine: See Turpentine.

Oil Rivers: chiefly branches of the Niger. They form the Niger delta, though some of them have sources independent of that river. From them comes most of the palm oil exported from West Africa. They form a wonderful network of more or less navigable rivers and creeks extending from the eastern boundary of the British colony of Lagos to the northern frontier of the German Cameroons. The land along the lower part of these rivers is marshy and covered with mangrove, but at some distance above tidewater the marshy banks become firm dry land and the mangrove is gradually supplanted by the screw pine and other vegetation. The rivers are under the administration of a British imperial commissioner, and the chief port is Akasa at the mouth of the main Niger. The climate of this delta region is less unhealthful for Europeans than in the other West African possessions of Great Britain.

C. C. Adams.

Oils [plur. of *oil*, from O. Fr. *oile*, *uile* > Fr. *huile* < Lat. *oleum*, from Gr. ἔλαιον, olive oil, oil, deriv. of ἐλαία, olive-tree]: liquid fats (see FATS and FOOD) existing ready formed in nature. They are mostly fluid at ordinary temperatures, unctuous to the touch, stain paper with a permanent greasy spot, are insoluble in water, little soluble in alcohol (castor oil excepted), completely dissolved by ether, often, but not always, tasteless and odorless, and form soaps with alkaline bases, setting free glycerin. In short, the oils are glycerides, and fall under the general designation of fat-oils, including certain pasty sorts, like palm oil, cocoa oil, and other butter-like vegetal fats. The fat vegetal oils are all fixed, while the essential oils are all volatile. The volatility of some of the fatty acids forms no exception to this statement. The essential or volatile oils mostly exist ready formed in plants, from which they are obtained by distillation. They are distinguished from the fat-oils not more by their volatility and odor than by their action with alkaline bases, not being capable of saponification. The volatile oils are therefore separately considered (III.), while the fixed fat-oils are conveniently grouped with reference to their origin, as I. Vegetable Oils and II. Animal Oils.

I. VEGETABLE OILS.—In plants the fat-oils exist chiefly in the seeds, sometimes in the flesh or pulp about the seeds, as in the olive, dogberry, etc., and much more rarely in the roots, as in the earth-almond (*Cyperus esculentus*), which contains 26 per cent. of oil disseminated in minute globules in the cellular tissue. In the oil-producing seeds the oil is often associated with albuminous matters, gum and mucilage; as in linseed, for example. When such seeds are bruised or ground and diffused in water, these albuminous bodies suspend the oil, entangled in a milky *emulsion* of a glairy and mucilaginous consistency. Linseed is a prominent example of this sort of seeds. The vegetal oils are usually divided into two groups: (1) *The drying oils*, like linseed oil, which on exposure to air absorb oxygen and dry to a resinoid surface or varnish; and (2) *the fatty* or *non-drying oils*, of which olive oil is an example. The latter class become rancid on exposure to air, but as a rule such oils do not dry up, although many of them thicken.

Purification of Oils.—The crude oils come from the press more or less changed by the heat employed, and contaminated by albumen, resinous and coloring matter, which must be removed to fit the oils for nice purposes. The treatment originally proposed by Thénard in 1801 is still in general use—mixing the oil with 2 or 3 per cent. of concentrated sulphuric acid in a lead-lined vat, and stirring it until it assumes a greenish tint. After twenty-four hours' repose about 2 per cent. of its volume of water, of about 170° F., is added, and the whole agitated vigorously until the liquid appears milky, when the mixture is transferred for rest to large reservoirs at a constant temperature of about 80° F. After some days' rest the clear oil is decanted and filtered either through cotton, carded wool, or flannel, sometimes through river sand and branches of trees free of leaves. The saturation of the acid is accomplished after Dubrunfaut by chalk without the use of so much water. The oil-cake itself is sometimes employed in a state of dry powder, to avoid filtration, 50 kilog. of the powdered cake being capable of clarifying 200 hectoliters of oil in successive portions of about 6 hectoliters each. Oils like cottonseed and palm oil are treated in England by a mixture of nitric acid and potassium chlorate, which rapidly oxidizes the coloring-matters. About 1 to 2 per cent. of this mixture suffices, and an excess of chlorate is to be avoided as well as of nitric acid, which with alkalies gives a strong red color to the oil. Many other methods of purification have been proposed for oils, of which we mention only that of *air-treatment* with acid by Michaud, who proposed in 1869 to blow air through the oil, while the acid is permitted to fall in, in numerous small streams. The oil charged with air forms with the feculence a mixture of less density, which gathers as a bulky scum on the surface, which is skimmed off, while the operation is repeated until this scum ceases to appear. The oil is then treated by a current of steam until it is warmed to 212°, and with a diminishing quantity of steam it is in half or three-quarters of an hour ready to separate from the water and filter.

Physical Properties.—All the oils are lighter than water, but their densities vary greatly with temperature; e. g. olive oil at 12° C. has sp. gr. ·919; at 26°, ·911; and at 94°, ·862. The congealing-points of the oils vary also greatly, being for olive oil 2° (C.); colza, — 6·25°; groundnut, — 7°; almonds, — 10°; grape, — 16°; poppy and castor, — 18°; linseed, — 27·6°; pine, — 30°. The oils vary equally in electric conductivity, that of olive oil being 677 times less than the others. This peculiarity was made the basis of Rousseau's *diagometer*, an instrument designed to detect adulteration in olive oil by the varying intensity of an electrical current moving a magnetic needle.

Chemical Properties.—The effects of air upon the vegetable oils have already been given. In general, the non-drying, both vegetable and animal, become rancid by exposure to air, while the drying oils become gummy or resinous. This effect is quickened or intensified by boiling them with oxide of lead, peroxide of manganese, and borate or acetate of manganese—an operation attended with the production of a high color. For colorless varnishes drying oils are treated in the cold by oleate of lead prepared by acting on oleic acid by litharge. The same result is obtained by the use of protoxide of manganese, precipitated by an alkali from a protosalt of manganese, rapidly washed, and incorporated with the oil. On driving into the mixture a finely divided current of air the manganese is peroxidized in the midst of the oil, giving after washing with oil a colorless and very drying oil. The action of acids and alkalies upon oils is considered under OLEIC ACID and SOAP. See also CASTOR OIL, LINSEED OIL, OLIVE, etc.

II. ANIMAL OILS.—The animal oils and fats have a constitution closely identical with the non-drying vegetal oils. They are in general ethereal salts of glycerin and the fatty acids, so rich in oleic acid as to remain fluid at ordinary temperatures. The animal oils have, as a class, a characteristic and very persistent odor, referable to their origin, which in some of the fish oils is peculiarly offensive. This animal odor adheres with great obstinacy to the soaps made from even the sweetest animal oils. The liquid animal oils are largely derived from marine animals. *Sperm oil* occurs in the cavity of the head of the sperm whale (*Physeter macrocephalus*), mixed with spermaceti, from which it is separated by crystallization and pressing in the cold. It is saponified with difficulty by potash, yielding the same fatty acids as spermaceti fat. It is esteemed the most valuable of animal oils, and brings the highest price. *Whale* or *train oil* is obtained from the blubber of the right whale (*Balæna misticetus*), from the blackfish, and from other species of whales. Its sp. gr. varies from ·919 to ·929. Dolphin oil and porpoise oil contain a peculiar fat called delphinine, phocenine, or dolphin fat. It is a neutral, very mobile oil, of sp. gr. 0·948–0·954, of a faint, peculiar, somewhat ethereal odor, like that of valeric acid. Seal oil, shark oil, sea-calf oil are fat-oils obtained from the blubber of these animals, and have characteristics in common with whale oil. The menhaden of the Atlantic coast are extensively taken for their oil and the *fish-guano* produced from the compressed fish after boiling to separate the oil.

Cod-liver Oil. See COD-LIVER OIL.

III. ESSENTIAL OR VOLATILE OILS.—The essential oils of plants consist chiefly of mixtures of hydrocarbons with acid of oxygenized bodies of the same class. They are mostly isomeric or polymeric with oil of turpentine, represented by $C_{10}H_{16}$. Turpentine oil is the product of various species of *Coniferæ*, and is obtained from wounds or incisions in the bark, from which it exudes in combination with the resin and other vegetable juices, and is separated from them by distillation. While all the volatile oils thus obtained from coniferous plants are alike in general properties, as of odor, solvent power, etc., they really differ much in density, and more especially in optical properties, some revolving the polarized beam to the right (dextro-rotatory), while others revolve it to the left (lævo-rotatory), and in unlike degrees. Most kinds of turpentine oils are mixtures of two or more isomeric or polymeric hydrocarbons, differing in physical and sometimes in chemical properties. The oxidized constituents of the essential oils are sometimes the direct products of the oxidation of the hydrocarbon itself, in which case they are usually viscid resins; while in other cases the two classes appear distinct. The hydrocarbons from essential oils may be arranged in three polymeric groups, having the formulas, respectively, $C_{10}H_{16}$, $C_{15}H_{24}$, $C_{20}H_{32}$. The first group comprises the greater number of these bodies—turpentine, orange, caraway, nutmeg, anise, thyme, etc.; the second, those from cloves, rosewood, cubebs, calamus, etc.; while the last group has only one representative, colophene. These groups are distinguished by the vapor-densities of the bodies belonging to them—viz., the first group requires a theoretical vapor-density of 4·71, while actual experiment on oil of turpentine, pepper, juniper, lemon, orange, etc.,

gives closely approximate results. For calamus and patchouli oils Gladstone got densities of 6·80 and 7·2, respectively, while theory requires for the formula $C_{15}H_{24} = 7·06$ sp. gr.

The volatile oils generally absorb oxygen rapidly, rarefying and gaining color in the process, and sometimes forming crystals of camphor-like bodies. Oil of turpentine in four months absorbs twenty times its volume of oxygen, and in forty-three months 128 volumes; it thus acquires the properties of ozone, and its bleaching power is seen on the cork used to stop the bottle containing it. Chlorine, bromine, iodine, and hydrochloric acid gas are all absorbed by turpentine and other oils of that group, which are thus changed generally into resins, balsams, or camphors. The oils of lemon, orange, etc., by exposure seem spontaneously to lose their delicate perfume and change to the odor of turpentine. The volatile oils are generally obtained by distilling the parts of plants in which they exist, as the leaves, bark, roots, and even wood, either alone or more usually with water, the vapor of which carries over mechanically the oils of a higher boiling-point. These usually emit at 212° a vapor of considerable tension, which gives the characteristic odor of the plant, and is condensed with the steam, separating in the receiver into a milky or turbid layer, usually, but not always, lighter than the water. Many oils of delicate perfume, like oil of lemons, orange, etc., exist in cells in the skin of the fruit and leaves in a state sufficiently abundant to permit their separation by mechanical pressure, while heat would impair their delicacy. The *essences* are only the watery solutions of essential oils, and are often prepared in domestic economy, as rose-water, essence of pennyroyal, mint, etc., by distillation or by addition of the oils to a sufficient quantity of water to hold them in emulsion or hydration, forming the so-called *distilled waters* of the apothecary.

Some of the volatile oils contain acids, aldehydes, etc., the study of which has shed important light on organic chemistry—e. g. oil of winter-green (*Gaultheria procumbens*) and meadow-sweet (*Spiræa ulmaria*) furnishing salicylate of methyl and salicylic aldehyde. Bitter almonds furnish benzoic aldehyde, and aldehydes of analogous constitution are obtained from the essential oils of cumin (*Cicuta virosa*), oil of cinnamon and cassia, etc. Sulphur exists in certain oils, as of garlic and mustard. The number of the volatile oils of vegetable origin is very large. Gmelin in his *Handbook* describes over 170. There are large areas of the earth where plants with a terebinthine or balsamic odor abound almost exclusively, as in portions of Nevada and California. The properties of the plants referred to remain, for the most part, to be investigated.

The odors of volatile oils are by no means all agreeable. Many are pungent, irritating, and even repulsive; their taste is usually aromatic, often burning. Alcohol and ether are their proper solvents. Many volatile oils are the result of decomposition of other compounds by heat, fermentation, and the action of acids; such are eupione, creosote, fusel oil, oil of wine, etc.; while others which exist ready formed in plants, like those of *Spiræa ulmaria* and *Gaultheria procumbens*, may be formed artificially. There are volatile oils of animal origin, as in ants, castoreum, skunk, etc.

The adulteration of volatile oils is often practiced with fixed oils, when it may be detected by a permanent greasy stain left on paper after evaporation and warming; by distilling off the volatile oil, leaving the fixed oil behind; or by dissolving the volatile oil in three or four volumes of 80 per cent. alcohol, when the greater part of the fixed oil remains behind. Alcohol is also a frequent adulterant, and may, when the quantity is large, be detected by dilution of the adulterated oil with water, when it becomes very turbid. Oil of turpentine is often used to adulterate the costly oils of the same series, as of orange, lemon, neroli, etc. It may often be detected by the smell, or after setting fire to it and then blowing it out.

The odor of volatile oils is closely connected with their oxidation. Oil of turpentine, lemon, clove, and the like, when distilled in carbonic acid or nitrogen, and over lime, are nearly odorless. Air restores the odor. Moisture seems essential also to the development of the odor of volatile oils. All odorous flowers are more fragrant when moistened with dew, and in dry climates roses and other fragrant blooms are scentless after the dry season sets in and dew no longer falls. Violets dried over calcium chloride under a bell lose all odor, but regain it completely when moistened again with water; and paper moistened with a volatile odor and then perfectly dried ceases to emit odor until it is again moistened with a little water. Rose-leaves and other fragrant petals yield a much stronger water if distilled from a bath acidulated with sulphuric acid—a fact noticed by Albertus Magnus. It is a curious fact that many distilled waters when kept in well-closed bottles become slimy, lose their proper odor, and acquire an offensive smell; whereas if kept in loosely covered vessels they remain unchanged, or even recover their proper odor when exposed, after change, to air again. Gmelin suggests that this is due to albuminous and mucous matters carried over in the distillation, which, when they putrefy, rob the volatile oil of a portion of its oxygen, depriving it of its proper odor. See *Neues Handwörterbuch der Chemie*, *Oele* and *Oele Ätherische*.

Revised by Ira Remsen.

Oinomania: See Delirium Tremens.

Oise, wäz: river of France. It rises in the Ardennes, Belgium, and joins the Seine after a course of 158 miles, half of which is navigable.

Oise: department of France, along the Seine and the Oise. Area, 2,261 sq. miles. The surface is flat, and the soil rich and very well cultivated. The wine is of inferior quality, but large crops of wheat are raised, and enormous quantities of fruit and vegetables are sent to the Paris markets. Iron manufactures are carried on, besides various industries on a small scale. Pop. (1896) 404,511. Capital, Beauvais.

Ojeda, or **Hojeda**, ō-hā′dä, Alonso, de: cavalier and adventurer; b. at Cuenca, Spain, about 1468. He was noted for his daring athletic feats and harebrained enterprises. In 1493 he joined Columbus for the second expedition to the New World, and during the two years following he led several military expeditions and explorations in the interior of Española. His most audacious feat was the capture of the Indian chief Caonabó from the midst of his tribe. Ojeda was again in Spain when accounts arrived of the third voyage of Columbus and the discovery of the coast of Paria, and through the influence of Bishop Fonseca he was permitted to fit out a trading and exploring voyage to the same region. With him were associated Amerigo Vespucci and Juan de la Cosa, probably as pilots. Leaving Cadiz May 20, 1499, with four ships, they followed nearly in Columbus's course, reached the coast of Guiana, passed between Trinidad and the mainland, and followed the continent westward, trading with the Indians for gold and pearls. At Lake Maracaibo, their farthest point, they found Indian villages built on piles in the water, whence they called the place Venezuela; and this name passed in time to the surrounding country. Returning they touched at Española, and reached Spain in June, 1500. In 1502 Ojeda explored the same coast to Cape Vela. Soon after he was imprisoned in Española, and again by his debtors in Spain; but his influence in court circles procured his release, and in 1505 he made a third voyage to South America, exploring on this occasion as far west as the Gulf of Darien. In 1508 he obtained a royal grant to colonize and govern the region called Nueva Andalucía, corresponding to the northern coast of Colombia from Cape Vela to the Gulf of Darien. Nicuesa received a similar grant of the Darien region. The two governors fitted out expeditions at Santo Domingo, and Ojeda sailed in Nov., 1509, with 400 men. At Cartagena Bay he landed with part of his force to capture Indians for slaves. The Indians, after their first surprise, gathered in great numbers, attacked the Spaniards, and killed all except Ojeda and one other, who escaped by concealing themselves in the swamps; they were rescued, when nearly dead, by a party sent from the ships. Ojeda then sailed to the eastern side of the Gulf of Darien, where he founded the colony of San Sebastian; but his reckless treatment of the Indians provoked their hostility, and the Spaniards were forced to keep within the fortifications, where they suffered terribly from hunger. Ojeda himself was severely wounded by a poisoned arrow. He at length left the colony in charge of Francisco Pizarro, and sailed away to seek re-enforcements; but, after being shipwrecked on Cuba, he finally reached Santo Domingo, with fortunes completely broken. Unable to secure aid for his colony, he died at Santo Domingo in complete poverty about 1514. For the subsequent history of the colony, see Darien.

Herbert H. Smith.

Ojibwas: See Algonquian Indians.

O′ka: a river of Central Russia and the chief affluent of the Volga. It rises in the government of Orel, becomes navi-


A 100 B 99 C 98 Longitude D West from Greenwich 96 F 95 G H 94
WOODWARD
CHEROKEE OUTLET
GRANT
KAY
OSAGE
NATION
CHEROKEE
NATION
GARFIELD
NOBLE
PAWNEE
DAY
DEWEY
BLAINE
KINGFISHER
LOGAN
PAYNE
LINCOLN
CREEK
CUSTER
ROGER MILLS
WASHITA
CLOUD CHIEF
WICHITA
NATION
CANADIAN
OKLAHOMA
CLEVELAND
POTTAWATOMIE
SEMINOLE NATION
GREER
MANGUM
KIOWA AND COMANCHE NATIONS
APACHES
FT SILL
INDIAN TERR.
CHICKASAW NATION
HOTAWATOMIE
ATOKA
OKLAHOMA
Scale of Miles
10 20 30 40 50
A 23 B 22 C 21 Longitude D West from 20 Washington 19 F G18 H
TOLIVER KANSAS
Liberal
Cimarron
Mineral City
BEAVER
BEAVER
Beaver Cr.
Logan
NEW MEXICO
Texline
TEXAS
OKLAHOMA
N.W. Part
Same Scale

gable at the city of Orel, and joins the Volga at Nijnii-Novgorod, after a course of 837 miles. As it runs through some of the most fertile and densely peopled regions of Russia, it is of great importance as a commercial highway.

Okaw River: See KASKASKIA.

Okayama, ō-kaă-yaa′maă: a town and prefecture in the province of Bizen, Central Japan; situated on the northern shore of the inland sea, and connected by rail with Hiogo and the East (see map of Japan, ref. 6–B). It is an important mission-station. Pop. of the town, 32,989. J. M. D.

Okecho′bee, Lake: the largest lake in the Southern U. S. It lies in Southern Florida; is 40 miles long, has an area of about 1,250 sq. miles, and is only 12 feet in maximum depth. It contains but few fishes. It receives several streams, of which Kissimmee river is the most important. A large part of the lake is grown up with grass and weeds. Its waters are discharged through the Everglades mainly by the Caloosa river. Nearly all the shores of the lake are impenetrable, swampy jungle, and the lake itself is nearly inaccessible. It contains a few low islands. It has been partially drained.

Okefeno′kee Swamp: one of the largest swamps of the U. S.; covers an area of about 500,000 acres, in Charlton, Ware, and Clinch cos., Ga., and Baker co., Fla. It is about 40 miles N. and S. by 30 E. and W. The eastern part is mostly an open lake dotted with small floating islands. The lake portion is 12 miles in width. This swamp has forests of heavy timber, and is the abode of countless rattlesnakes, moccasins, and alligators, besides many species of game-birds.

O′ken (originally *Ockenfuss*), LORENZ: naturalist; b. at Bohlsbach, Baden, Aug. 1, 1779; studied medicine and natural science at Würzburg and Göttingen, and was appointed Professor of Medicine at Jena in 1807 and of Natural Science in 1812. In 1816 he began the publication of *Isis*, a periodical of a miscellaneous character, though chiefly devoted to natural history and philosophy. Some political criticisms which it contained gave the Government an opportunity of interfering, and in 1819 Oken resigned his office and lived as a private teacher till 1828, when he received a professorship at Munich. In 1832 he removed to a similar position in Zürich, where he died Aug. 11, 1851. His principal works are *Lehrbuch der Naturphilosophie* (1808–11; Eng. trans. by Dr. Tulk, London, 1847); *Lehrbuch der Naturgeschichte* (1813–27); *Die Zeugung* (1805); *Ueber die Bedeutung der Schädelknochen* (1806), etc. As a pupil of Schelling, the general character of Oken's works has not been acceptable to naturalists, speculation having been cultivated too much at the expense of observation, and his hypotheses now exist chiefly as a warning against "transcendental" excesses. Even the hypothesis of the vertebral composition of the skull, which he developed, after but independently of Goethe, has now little acceptance.

Okhotsk′ Province of Siberia: See MARITIME PROVINCE.

Okhotsk, Sea of: a large inlet of the Pacific Ocean on the eastern shore of Asia, between the island of Saghalin, Siberia, Kamchatka, and the Kurile islands. Its northern part is frozen from November to April.

Oklaho′ma: one of the Territories of the U. S. of North America (South Central group); organized May 2, 1890; capital, Guthrie.

Location and Area.—It lies between 34° and 37° N. lat. and 96° and 103° W. lon.; is bounded N. by Kansas and Colorado, E. by Indian Territory, S. by Indian Territory and Texas, W. by Texas and New Mexico. Area, 39,030 sq. miles, of which 200 sq. miles are water surface.

Physical Features.—The greater part of Oklahoma is an upland prairie, rising gradually toward the N. and W. The Wichita Mountains in the S. are the principal elevations. The Cimarron and Canadian rivers, important tributaries of the Arkansas, with a general course from N. W. to S. E., water the northern and central portions, while the Red river forms a part of the southern boundary, and its two forks, with numerous smaller feeders drain the southwestern portion.

Soil and Productions.—The soil in general is similar to that on the same meridians in Texas and Kansas, and is adapted to the cultivation of almost every kind of plant. Wheat has averaged 20 bush. to the acre throughout Oklahoma, with maximum production in places of 62 bush., and corn and oats have averaged 40 bush. to the acre. Cotton yields an average of 500 lb. to the acre. Horticulture thrives in every section, the more hilly portions being especially adapted to apples and grapes. The woodlands contain walnut, oak, hickory, pecan, and other trees common to the latitude. The following table shows the acreage, yield, and value of the principal crops for the year 1900:

CROPS.	Acreage.	Yield.	Value.
Corn	544,002	14,144,052 bush.	$3,677,454
Wheat	981,967	18,657,373 "	9,888,408
Cotton	208,553	66,555 bales	2,512,584
Totals	1,734,522	.....	$16,078,446

The farm animals on Jan. 1, 1900, comprised 50,326 horses, value $1,213,970; 9,584 mules, value $350,107; 40,715 milch cows, value $1,298,808; 283,256 oxen and other cattle, value $7,182,529; 33,094 sheep, value $83,380; and about 50,000 swine, value $250,000; total head, 466,975; total value, $10,378,794. The minerals so far as known comprise gold, silver, coal, iron, salt, gypsum, asphaltum, petroleum, building-stones, and flagging-stones.

Climate.—The climate of Oklahoma is so equable that the staple products of both North and South can be cultivated with profit. The average annual temperature is 58·4°. The mean annual rainfall is about 35 inches.

Divisions.—For administrative purposes Oklahoma is divided into twenty-three counties, as follows:

COUNTIES AND COUNTY-TOWNS, WITH POPULATION.

COUNTIES.	* Ref.	Pop. 1890.	Pop. 1900.	COUNTY-TOWNS.	Pop. 1900.
Beaver	5–G	2,674	3,051	Beaver	112
Blaine †	2–C	.....	10,658	Watonga	.....
Canadian	3–C	7,158	15,981	Elreno	3,383
Cleveland	3–D	6,605	16,388	Norman	2,225
Custer †	3–B	.....	12,264	Arapahoe	253
Day †	2–B	.....	2,173	Grand	492
Dewey †	2–B	.....	8,819	Taloga	.....
Garfield †	2–D	.....	22,076	Enid	3,444
Grant †	1–D	.....	17,273	Pondcreek	822
Greer ‡	4–B	5,338	17,922	Mangum	.....
Kay †	2–D	.....	22,530	Newkirk	1,754
Kingfisher	2–C	8,332	18,501	Kingfisher	2,301
Lincoln †	3–E	.....	27,007	Chandler	1,430
Logan	2–D	12,770	26,563	Guthrie	10,006
Noble †	2–D	.....	14,015	Perry	3,351
Oklahoma	3–D	11,742	25,915	Oklahoma	10,037
Pawnee †	2–E	.....	12,366	Pawnee	1,464
Payne	2–E	7,215	20,909	Stillwater	2,431
Pottawatomie †	4–E	.....	26,412	Tecumseh	1,193
Roger Mills †	3–B	.....	6,190	Cheyenne	.....
Washita †	3–B	.....	15,001	Cloud Chief	.....
Woods †	1–C	.....	34,975	Alva	1,499
Woodward †	2–B	.....	7,469	Woodward	.....
Kaw Indian Reservation	1–E	.....	768	.....	.....
Kiowa, Comanche, and Apache Reservation	4–C	.....	4,968	.....	.....
Osage Reservation	1–E	.....	6,717	Pawhuska	.....
Wichita Reservation	3–C	.....	1,420	.....	.....
Totals		61,834	398,331		

* Reference for location of counties, see map of Oklahoma.
† Organized from Indian lands since 1890.
‡ Claimed by Texas; awarded to Oklahoma by U. S. Supreme Court, Mar. 16, 1896.

Principal Cities and Towns, with Population for 1900.—Oklahoma, 10,037; Guthrie, 10,006; Shawnee, 3,462; Enid, 3,444; El Reno, 3,383; Perry, 3,351; Ponca, 2,528; Stillwater, 2,431; Kingfisher, 2,301; Blackwell, 2,283; Norman, 2,225; Newkirk, 1,754; Alva, 1,499.

Population and Races.—1890, 61,834 (native, 59,094; foreign, 2,740; males, 34,733; females, 27,101; white, 58,826; colored, 3,008, including 2,973 persons of African descent, 25 Chinese, and 10 civilized Indians).

Industries and Business Interests.—Though Oklahoma was organized as a Territory on May 2, 1890, the census returns show that on June 1 following 72 manufacturing establishments reported. These had a combined capital of $95,519, employed 195 persons, paid $71,918 for wages and $56,518 for materials, and had products valued at $180,445.

Finance.—In 1900 the assessed valuations aggregated $49,338,691. The bonded debt was $48,000, and the general warranty indebtedness $379,054.18.

Banking.—On Sept. 5, 1900, there were 24 national banks, with combined capital of $865,100, surplus and undivided profits of $151,761.08, and deposits of $2,956,208.23; Dec. 31 there were 79 Territorial banks, capital stock $744,588.66, surplus and profits $483,970.73, and deposits $3,918,622.12. There are six building and loan associations.

Post-offices and Periodicals.—On Jan. 1, 1901, there were 619 post-offices, of which 27 were presidential (6 second-class, 21 third-class) and 592 fourth-class, with 192 money-order offices. There were 152 newspapers and periodicals: 13 daily, 126 weekly, 1 semi-monthly, and 12 monthly.

Means of Communication.—The Atchison, Topeka and Santa Fé, the Chicago, Rock Island and Pacific, the St. Louis and San Francisco railways, and the Choctaw Coal and Railway Company, operate lines within the Territory. The total mileage June 30, 1899, was 710·94.

Churches.—In 1893 the Roman Catholic Church had 25 organizations, with a reported membership of 10,000; the Methodist Episcopal Church North, 165 organizations, 2,136 members; the Baptists, 25 organizations, 800 members; the Presbyterian Church, 24 organizations, 750 members; the Congregationalists, 24 organizations, 616 members; and the Protestant Episcopal Church, 6 organizations, 166 members. There were 50 organizations of the Young People's Society of Christian Endeavor, with 1,000 members.

Schools.—In 1899 there were 114,736 children of school-age, of whom 85,635 were enrolled in the public schools, with an average daily attendance of 54,600. There were 1,982 schools and 2,182 teachers—914 men, and 1,268 women; average monthly salaries, men $31.93; women $26.20. The value of school property was $700,000; revenue, $617,592; and expenditure $596,492. Besides direct taxes the school districts receive the proceeds of fines in criminal cases, and also moneys arising from the rental of lands set apart for educational purposes. The Legislature has established a university at Norman, a normal school at Edmond, and an agricultural and mechanical college at Stillwater.

History.—Oklahoma (beautiful land) is a part of the Louisiana purchase of 1803, and of the tract set apart for Indian tribes by act of Congress June 30, 1834. Patents granted to the "five civilized tribes" covered materially all the lands in Indian Territory. By a treaty in 1866 the western half of the Creek territory, containing 3,402,450 acres, was ceded to the U. S. for settlement of other civilized Indians and freedmen, the Government to pay 30 cents an acre. The Seminoles at the same time ceded their tract of over 2,000,000 acres at 15 cents an acre, purchasing 200,000 acres of the Creek cession. Remnants of seven tribes were located by the Government on the ceded lands, but a large portion remained unoccupied. In 1879 schemes were projected by speculators for taking possession of these unoccupied lands. Parties of settlers entered the Territory with the intention of obtaining homes. President Hayes issued proclamations forbidding such movements, and ordering the ejectment of all intruders. Many of the invaders were arrested and expelled from the Territory, but new expeditions were started. Colonization companies were formed, and lands guaranteed to members. This state of things continued till 1887. Legislation then began to be discussed in Congress looking toward the formation of a new Territory in the coveted region. The first bill for territorial organization passed the House, but was lost in the Senate. Meanwhile the Creeks and Seminoles were induced to enter into an agreement for the complete cession and release of their lands provisionally ceded in 1866. The Government paid for these cessions $4,193,799, receiving an aggregate of 5,439,865 acres. President Harrison's proclamation opened the unoccupied portion to settlement Apr. 22, 1889. A military force equal to a regiment of cavalry and more than a regiment of infantry was employed to keep out intruders until noon of the designated day, and to preserve order among the throngs of expectant settlers. Two land-offices were opened and a U. S. court established. More than 50,000 persons entered the Territory on the first day. During the afternoon of that day a bank was opened at Guthrie with a capital of $50,000. Four months later the town of Guthrie had four daily newspapers, water-works, street-car and electric-light companies, and six banks. For the first year the settlers had no organized government, but early in 1890 a law was passed by Congress and signed by the President creating Oklahoma Territory. The Territory was made to include the lands ceded by the Creeks and Seminoles, together with the Public Land Strip, or No-Man's Land. The Cherokee Strip was to be added to the Territory whenever the Indian title should be extinguished, without further legislation. The district known as Greer County was claimed by Texas, and provision was made for the judicial determination of the title. Further cessions were made by the Sac and Fox, Pottawatomie, Shawnee, Cheyenne, and Arapahoe Indians, and as a result nearly 300,000 acres of land formerly held by these Indians was opened to white settlers during 1891. In Sept., 1893, the Government having perfected its title to the Cherokee Strip by treaty and purchase, this entire tract, consisting of some 6,000,000 acres of land, was opened to settlement by the President's proclamation. The scenes at the first settlement of Oklahoma, in 1889, were repeated. It was estimated that 90,000 people struggled to possess themselves of a title to the soil. Much suffering resulted from lack of water and provisions. The incorporation of the Strip makes the southern boundary of Kansas the northern boundary of the Territory.

GOVERNORS OF OKLAHOMA.

George W. Steele	1890-92	Cassius M. Barnes	1897–
Abraham J. Seay	1892-93		
William C. Renfrow	1893-97		

Revised by WILLIAM C. RENFROW.

Oklahoma City: city (settled Apr. 22, 1889); capital of Oklahoma co., Okl. (for location, see map of Oklahoma, ref. 3–D); on the North Canadian river, and the Atch., Top. and Santa Fé Railroad; 25 miles S. of Guthrie. The river has a fall of 27 feet in 4 miles, and the power thus obtained has been brought into the city for manufacturing purposes by means of a canal. The city is the largest cotton-market in Oklahoma; contains flour-mills, cotton-gins, brick-yards, packing-houses, and several hotels; and has a large trade in agricultural products and lumber. There are 3 national banks and 2 daily and 4 weekly newspapers. Pop. (1890) 4,151; (1900) 10,037. EDITOR OF "GAZETTE."

Okra: See GUMBO.

Ok'ubo, TOSHIMICHI: statesman; b. in the province of Satsuma, Japan, about 1830 A. D. Trained under the able lord of Satsuma, who died in 1858, he early directed all his energies to the overthrow of the Tokugawa shogunate or *bakufu*, whose most determined enemies were found in the Satsuma clan, and Okubo became their leading spirit. Their ideal was the restoration of the imperial power as it existed before 1200 A. D., and this change was effected in 1868 by means of Western appliances. From 1870–78 Okubo was the most powerful minister in the imperial cabinet. He went on a special mission to China in 1874, and successfully settled the Formosan difficulty. Later, Saigo Takamori separated from him and raised a revolt in Satsuma; but the suppression of this rebellion in 1877 left Okubo's policy triumphant. On May 14, 1878, when on his way to the palace in Akasaka, Tokio, he was murdered by six bravoes belonging to the party of the deceased Saigo. A handsome monument has been erected on the spot. Okubo was a prominent member of the Iwakura embassy which visited Washington in 1872. J. M. DIXON.

Ok'uma, SHIGENOBU: statesman and financier; b. in the province of Kiushiu, Hizen, Japan, in 1837. He studied Dutch at Nagasaki, and also English; after the restoration entered the Foreign Office, and became a councilor of state in 1870, with charge of the Finance Department. For the next twelve years he directed the finances of Japan, but the depreciation of the fiat currency and other circumstances led to his removal. In 1882 was organized the Kaishinto, or constitutional-liberal party, of which he is the acknowledged leader; it seeks the overthrow of clan rule, and the subordination of cabinets to the parliament. In Oct., 1889, Okuma, who had returned to office as Minister for Foreign Affairs, was attacked by an assassin, and had his leg blown off by a dynamite bomb. Okuma's liberal schemes for a revision of the existing treaties fell through, and he resigned office in Nov., 1891. He founded a college in Tokio—the Semmon-Gakko—largely devoted to the study of political economy. J. M. DIXON.

O'laf, SAINT: the patron saint of Norway; b. about 995; King of Norway 1015–28; a son of Harald Gränske, a grandson of Harald the Fair-haired; commanded a Viking fleet when twelve years old, and was one of the most famous and most dreaded sea-kings of the North before he was nineteen. In 1014 he returned from a pillaging jaunt along the coasts of France and Spain, and installed himself in his patrimony, the throne of Norway. He now set about introducing Christianity among his countrymen, but his measures were so severe and violent that the Norwegians rose in rebellion against him, and when, in 1028, Knud (Canute) the Great, King of Denmark and England, who laid claim to Norway, landed with an army near Throndhjem, then called Nidaros, Olaf was compelled to flee to Russia. Two years afterward

he returned with aid from Russia and Sweden, and gave battle at Stiklestad, near Throndhjem, July 29, 1030, but his army was routed, and he himself slain and buried on the spot. Subsequently, when Norway became thoroughly Christianized, his body was taken to the cathedral of Throndhjem and enshrined behind the high altar. Great miracles were reported; crowds of pilgrims journeyed to his shrine; legends and folk-lore gathered around his name; and in the following century he was solemnly canonized and declared the patron saint of the country. On Aug. 21, 1847, King Oscar I. instituted the order of St. Olaf. See NORWAY.

Revised by R. B. ANDERSON.

Olaf Trygvason: King of Norway 995–1000; b. in 964; great-grandson of Harald Haarfager, and a son of Trygve (Old Norse, *Tryggvi*), who was viceroy in Southeastern Norway, and who was assassinated by Gudröd, son of Erik Bloodaxe. The widow of Trygve and her son fled through Sweden to Russia. The stories of his experiences in Russia and of his Viking expeditions in Baltic and British waters are so full of miracles and romance that it is difficult to sift the wheat from the chaff. Meanwhile it is certain that the young man became celebrated as the greatest hero and athlete of his time. He plundered in England with the Danish king Svend, but made peace with King Ethelred in 994, accepted the Christian faith, and was baptized, King Ethelred himself being his god-father. Olaf promised never again to attack England, and the following summer (995) he returned to Norway. He arrived there in the most opportune moment, the ruler, Hakon Jarl, having just been driven from his throne and murdered by this thrall. Olaf found no trouble in getting possession of the crown. He devoted all his time and strength to the introduction of Christianity, but his methods were too severe and the cause made but little progress. He founded Nidaros (now Throndhjem), and made it the capital of the kingdom. He also sent Christian missionaries to the Orkneys, Faeroes, Iceland, and to Greenland. Leif Erikson, who discovered Vinland (see VINLAND), was the missionary he sent to Greenland. Finally he organized an expedition against the Wends (in Pomerania) to secure some possessions belonging to his queen, Thyra, a sister of Svend Forkbeard of Denmark. At the same time an alliance was formed against him by the Danish king Svend, the Swedish king Olaf, and the banished Norwegian Jarl Erik Hakonson. The allied forces attacked Olaf near Svolder (an island near Rügen in the Baltic), and after one of the fiercest naval engagements known in old Norse history he fell Sept. 9 in the year 1000. Olaf Trygvason is the most conspicuous figure in old Norse history, and he is the subject of many a song and story. See NORWAY.

RASMUS B. ANDERSON.

Olathe: city; capital of Johnson co., Kan. (for location, see map of Kansas, ref. 5–K); on the Missouri river, and the Atch., Top. and Santa Fé and the Kans. City, Ft. Scott and Memphis Railways; 22 miles S. W. of Kansas City, Mo. It is in an agricultural region; contains an academy, the Kansas Institution for the Education of the Deaf and Dumb, a commercial college, 2 libraries, a national bank, State bank, and private bank, and 5 weekly newspapers; and has flour-mills, canning-factory, and a number of wood-working establishments. Pop. (1880) 2,285; (1890) 3,294; (1900) 3,451.

EDITOR OF "HERALD."

Ol'bers, HEINRICH WILHELM MATHIAS: astronomer; b. at Arbergen, near Bremen, Oct. 11, 1758; studied medicine at Göttingen, and practiced as a physician at Bremen, where he died Mar. 2, 1840. His leisure hours he gave to the study of astronomy, especially comets. He invented a new method of calculating the orbits of comets from three observations, which proved easier and more accurate than the old one; and his calculations and observations of comets, collected and published in the *Astronomisches Jahrbuch* in 1782–1829 and 1833, enjoy a great reputation. Of the planets between Mars and Jupiter, which were eagerly sought after by the astronomers in the beginning of the nineteenth century, he discovered two—Pallas, Mar. 28, 1802, and Vesta, Mar. 29, 1807.

Old Age, Diseases of: The natural history of the bodies of animals, in common with that of all living beings, includes the following stages: First, the embryonic stage; second, that of infancy; third, that of adolescence; fourth, that of adult life or maturity; fifth, that of old age (senescence) or decline, which is terminated at death. Each of these stages is marked by physiological conditions differing in the main from those of other stages. In man, it is well known that the physiological activity of infancy and adolescence is in marked contrast to the physiological deliberateness (we may say) of adult life and the physiological inactivity of old age. Likewise there are certain diseases that are very common in early life, but practically unknown in old age; so also in old age certain disorders are more likely to occur than at other times of life. Conditions which predispose to these diseases are, in general, the physical inability to perform movements and exercises which in earlier life are not only easy but usually pleasant; the inactivity of the muscles of the internal organs, such as the intestines or the bladder; and the rigidity of the blood-vessels, which opposes an obstacle to the motion of the blood propelled by a heart which does its work less actively than formerly; and the increasing fragility of these blood-vessels. In addition to this, every tissue in the body of an old person differs from similar tissues in the young just as surely as an old leaf differs from a newly developed one. This difference can be seen to a certain extent in the microscope, but beyond this, changes which elude sight and chemical analysis mark the old tissues, and are clearly evinced by the functional inactivity of these tissues. They are the occasion of accidents and diseases to which the old are more liable than the young. Among the diseases of old age we can not properly class those changes in the hair and the scalp which make one gray and the other bald, nor perhaps that common alteration of the skin known technically as vitiligo (leucoma), which consists in the disappearance of the pigment matter from beneath the cuticle in certain places, so that there are patches lighter in color than the general hue of the skin; but there is a special tendency in the old to the formation of small collections in the skin, due to the stopping up of the sebaceous follicles and the suppression, to a certain extent, of the function of perspiration; and they are often sufferers from erysipelas and carbuncles.

In the eyes, the development of far-sightedness (presbyopia) can not be considered a disease, but the formation of cataracts (opacities of the crystalline lens) can.

In the ears, the dull hearing is physiological, and the disposition to the accumulation of wax (cerumen) in the external auditory canal comes in the same category.

In the muscular system, the changes of old age consist in weakening of the muscle fibers and disappearance of the fat which normally surrounds them, resulting in leanness, which is a familiar feature of advanced age. In what may be called early old age there is sometimes a development of abnormal quantities of fat beneath the skin and among the muscles, but if persons with this development live long they almost invariably lose their fat and present the normal picture of senility. The muscular system of old persons is not more subject to disease than that of adults.

The bones of the old undergo an alteration of the proportions of their animal matter (organized matter) compared to their mineral ingredients (unorganized matter). The former is reduced in relative quantity, the latter is increased. As a consequence, the bones are more brittle and more liable to fracture. An example of fracture caused by trifling violence is seen in that of the neck of the thigh-bone (femur). This part of the bone may be broken by a wrench occasioned by tripping upon a carpet, or even by the weight of the body alone—what is known as "spontaneous" fracture. Connected with these changes in the bones there is often stiffness in the joints, due partly to alteration in the membrane covering the ends of the bones which make up the joint, partly to diminished secretion of the lubricating fluid (synovia) of the joint, and partly to the weakness of the muscles.

More serious troubles than those of the parts already mentioned occur in the internal organs of old persons. The circulatory apparatus undergoes changes, which—if not in themselves pathological—predispose to accident and disease. The tissues composing the walls of the heart and blood-vessels, as age advances, lose their elasticity and contractile force by the substitution of fat for muscle-cells, and eventually the deposit of calcareous salts. Fatty degeneration of the heart, with the deposit of various salts immediately under the thin lining membrane (endothelium) of the heart and arteries, weakens the heart, and may be followed by dilatations of its walls or of the walls of the arteries, resulting in the latter case in aneurisms. Further, fragments of such deposits on the valves of the heart and of the aorta may become detached and be carried forward in the circulation (embolism) until they lodge in some vessel too small to permit their further progress, and by blocking it up cut off the circulation of a certain area in the brain or lungs or

some other portion of the body (infarct). When fatty or calcareous degeneration occurs in the nutrient arteries of the heart (coronary arteries) the result may be what is known as angina pectoris, or some other form of disease, which in time is surely fatal. When an embolus lodges in the brain and becomes an infarct, the result is disturbance of that part of the brain; and this may go so far as to cause paralysis of the portion of the body over which it presides. In the lungs an infarct is likely to cause pneumonia. In the kidney an infarct causes also destruction of a certain portion of its working tissue. An infarct occurring in a toe is a common cause of what is called senile gangrene. The changes in the circulatory apparatus of old persons sometimes leads to unusual distension of the blood-vessels (plethora) or to dropsy caused by the leakage of their contents through their impaired walls.

The respiratory apparatus of old persons is especially liable to injury and disease. This is seen in the development of asthma, which may be considered here, although it is often regarded as a disease belonging to the nervous system and only showing its effects in the lungs. A very common cause of asthma is the development of emphysema, which is a dilatation of the air-cells (alveoli) that, like the leaves on a tree, are found at the ends of the minutest ramifications of the bronchial tubes. The lining membrane of the bronchial tubes is especially prone to disease in old persons, who suffer often and severely with bronchitis, and in whom this disease is almost as dangerous as it is in little children, whose bronchial tubes are so small that they are easily blocked up by an excess of their normal secretion. In advancing age there is a tendency to the development of consumption (phthisis), which finds its largest number of victims before the age of thirty years, and then diminishes in frequency until about the age of fifty years, when persons with weak lungs pass through a second period of danger.

The disorders of the digestive apparatus in old persons are to a certain extent connected with the loss of their teeth and the imperfect activity of their salivary glands. Partly on this account and partly because of the growing old of the mucous membrane of the stomach, indigestion is very frequently found in the old. The liver, which is part of the digestive apparatus and a most important organ in producing regular evacuations of the bowels, undergoes senile changes which sometimes result in jaundice, and frequently in constipation or in actual obstruction of the bowels, the former impairing the health and the latter being very dangerous to life. These changes sometimes lead to dropsy, because they constrict the large (portal) vein which brings back to the heart the blood from the abdominal viscera.

After middle life and in old age the kidneys often undergo changes, consisting in alterations of their structure caused by gout (gouty kidney), which are like those of the form of kidney disease called Bright's disease. In old age albumin or sugar may be excreted by the kidney to such an extent as to constitute a true albuminuria, or a diabetes mellitus. In some cases dropsy may occur. The old, like the very young, are liable to the discharge of small concretions from the kidney—what is called gravel. Such concretions, remaining in the kidney of the old, may cause the formation of stones (calculi), and these in turn may give rise to an inflammation accompanied by the formation of matter (pus), constituting what is known as pyelitis. In the old, and especially in men, the urinary bladder is frequently the seat of disease. Owing to the weakness of the muscles in its wall, there is often in the old an inability to properly evacuate this organ, leading sometimes to accumulation of its contents (technically called "retention"), which may result in partial paralysis of the organ and dribbling away of its contents, which deceives the sufferer into the notion that the organ must surely be empty. This involuntary evacuation sometimes depends upon a weakness in the circular muscular fibers at the neck of the bladder, and is then called "incontinence." In old men the prostate gland, which is situated close to the neck of the bladder, sometimes grows to such a size as to furnish a mechanical obstacle to the proper evacuation of the bladder. In such cases, and in others in which the bladder is not properly emptied, there often develops an inflammation of the bladder (cystitis), which may occasion very serious difficulty and even death. This inflammation is sometimes propagated along the tubes which lead from the kidneys to the bladder (ureters), and sets up what has been mentioned above as pyelitis.

The brain and nervous system in the old are peculiarly liable to functional and organic disorders. Vertigo is only a manifestation of a defect in the circulation within the brain. Stoppage of the circulation by an infarct may cause a passing disturbance or a paralysis which leads to death. The breaking of a blood-vessel in the brain, with the pouring out of blood into the general tissue of the brain, constitutes what is called apoplexy. There is also another form of apoplexy called serous, in which there is an internal dropsy caused by the passing of the watery parts of the blood through the thinned walls of the blood-vessels. In the old, palsy with its tremblings is frequently seen, and changes which elude detection by the microscope give rise to what is called senile dementia.

The constitutional diseases to which the old are especially liable are gout and rheumatism. To mention the many disturbances which may depend upon these diseases would require much more space than can here be given to the subject, and those who wish information on these points may consult articles under these titles.

Protection against the diseases of old age is best secured by attention to the general principles of health. The old should be well housed, well clothed, with especial care to protect their extremities; they should rest, and avoid strains of body or mind as far as possible. Moderate exercise is healthful; but it should be remembered that rest, and not activity, is the normal state of the old. In eating and drinking, the old should exercise temperance, as suggested by nature. The comparative inactivity of the body in old age is accompanied by a comparatively limited demand for food, and this should be taken at rather longer intervals than is common in the more active stages of life. Speaking from the physiological standpoint, the use of spirits should be regulated by the custom of each individual. Those unused to wine have no need for it when older; those accustomed to it may usually continue its use in moderation.

CHARLES W. DULLES.

Old'castle, Sir JOHN, Baron Cobham, popularly known as "the good Lord Cobham": religious reformer; b. in England about the middle of the fourteenth century; fought with credit in the French wars; obtained by marriage the title of baron; was an early convert to the doctrines of Wycliffe; took part with John of Gaunt, Duke of Lancaster, in his efforts to promote ecclesiastical reform, presenting a remonstrance on the subject in Parliament, entitled *Twelve Conclusions addressed to the Parliament of England*; wrote a number of discourses and satirical verses: declared the pope to be Antichrist; consequently was accused of heresy, and thrown into the Tower in the first year of Henry V. (1413); escaped to Scotland, and thence into Wales; was falsely accused of raising an army of 20,000 Lollards to overthrow the king; thereupon was outlawed by Parliament and a price set on his head. He was captured in Wales, was hung in chains alive upon a gallows, and burned to death by a slow fire at St. Giles's Fields, London, Dec. 25, 1417. See his *Life*, by Gilpin (1808).

Old Catholics: a body of seceders from the Roman Catholic Church. The movement dates from a protest against the papal infallibility decree of the Vatican Council in 1870 as being contrary to history and conscience. Dr. DÖLLINGER (*q. v.*), who had done more than any one else to incite to rebellion against the Vatican decrees, in an open letter to the Archbishop of Munich (formerly his pupil), declared (Mar. 28, 1871) that "as a Christian, as a theologian, as an historian, and as a citizen, he could not accept the Vatican decrees"; whereupon he was excommunicated Apr. 17, 1871, as being guilty of "the crime of open and formal heresy." His colleague, Prof. Friedrich, incurred the same fate. The latter became an Old Catholic, but Döllinger did not follow. The movement spread with considerable rapidity in Germany and Switzerland. It professed to retain the whole Catholic system, with the exception only of the Vatican decrees, which were regarded as dangerous innovations. It never identified itself with Protestantism in any form; but it is regarded by the Roman Catholic Church as neo-Protestant, since it denies her authority, rejects her specific doctrines, and affiliates with many religious bodies considered by her outside the pale of the true faith. It was formally organized in 1873 by the election of Prof. Joseph Hubert Reinkens as bishop. He was consecrated by the Jansenist bishop Heykamp at Rotterdam Aug. 11, 1873, and recognized in this new dignity by the Prussian Government. He resides at Bonn on the Rhine. The Old Catholics, or "Christian Catholics," of Switzerland elected Edward Herzog, formerly a priest at Olten, their bishop. He was consecrated by Bishop

Reinkens at Rheinfelden, Sept. 18, 1876, and resides at Berne. In 1880 he visited the U. S. as a guest of the General Convention of the Protestant Episcopal Church then in session at New York. The Old Catholics are most in sympathy with the Episcopal Church of England and the U. S., but still retain the mass and most of the doctrines and ceremonies of the Roman Church. The question of clerical celibacy nearly created a split among them. They have a theological faculty at Bonn, and one at Bern. The movement never extended beyond Germany and Switzerland, but Père Hyacinthe, the eloquent ex-preacher of Notre Dame, who has a small congregation of admiring followers in Paris, has recently declared himself an Old Catholic. The Old Catholics of Germany and Switzerland held a second international congress at Lucerne Sept. 13–15, 1892, at which they resolved to publish an international theological quarterly review, to be edited by Prof. Michaud, of Berne. The Old Catholic congregation in Bonn is the most flourishing, though not very large, and celebrated in 1892 its twentieth anniversary, at which Bishop Reinkens and Prof. von Schulte delivered addresses. The movement seems to have almost spent itself. For the Old Catholic side, see Joh. Friedr. von Schulte, *Der Altkatholicismus, Geschichte seiner Entwickelung*, etc. (Giessen, 1887); Fr. Nippold, *Neueste Kirchengeschichte* (Berlin, 4th ed. 1892); *Proceedings* of the Second International Old Catholic Congress (Lucerne, 1893); *Revue internationale de théologie*, edited by E. Michaud. For a *résumé* of the Roman Catholic view of this schism, see Hergenroether, *Kirchengeschichte* (vol. iii., pp. 979–984).

PHILIP SCHAFF.

Oldenburg, ōl'den-boorch: grand duchy of North Germany. It consists of three distinct parts, viz.: Oldenburg proper, bordering N. on the German Ocean and surrounded on the other sides by Hanover; the principality of Lubeck, wholly inclosed by Holstein, the Baltic, and territory of the free city of Lubeck; and the principality of Birkenfeld, situated in Rhenish Prussia. Total area, 2,479 sq. miles. Pop. (1900) 398,499. Oldenburg proper is low and flat; large dikes have been erected along the shores of the ocean and the rivers Weser and Jahde. The soil is partly marshy, partly sandy, in some places covered with extensive forests, in others with heath. Agriculture and cattle-breeding are the chief occupations; of manufactures there are none. Oldenburg was established as an independent state, ruled by a count, at the end of the eleventh century. The family that established its power then has ruled ever since, giving, moreover, new dynasties to Russia, Denmark, and Sweden. In 1773 Oldenburg was made a duchy, and in 1815 a grand duchy. A constitution was given to the grand duchy Feb. 18, 1849, which, revised by a decree of Nov. 22, 1852, granted liberty of the press, trial by jury, and equality of all citizens in political and social matters. The legislative power is exercised by a *Landtag* or diet; the executive, by a responsible ministry under the grand duke.

Oldenburg: city of Germany; capital of the grand duchy of Oldenburg. It has several good educational institutions, museums, and scientific collections; a public library with 100,000 volumes, a fine ducal palace with beautiful gardens; two large and much-frequented cattle and horse fairs; and an active trade on the river Hunte, here navigable for small vessels. Pop. (1890) 21,646.

Old English: See ENGLISH LANGUAGE and ENGLISH LITERATURE.

Old'ham: town; in the county of Lancashire, England; on the Medlock; 6 miles from Manchester (see map of England, ref. 7–G). In 1760 it consisted of only sixty houses, but the discovery of rich coal mines in its immediate vicinity occasioned the establishment of large cotton-factories, and soon it became one of the leading manufacturing towns of England. It has nearly 300 cotton-mills with over 12,000,000 spindles, which consume one-fifth of the total imports of cotton into England. Its other manufactures include velvets, silks, hats, cords, etc., besides great weaving-machine works. The parliamentary borough, which is larger than the municipal, returns two members. Pop. (1891) 131,463; (1901) 137,238.

Oldha'mia [Mod. Lat., named from Dr. Oldham, late director of the Geological Survey of India]: a peculiar organism having a branching, plant-like form, thought by some to be a polyzoon, by others a vegetable; found in the Cambrian rocks of Ireland, and interesting as one of the first-known forms of life.

Old Light: See NEW LIGHT.

Old Man's Beard: See FRINGE-TREE.

Old Persian: See PERSIAN LANGUAGE.

Old Prussian Language: an extinct variety of the Lithuanian language. It was the language of the early inhabitants of the territory between the Deime, the Alle, and the Weichsel. Only the scantiest means of information concerning it have been handed down to us. This is attributable to the fact that the German orders, which in the thirteenth century had subdued the Prussians, after the bloody struggle forbade the use of the language, which was in consequence after the introduction of the Reformation into Prussia already so far repressed that even the kindly encouragement of Duke Albrecht, the first secular ruler of the province, could not avail to prevent its speedy extinction. From the period prior to the secularization of Prussia there is preserved but one record of the language, namely, the so-called *Elbing Vocabulary*, a manuscript dating from about 1400, which was, however, copied from an original belonging to the thirteenth century. This vocabulary contains 803 Prussian words with a German translation, and appears to have been prepared for the use of officials of the orders who acted as judges. The other sources of the Old Prussian are, with the exception of certain lesser materials and various names of places and persons, two translations differing in dialect of Luther's lesser catechism (Königsberg, 1545), and a translation of Luther's *Enchiridion* (Königsberg, 1561). These versions are unfortunately so imperfect and the orthography of the *Elbing Vocabulary* is so bad that all these texts yield little more than a caricature of the Old Prussian language, which was entirely extinct by the end of the seventeenth century. For the study of the Old Prussian we are limited almost exclusively to the works of G. H. F. Nesselman: *Die Sprache der alten Preussen an ihren Ueberresten erläutert* (Berlin, 1845); *Ein deutsch-preussisches Vocabularium* (Königsberg, 1868); *Thesaurus linguæ prussicæ* (Berlin, 1873). These fail, however, to satisfy scientific needs. See LETTIC RACE.

A. BEZZENBERGER.

Old Red Sandstone: an important geologic formation of Devonian age occurring in Scotland and Wales. The name was formerly applied also to one of the units of geologic chronology, but in that sense has been replaced by Devonian. This change accords with the general tendency in geologic nomenclature to avoid giving a chronologic meaning to petrographic terms, which can be actually descriptive only in restricted districts. The formation in Scotland has an estimated thickness of 6,000 to 20,000 feet, including shales, conglomerates, and volcanic tuffs, as well as the characteristic red sandstones. It is believed to have been laid down in inland lakes or seas, and is distinguished by its remarkable fish remains, which constitute a principal theme of Hugh Miller's classic works, *The Old Red Sandstone* and *Footprints of the Creator*. See DEVONIAN PERIOD, and Archibald Geikie's paper on *The Old Red Sandstone of Europe* in the *Transactions* of the Royal Society of Edinburgh, vol. xxviii. (1879).

G. K. GILBERT.

Old-School Baptists: See ANTI-MISSION BAPTISTS.

Old Style: See CALENDAR.

Old Testament: See BIBLE.

Old Wife, or **Old Squaw**: a common name for the long-tailed duck (*Harelda glacialis*), an abundant and prettily marked species of the northern hemisphere generally, though most common along the coast. The breeding plumage is varied with black, white, and brown, and the two central tail-feathers of the male reach a length of 8 or 9 inches. For the fish of this name, see WRASSE.

F. A. L.

Oleacin'idæ [Mod. Lat., from *Oleacina*, the name of one of the genera]: a family of terrestrial gasteropod molluscs of the order *Pulmonata*. The shell is spiral, and in most oblong and with a narrow aperture, but in some is depressed and heliciform, with a wide aperture. The family includes numerous species.

Olean: city (chartered 1893); Cattaraugus co., N. Y. (for location, see map of New York, ref. 6–C); at the junction of the Allegheny river and Olean creek; on the Erie, the West. N. Y. and Pa., and the Cent. N. Y. and West. railways; 69 miles E. S. E. of Buffalo. It is on the border of the largest hemlock lumber belt in the U. S., is close to the Pennsylvania oil-fields, and is the center of large lumber and tanning interests. It is also the eastern terminus of the Ohio pipe-line and the western terminus of a pipe-line

from the Pennsylvania oil-fields to the Atlantic seaboard, and contains one of the largest refineries of the Standard Oil Company, with immense storage tanks. There are 11 churches, 7 public-school buildings, public library, a commercial college, St. Mary's parochial school, 2 banks, 2 daily, a semi-weekly, 2 weekly, and 3 monthly periodicals, and a State armory. The city is lighted by electricity, and has natural gas for fuel and lighting, electric street-railway, 3 flour-mills, 4 foundries and machine-shops, railway-shops, 2 planing-mills, marble, glass, barrel, and lubricating works, and other industries. Pop. (1880) 3,036; (1890) 7,358; (1900) 9,462. JAMES H. MCKEE.

Olean'der [Fr. *oléandre* : Ital. *oleandro* : Span. *eloendro*, under influence of *oleum* from Lat. **lorandrum*, itself a corruption, under influence of *laurus*, *lorus*, of *rhododendron* = Gr. *ῥοδόδενδρον*; *ῥόδον*, rose + *δένδρον*, tree]: an evergreen shrub (*Nerium oleander*) of the family *Apocynaceæ*, a native of warm parts of the Old World, and now extensively cultivated. In colder regions it thrives as an ornamental shrub, but requires protection from frost. Its flowers are usually of a rich-pale red, but are sometimes white. *N. odorum*, the fragrant oleander, a native of India, is a more tender species, with sweet-scented flowers. The wood and all parts have a poisonous action resembling that of digitalis, best treated by a judicious use of stimulants.
Revised by L. H. BAILEY.

Olearos: See ANTIPAROS.

Oleas'ter [Lat., wild olive-tree, deriv. of *o'lea*, olive-tree]: a small tree (*Elæagnus angustifolia*) of the family *Elæagnaceæ*, a native of warm regions in the Old World; is planted as an ornamental tree for its silvery foliage. Its flowers are exceedingly fragrant. Several other species of *Elæagnus* are cultivated for ornament, and one, the goumi of the Japanese (*E. longipes*), is now somewhat grown for the acid berries. L. H. B.

Ole Bull: See BULL, OLE BORNEMANN.

Olefiant Gas: See ETHYLENE.

O'lefines [deriv. of *olefiant*; Lat. *o'leum*, oil + *-ficare*, make, produce]: hydrocarbons of the general formula C_nH_{2n}, homologous with ethylene, C_2H_4, so called from their property of forming oily compounds with chlorine, like Dutch liquid, $C_2H_4Cl_2$. They are found among the products of destructive distillation, and may be formed by the exposure of paraffins to high temperatures under pressure; thus:

Butane. Ethyl hydride. Ethylene.
$$C_4H_{10} = C_2H_6 + C_2H_4.$$

See ETHYLENE, HYDROCARBONS, and TAR.

O'leic Acid [*oleic* is from Lat. *o'leum*, oil]: an acid (formula $C_{18}H_{34}O_2$), discovered in 1811 by Chevreul; the most important of the group of fatty acids of the general formula $C_nH_{2n-2}O_2$, set free by the saponification of olein, the fluid component of most oils and natural fats. It is obtained by treating olive oil, almond oil, or animal oils, by a caustic alkali, preferably by potash, decomposing the resulting soap by tartaric acid, and heating the fatty acid, after first washing it with water in the water-bath with half its weight of oxide of lead in fine powder for some hours. The oleate of lead, separated by ether and filtration from the stearate, is decomposed by dilute hydrochloric acid, and the ethereal solution of oleic acid is then separated from the acid-water, washed, and the ether distilled from it. Oleic acid is soluble in alcohol, and crystallizes from it on cooling in brilliant crystals which melt at 57° F. to a clear colorless oil. At 39° F. this fluid acid solidifies to a hard white crystalline mass, which expands as it cools. Oleic acid distills over unchanged in a vacuum, and is even soluble in strong sulphuric acid at ordinary temperatures without decomposition. It is without smell or taste when pure, and is insoluble in water. Alcohol and ether dissolve it in all proportions, and in solutions it reacts neutral. By air it is slowly oxidized at ordinary temperatures, but it rapidly absorbs oxygen when melted, becoming rancid both to smell and taste, and then develops a strong acid reaction. It dissolves the solid fats, and is itself dissolved by sodium chloride (as in bile), forming a soap with an acid reaction.

Very large quantities of crude and high-colored oleic acid are produced in the lime saponification of lard and tallow by Chevreul's method in the manufacture of stearin candles. The insoluble lime-soap formed in this process is decomposed by dilute sulphuric acid, and the cake of fatty acids which forms on the surface of the cooled mother-liquor holds the oleic acid entangled in the stearic and margaric acids, from which it is in great part freed by filtration at 32° in the hydraulic press. This impure oleic acid, which is found in commerce under the name of *red oil*, yields pure oleic acid after separation from its lead-salt, after a second saponification with an alkali, and is salted out with sodium chloride mixed with sodium carbonate, by which means only can it be freed from the associated coloring-matters. At 66° F. the specific gravity of oleic acid is 0·898. Nitrous acid converts oleic acid into elaidic acid, an isomeric form of oleic acid, without forming a second decomposition product. Nitric acid acts on oleic acid with violence, evolving volatile acids of the general formula $C_nH_{2n}O_2$—namely, acetic, butyric, propionic, caproic, etc.—and mixed acids of the general formula $C_nH_{2n-4}O_2$, such as suberic, pimelic, adipic, etc.; the number and proportion of these depending on the activity and duration of the reaction. With the metals oleic acid forms neutral oleates $M'(C_{18}H_{33}O_2)$ or $M''(C_{18}H_{33}O_2)_2$, according to the equivalence of the metal. The neutral oleates of the alkali metals are soluble in water, and are not completely thrown down from solution, as are the stearates and palmitates, by the addition of another soluble salt. The acid oleates are liquid and insoluble in water. Absolute alcohol and ether dissolve the oleates in the cold, by which reaction they are distinguished and separable from the stearates and palmitates.
Revised by IRA REMSEN.

O'lein, or **Ela'in** [from Gr. *ἔλαιον*, oil]: that portion of oil or fat which remains liquid at ordinary temperatures; the oily principle of solid fats. It is of variable composition, but in all cases it consists of oleic acid, or of some acid homologous with the oleic, combined in various definite proportions with glycerin. Drying oils and volatile oils do not contain olein. The olein of commerce is chiefly a crude oleic acid prepared from palm oil in the British candle-factories. "Lard oil" is a similar product derived from lard in the U. S. Both are now chiefly used for oiling machinery. See OLEIC ACID.

Oleomargarine [Lat. *o'leum*, oil + margarine]: See BUTTER, ARTIFICIAL; CHEESE, and MARGARINE.

Oler'iculture: that branch of horticulture which treats of the art and science of growing kitchen-garden vegetables. It is synonymous with the term vegetable-gardening. The strawberry is referred to olericulture in Europe, but in the U. S. to pomology; the melon to pomology in England, but in the U. S. to olericulture. *Truck-gardening*, or *trucking*, is a term applied to that style of vegetable-gardening which grows vegetables upon a somewhat large scale for strictly commercial purposes, in distinction from *farm-gardening* or *kitchen-gardening*, in which plants are grown for home use. *Market-gardening* is identical with *truck-gardening*, although the eleventh census of the U. S. separated them, using the latter term to designate the industry when "carried on in favored localities at a distance from market, water and rail transportation being necessary," while market-gardening is "conducted near local markets, the grower of vegetables using his own vehicle for transporting his products direct to either the retailer or consumer."

The truck-gardening interests of the U. S., as reported by the eleventh census, employed 534,440 acres of land in 1890. The most important trucking districts are the New England, the New York and Philadelphia, the peninsular, comprising the Delaware and Chesapeake peninsula, the Norfolk, the Southern Illinois, and the South Atlantic. The most notable single trucking center is Norfolk, Va., where light warm soil, the proximity of the Gulf Stream, and excellent water and rail transportation combine to afford the best natural conditions and economical market facilities. The truck-gardening interests of the U. S. have been greatly modified and extended by the introduction of simple and efficient forcing-houses. (See GREENHOUSE.) Tomatoes, cucumbers, radishes, lettuce, and other crops are now grown with as much profit in winter as in summer. The largest acreage devoted to a single crop in the census year was 114,381 acres in watermelons; there were 77,094 acres in cabbages, 56,162 in pease, and 37,970 in asparagus. See Vilmorin-Andrieux's *Vegetable Garden* (English edition); Henderson's *Gardening for Profit*; Burr's *Field and Garden Vegetables of America*; Greiner's *How to Make the Garden Pay*. L. H. BAILEY.

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

Olga, SAINT: a patron saint of Russia, who in 903 became the wife of the Grand Duke Igor I. of Kieff. He was murdered 945, and Olga became regent in the name of their

son Sviatoslaff. She punished the murderers cruelly and made a vigorous ruler. When Sviatoslaff ended his minority (955) and ascended the throne, she retired to Constantinople, embraced Christianity and was baptized under the name of Helena. She returned to Russia, labored earnestly, but with indifferent success, to introduce Christianity—her son never accepted it—and died at Kieff in 969, aged about eighty years. Her day in the Russian calendar is July 11. See Castremont, *Histoire de l'introduction du Christianisme sur le continent Russe, et la vie de Sainte Olga* (Paris, 1879).

Revised by S. M. Jackson.

Olib'anum [=Late Lat., from Arab. *al*, the + *lubān* (whence Gr. λίβανος), frankincense]: a gum resin which exudes from the tree *Boswellia serrata*, which grows in Africa and India. It occurs in oblong or rounded laminæ, opaque, of yellow or reddish color, dull and waxy on the fracture. It melts with difficulty and imperfectly when heated, and burns with a bright flame. It has a balsamic, resinous smell and an acrid bitter taste. Triturated with water, it forms a milky, imperfect solution. Alcohol dissolves nearly three-fourths of it. Braconnot (*Ann. Chim. Phys.* (2), lviii., 60) found 100 parts of it to yield 8 of volatile oil, 56 of resin, 30·8 of gum, and 5·2 of a glutinous body insoluble in water and alcohol, with some mineral matter. It is used for fumigation and in the preparation of plasters It has been burned from antiquity in religious ceremonies. See Boswellia, Frankincense, and *U. S. Disp.*; *Jahresb.*, 1858, 482; *Ann. Chem. u. Pharm.*, xxxv., 306; *Zeit. f. Chem.* (2), vii., 201.

Olifant River, or **Elephant River**: See Limpopo River.

Ol'igarchy [from Gr. ὀλιγαρχία; ὀλίγος, few + ἄρχειν, rule]: a form of government in which the supreme power is vested in a small class of persons. It differs from aristocracy in the extent of the governing class, which in an aristocracy usually embraces the entire body of the nobles, while in an oligarchy a certain political clique or coterie has the controlling influence. Oligarchies have been among the most unjust and oppressive of governments, and for the most part have been short-lived.

Oligocene Period [*oligocene* is from Gr. ὀλίγος, small + καινός, new]: a division of geologic time succeeding the Eocene period and preceding the Neocene. In the classification of Cenozoic or Tertiary time by Lyell three divisions were recognized: Eocene (older), Miocene, and Pliocene. Subsequently it was found advantageous in classifying certain European formations to substitute two divisions for the Eocene, the name Eocene being retained for the older and Oligocene, proposed by Beyrich, being applied to the younger. In the nomenclature adopted by the U. S. Geological Survey for the geologic atlas of the U. S. the earlier use of Eocene is restored. See Eocene Period. G. K. G.

Oligochætæ [Mod. Lat., from Gr. ὀλίγος, few + χαίτη, bristle]: an order of Annelid worms, of which the earthworms may be taken as types. In all the elongate cylindrical body is without distinct head, without any distinct appendages, but with a few bristles on each segment, the remnants of the fleshy feet (parapodia) with many bristles occurring in other Annelids. These worms are hermaphrodite, and the young develop without a metamorphosis. Two divisions are usually recognized. The first is the *Terricolæ*, or Earthworms (*q. v.*), which live in moist earth; the second, the *Limicolæ*, live in the ooze at the bottom of the water, but few occurring in the sea, the great majority being inhabitants of fresh water. Of the *Limicolæ* there are many genera, which are grouped in five families. Little is known of the American forms. The genera of *Terricolæ* are numerous. The student should consult Wilson's papers on the embryology (*Journal of Morphology*, i. and iii.) and the numerous papers on the anatomy and species, by Beddard and Benham, in the *Quarterly Journal of Microscopical Science* since 1885. J. S. Kingsley.

Olin'da: a town of the state of Pernambuco, Brazil; on a low promontory of the coast, about 9 miles N. of the city of Pernambuco, with which it is united by railway (see map of South America, ref. 4–H). It was the first settlement in Northern Brazil, having been founded in 1535; was long the capital of Pernambuco, and having been taken by the Dutch, was the capital of their colony in Brazil from 1630 to 1654. Until about 1710 it was the most important commercial city of the coast N. of Bahia. Recife, or Pernambuco, which had been a fishing village, gradually supplanted it as a trading center, and eventually became the political capital; but Olinda remained the see of the bishop. It is now the residence of many wealthy Pernambucans, and is a favorite resort for bathing, etc. Its quaint old buildings, erected by the Portuguese and Dutch, are very interesting. Pop. (1891) about 9,000. Herbert H. Smith.

Oliphant, Carolina: See Nairne.

Oliphant, Laurence: traveler, author, and mystic; b. in England in 1829, son of Sir Anthony Oliphant, subsequently chief justice of Ceylon; went to Ceylon in his youth; visited Nepaul in 1850; journeyed through Southern Russia and the Crimea, and in 1853 published *The Russian Shores of the Black Sea*; became private secretary to Lord Elgin, Governor-General of Canada; subsequently was superintendent of Indian affairs in Canada; published *The Trans-Caucasian Provinces the Proper Field of Operations for a Christian Army* (1855); accompanied the army of Omar Pasha to the region in question; wrote *The Trans-Caucasian Campaign of Omar Pasha* (1856); accompanied Lord Elgin as private secretary on his mission to China in 1857; wrote *A Narrative of the Earl of Elgin's Mission to China and Japan* (1860); was *chargé d'affaires* in Japan 1861; sat in Parliament for the Stirling burghs 1861–68; joined with his mother the semi-religious community established by Thomas L. Harris at Portland, Chautauqua co., N. Y.; became correspondent of *The Times* in Paris in 1870, and manager of the American interests of the Direct Cable Company; about 1875 settled at Haifa, Palestine, having interested himself in the project for colonizing Palestine with the Jews. D. at Twickenham, England, Dec. 23, 1888. Among his works were *The Land of Gilead* (1880); *Episodes in a Life of Adventure* (1887); *Scientific Religion* (1888); and the novels *Piccadilly* (1870); *Altiora Peto* (1883); and *Masollam* (1886). See *Life* by Mrs. M. O. W. Oliphant (1891).

Oliphant, Margaret O. Wilson: novelist; b. at Wallyford, near Musselburgh, Scotland, in 1828; published more than seventy books, including a large number of successful novels and other works of fiction, consisting chiefly of delineations of Scottish and English life and character, most of which have been republished in the U. S. Among them are *Passages in the Life of Mrs. Margaret Maitland* (1849); *Adam Graeme of Mossgray* (1852); *The Chronicles of Carlingford* (1863); *Salem Chapel*; *The Perpetual Curate* (1864); *The Minister's Wife* (1869); *A Rose in June* (1874); *Within the Precincts* (1879); *A Little Pilgrim: in the Unseen* (1882); *A Country Gentleman* (1887); *Sons and Daughters* (1890); *The Cuckoo in the Nest* (1893). She wrote biographies of Edward Irving (1862), St. Francis of Assisi (1871), Count Montalembert (1872), Principal Tulloch (1888), Thomas Chalmers (1893), and others; *Historical Sketches of the Reign of George II.* (2 vols., 1869); *Royal Edinburgh* (1890); *The Literary History of England from 1790 to 1825* (1882); *The Victorian Age of English Literature* (1893). D. in Wimbledon, England, June 25, 1897.

Oliphant, Thomas Laurence Kington: biographer and philologist; b. near Bristol, England, Aug. 16, 1831; educated at Eton and Oxford; studied law at the Inner Temple; is author of *Life of the Emperor Frederick the Second* (1862); *Jacobite Lairds of Gask* (1870); *Sources of Standard English* (1873); *Life of the Duc de Luynes* (1875); *Old and Middle English* (1878; 2d ed. 1893); *New English* (1886).

Olivares, ō-lĕē-vaa'rās, Gasparo de Guzman, Count of: prime minister of Philip IV. of Spain; b. in Rome, Jan. 6, 1587, his father being at that time the Spanish ambassador at the papal court; studied at Salamanca; became influential in court circles as the trusted friend of the heir-apparent, who, on succeeding to the throne in 1621, made him Duke of San Lucar de Barrameda, and intrusted the administration to his direction. Under his ministry Spain was involved in wars with Portugal, France, and the Netherlands; the people were impoverished by the heavy taxes; revolts broke out in Catalonia and Andalusia, and Portugal secured her independence. The failure of his policy caused his dismissal from court, and having afterward published a work that gave offense to people in authority, he was banished to Toro, where he died July 22, 1645.

Olive [viâ O. Fr., from Lat. *oli"va*, *o'lea*, from Gr. ἐλαία, olive-tree]: a tree of the genus *Olea* (*Olea europæa*). The olive-tree has been grown from the most ancient times, both in Europe and Asia Minor; both fruit and oil form important products of the Mediterranean region, where the bland "sweet" oil replaces butter and other animal fats for table and culinary use; while all over the world it is used for

salads as well as for medicinal purposes, in preference to all others. The pickled fruit also is in its home an article of food in common use, while elsewhere esteemed a table delicacy. The tree is a slow grower, but attains great size and age; some groves have an historic celebrity, and are preserved with scrupulous care. The wood is close-grained, hard, of a yellowish tint, and is much esteemed for carving and fine work generally. The small-fruited wild olive (oleaster) is of value only as a grafting stock for the improved varieties, of which over thirty are cultivated in Southern France alone, and many others in Spain and Italy, the three countries that chiefly supply the commercial demand. The olive has been extensively propagated in California, where the "mission olive" was early introduced by the Franciscan missionaries; and that State produces both excellent oil and pickled fruit. Attempts to introduce it into the Southern U. S. have not been successful, on account of the occasional severe changes and low temperatures occurring there. According to Humboldt, for the success of the olive the mean temperature of the coldest month should not fall below 41·5° F. or 5° C. Some varieties are much hardier than others, bear considerable frost, and require less heat to mature the fruit.

The tree is propagated either from twig cuttings, from sprouts of truncheons of old wood set in moist ground, or from gnarled woody buds (*novoli*) that form mostly near the base of the trunk. It begins to bear from the seventh to the ninth year, according to climate and varieties, some trees yielding crops alternate years, others annually. The crop increases up to the thirtieth year, when single trees, it is said, sometimes yield as much as 300 lb. of oil; but ordinarily 10 to 15 lb. per tree is accepted as a fair crop, corresponding to about 70 to 100 lb. of the fruit. While the tree is not very exacting as to soil, is not exhaustive, and is often seen doing well on stony slopes, it responds gratefully to fertile soil and liberal fertilization; the pomace from the oil-press is frequently the only return it receives for years, and the fact that the oil takes nothing from the soil accounts in part for the persistence of its production in the oldest countries. The color of the fruit when fully ripe (in November and December) is purple or purplish black; its shape varies from almost round to long-oval; the oil is contained (to the extent of 15 to 25 per cent. of the whole fruit) in the watery flesh, together with a bitter astringent principle, which renders the natural fruit uneatable, but belongs only to the juice, and can readily be extracted by weak lye. The hard pit varies much in size; the little oil contained in its kernel deteriorates that of the flesh, and is excluded from the best qualities when practicable. The best varieties for oil are not well suited for pickling; the pickling olives should be large, firm-fleshed, and have a small pit, like the "queen olive" of Spain.

For *oil-making* the fruit is not allowed to get fully ripe, as the oil would then be thick and rank-tasting; for the best quality the flesh must still be firm, the color golden to purplish only, and the fruit must be worked quickly after gathering. It is usually pulped in an edge-wheel crushing-mill of stone; but as this crushes the pits, improved tinned-iron mills in which this can be avoided are now being introduced. The highest quality, "virgin" oil, is that which flows from the crushed mass without pressing; its quantity is usually quite small, and it is not ordinarily found in commerce. The next best, the first quality of commerce, is obtained by pressing the cold pulp in round flat baskets or bags, made of such perfectly inodorous, strong materials as palm-leaves, esparto grass, bamboo, or (in California) canvas cloth; the oil being extremely liable to absorb any odors with which it may come in contact, the utmost cleanliness and exclusion of all damaged fruit must be carefully observed. After the first pressing, the pomace or press-cake is broken up, reground, and thinned with cold water; there follows a second pressing which yields a commoner quality of oil, used by the poorer classes of the population. A third, and occasionally a fourth pressing with *hot* water yields a still inferior oil, used for burning, lubrication, and soap-making.

The liquids flowing from the press are murky-looking emulsions of the watery juice with minute droplets of oil. They are usually allowed to settle in appropriate tanks, an operation which according to circumstances may require from a few weeks to several months, and during which the air is excluded as much as possible to avoid rancidity. The oil floating on top is dipped or drawn off, and if not perfectly limpid is filtered, so as to remove completely any of the acrid juice that would render it unpalatable. Of late a more rapid process of separation, by means of a water-current in a settling-tank, has been introduced with great advantage.

The *pickled olive* is an important article of commerce, and in the olive-growing countries also an important part of the daily food. For home use the fruit is allowed to grow much riper than when intended for export, and is then more palatable and digestible, but more difficult to keep. In either case the acridity may be extracted slowly by water alone, frequently changed and then replaced by brine, together with laurel-leaves, coriander, fennel, etc., and sometimes vinegar, according to taste; but for export the fruit, when barely turning color and still quite hard, is steeped in caustic lye of varying strength (4 to 6 oz. to a gallon of water) for eight to ten or more hours, until the pit is readily detached from the flesh. The lye is then replaced by cold water, renewed daily, until the acridity is removed, and then by brine, which may or may not be flavored as above. Sometimes the fruit is also pitted, stuffed with capers, and preserved in fine oil.

The olive oil industry has suffered greatly from the adulteration (chiefly carried out at Marseilles) with cheaper oils, especially that of the peanut (*Arachis hypogæa*) and of cottonseed. The latter addition, if not too heavy, is difficult of detection by the taste, though easily shown by chemical reagents. E. W. Hilgard.

Olive Family, or **Olea'ceæ** [*Oleaceæ* is Mod. Lat., named from *O'lea*, the typical genus, from Lat. *o'lea*, from Gr. ἐλαία, olive-tree]: a family of dicotyledonous trees and shrubs, including about 300 species, mostly natives of warm, temperate, and tropical climates, the ash alone having a higher northern range. The leading character of the family is that of having regular gamopetalous or sometimes polypetalous flowers, with the parts of the calyx and corolla four and hypogynous, while the stamens are only two, and the ovary two-celled; but some are apetalous. The olive-tree is far the most important representative of the family, and next to it the ash-trees with their excellent tough timber, one species also yielding manna. Among the small trees or shrubs cultivated for ornament are lilacs, privet, fringe-tree, Forsythia, and jasmine.

Oliver, George, D. D.: clergyman and author; b. at Papplewick, England, Nov. 5, 1782; graduated at Cambridge 1803; took orders in the Church of England; became head master of King Edward's grammar school at Great Grimsby 1809; vicar of Scopwick 1831; incumbent of Wolverhampton 1834, and rector of South Hykeham, Lincolnshire, 1847; filled high posts in the Masonic order, and wrote several works upon Masonry which met with wide acceptance. Among them are *Historic Landmarks of Freemasonry*, *The History of Initiation*, *Antiquities of Freemasonry*, and *Institutions of Masonic Jurisprudence*. D. Mar. 3, 1867.

Oliver, Grace Atkinson: See the Appendix.

Oliver, Peter, LL. D.: chief justice of Massachusetts; b. at Boston, Mass., Mar. 26, 1713; graduated at Harvard College 1730; held several offices in Plymouth County, and was appointed a justice of the Supreme Court Sept., 1756; became chief justice 1771; was impeached by the House of Representatives 1774 for refusing to subscribe an engagement to receive no pay or emolument except from the Assembly; accompanied the British troops on their retirement from Boston 1776; subsisted some years in England on a grant from the crown. D. at Birmingham, Oct. 13, 1791. He was author of various political writings and of some poems.

Olives, Mount of, or **Mount Olivet**, now **Jebel et-Tûr** (mount of the rock): an eminence on the E. of Jerusalem, from which it is separated by the narrow valley of Jehoshaphat. It rises 2,693 feet above the level of the sea, and 100 feet above the most elevated part of Jerusalem. It forms the middle summit of a ridge of hills which to the N. expands into a large elevated table-land, but which here contracts and terminates in a row of three hills. The southernmost of these hills is now called the "Mountain of Offense," because Solomon there instituted the pagan worship for his concubines. The northern hill was the place where Titus encamped when he besieged Jerusalem. The middle summit is the proper Mount of Olives. At its foot, near the bridge over the brook of Kedron, lies the garden of Gethsemane. Its swelling sides are streaked with patches of bare rock between the olive groves, which are planted in terraces. The Church of the Ascension, built upon its

top by Helena, which was seen by Sir John Mandeville in 1327, has disappeared, and in its place is a small octagonal chapel within a paved court connected with a mosque. In the Old Testament, Mt. Olivet is first mentioned in connection with the flight of David from Absalom (2 Sam. xv. 30); next as the scene of the worship of Chemosh and Moloch, set up by Solomon (1 Kings xi. 7), but destroyed by Josiah (2 Kings xxiii. 13); and finally as the place from which, by the order of Ezra, the people got the branches for the feast of tabernacles (Neh. viii. 15). In the New Testament the allusions are more numerous. "It is very prominent," Schaff says (*Through Bible Lands*, n. e., p. 272), "in the closing scenes of our Saviour's ministry. In Bethany, on the eastern slope of Olivet, he had his most intimate friends, Lazarus, Martha, and Mary, and performed his last and greatest miracle (Luke x. 38–42; John xi.); from Mt. Olivet he made his triumphal entry into Jerusalem (Luke xix. 29–38); here he spent the nights intervening between the entry and his passion, and returned every morning to teach in the temple (Luke xxi. 37); descending from this mountain, he wept over the ungrateful city and foretold her fearful doom (Luke xxi. 41–44); to it he repaired on the night of his betrayal (John xviii. 1); from it he ascended to heaven to take possession of his throne (Luke xxiv. 50; Acts i. 12)." See also Tobler, *Siloahquelle und d. Oelberg* (St. Gall, 1852). Revised by S. M. Jackson.

Olivet College: an institution of learning at Olivet, Mich.; founded in 1844. While not sectarian, it is more closely related to the Congregational denomination than to others. Its nine buildings, well placed in a charming spot, are well built and finely equipped. The musical department and the department of science are exceptionally well equipped. The yearly attendance is about 300. The value of the college property and endowment is about $300,000.
Willard G. Sperry.

Oliv'idæ [Mod. Lat., named from *Oli'va*, the typical genus, from Lat. *oli'va*, olive (see Olive), named from its olive shape]: a family of Gasteropod molluscs, with elongate oval shells, the outer surface polished and frequently brightly colored. The spire is short, the mouth elongate, its inner lip obliquely plaited. The species of Olives are numerous (over 100), and are arranged among several genera. Their beauty makes them great favorites with collectors.

Olivier, ō'lĕv'vi-ā', Juste Daniel: poet; b. at Eysins, canton of Vaud, Switzerland, Oct. 18, 1807. He showed an early inclination to letters, and at eighteen won a prize in the poetical competition at Lausanne. In 1830 he published his first volume of poems, *Poèmes suisses*; this was followed by *L'Avenir* (1831); *L'Évocation* (1833); and *Les Deux Voix* (1835). About 1842 he became involved in political difficulties, left his professorship in Lausanne, and went to Paris, where he lived most of the rest of his life. D. in Geneva, Jan. 7, 1876. Later poetical works are *Les Chansons lointaines* (1847); *Dernières Chansons*; *Théâtre de société, fantaisies dramatiques* (1870). He also wrote a number of works in prose: *Le Canton de Vaud* (2 vols., 1837–41); *Études d'histoire nationale* (1842); *Mouvement intellectuel de la Suisse* (1845). A. G. Canfield.

Ol'ivine: See Chrysolite.

Ollier, ō'li-ā', Louis Xavier Édouard Léopold, M. D.: surgeon; b. in Lyons, France, in 1825; graduated M. D. at the School of Medicine, Paris, in 1857; settled in Lyons; appointed surgeon to the Hôtel Dieu and professor in the surgical clinic; paid special attention to the surgical pathology of bones and joints, and his researches on these subjects are highly esteemed by the medical profession. His principal works are *Traité expérimental et clinique de la régénération des os et de la production artificielle du tissu osseux* (Paris, 1867); *Traité des résections* (Paris, 1885–89).
S. T. Armstrong.

Ollivier', Émile: statesman; b. at Marseilles, France, July 2, 1825; studied law, and began to practice as an advocate at Paris in 1847. In 1848 he was sent as commissary-general to Marseilles to pacify the city, and shortly after he was appointed prefect, but in 1849 returned to his business in Paris. In 1857 he was elected a member of the Legislative Assembly, and made himself conspicuous by his courageous and eloquent opposition to the government of Napoleon III. Gradually, however, the emperor succeeded in winning him over to his side, and he was generally considered a political renegade, when on Jan. 2, 1870, he became Napoleon's prime minister. He was president of the cabinet when the war was declared against Prussia, but he retired Aug. 9, after the first reverses of the French arms. He was elected to the Academy Apr. 7, 1870. He was a candidate for election to the Chamber in 1876, in 1877, and in 1885, but was defeated on each occasion. He has published, among other works, *Démocratie et Liberté* (1867); *Le 19 Janvier* (1869); *Principes et Conduite* (1875); *L'Église et l'État au Concile du Vatican* (2 vols., 1879); *M. Thiers à l'Académie et dans l'Histoire* (1880); *Nouveau manuel de droit ecclésiastique français* (1885); and *1789 et 1889* (1890).
Revised by F. M. Colby.

Olmedo, José Joaquín, de: poet; b. in Guayaquil, Ecuador, May 20, 1780; d. there Feb. 19, 1847. Educated at Quito and Lima, he received the degree of doctor from the university of the latter city in 1805. He taught law for a time in the university, then began practice as an advocate in Guayaquil. In 1810 he went to Spain as a deputy to the famous Cortes of Cadiz, remaining in the mother-country until 1814. Returning to America, he was a member of the so-called Junta de Gobierno of Guayaquil (1820), and of the Constitutional Assembly of Peru (1823). He was one of the Peruvian deputation to seek military aid of Bolívar; and was sent by the latter as minister plenipotentiary to London, where he became a warm friend of Andrés Bello. Returning home in 1828 he was a member of the constitutional convention of Riobamba, which finally separated Ecuador from Colombia (1830). Elected successively vice-president of Ecuador and governor of the department of Guayas, he presided over the national convention of Ambato in 1835. In 1845 he headed the successful revolution against Gen. Flores, and directed the provisional government; but was defeated in his candidature for the presidency. It is, however, as a poet that he will be longest remembered, having in spite of the small amount of his production an indisputable claim to a foremost place in Spanish-American letters. His poetic manner is that of Quintana, too rhetorical for the taste of the present; and the title often given him, the South-American Pindar, indicates both his excellences and his defects. Few poets, nevertheless, are more widely read by Spanish-Americans. There is no good complete edition of his works. The most important are to be found in the *América Poética* of Gutierrez (Valparaiso, 1846). These should be supplemented by the *Poesías inéditas de Olmedo*, edited by D. Manuel Corpancho in 1861. See also Herrera, *Apuntes biográficos de D. J. J. Olmedo* (Quito, 1887).
A. R. Marsh.

Olmsted, Denison, LL. D.: scientist; b. at East Hartford, Conn., June 18, 1791; graduated at Yale 1813; was a college tutor 1815–17; became in 1817 professor of chemistry, mineralogy, and geology, and executed what is believed to have been the first State geological survey in the U. S. (report published 1824–25); became in 1825 Professor of Mathematics in Yale College, and in 1836 Professor of Astronomy and Natural Philosophy; published in 1831, 1832, and 1842 text-books on natural philosophy, several works on astronomy for schools, and a number of biographical memoirs; made important observations on hail, on meteors, the aurora borealis, etc.; his conclusions regarding the latter phenomenon are in vol. viii. of the *Smithsonian Contributions*. D. at New Haven, Conn., May 13, 1859.

Olmsted, Frederick Law, M. A.: landscape architect; b. in Hartford, Conn., Apr. 26, 1822; studied civil engineering, and later pursued scientific studies at Yale College. He was then for two years a working student of agriculture, and afterward seven years a farmer and horticulturist upon his own land. In 1853 and 1854 he made a study of the economical conditions of the slave States, traveling a distance of more than 4,000 miles on horseback. In the spring of 1857 he was appointed superintendent of the preparatory work of the projected Central Park of New York. In 1858, in association with Calvert Vaux, he devised a plan for this park, which was selected as the most satisfactory of thirty-three plans submitted in competition. After the adoption of the plan the designers were employed to carry it out. At the outbreak of the civil war in 1861 he was appointed by President Lincoln a member of the National Sanitary Commission, and organized and managed its executive business. He spent the period 1863–65 on the Pacific slope, serving as chairman of the California State commission, taking the custody of the Yosemite and Mariposa reservations, ceded to the State by Congress as public parks. From 1865 to 1872 he engaged in New York in the general practice of landscape architecture; in 1872 served for a time as presi-

dent and treasurer of the park commission of New York; in 1876 moved to Boston. He has been employed upon upward of eighty public recreation-grounds, among the more important of which are the public parks of New York, Brooklyn, Boston, Bridgeport, Trenton, Montreal, Buffalo, Chicago, Milwaukee, Louisville, and Kansas City. He is the designer of the grounds of the Capitol at Washington; also of the general scheme for the restoration and preservation of the natural scenery of Niagara Falls, and, in association with Mr. Vaux, of the plan now being carried out by the State of New York for this purpose. Mr. Olmsted is the author of the following works: *Walks and Talks of an American Farmer in England*, first published in 1852; it has been several times reprinted; *A Journey in the Seaboard Slave States* (1856); *A Journey in Texas* (1857); *A Journey in the Back Country* (1861). Translations of *A Journey in Texas* have been published in Paris and Leipzig.

Ol'mütz: town; in the province of Moravia, Austria; on the March; 129 miles N. N. E. of Vienna (see map of Austria-Hungary, ref. 3–F). It is strongly fortified, and was the place of imprisonment of La Fayette. It is the see of an archbishop. It has a well-attended university, two military academies, a polytechnic school, manufactures of linens, cloths, and porcelain, and a large trade in grain and cattle. Pop. (1890) 19,761.

Olney: city; capital of Richmond co., Ill. (for location, see map of Illinois, ref. 9–G); on the Balt. and Ohio S. W., and the Peoria, Dec. and Evans. railways; 31 miles W. of Vincennes, 117 miles E. of St. Louis, Mo. It is an important shipping point and trade center, is engaged in manufacturing, and has a public library (founded in 1886), a national bank with capital of $50,000, a private bank, and four weekly newspapers. Pop. (1880) 3,512; (1890) 3,831; (1900) 4,260.

Olney, JESSE, A. M.: educator; b. at Union, Tolland co., Conn., Oct. 12, 1798; taught at Whitesborough and Binghamton, N. Y., and for twelve years in the Hartford Grammar School, where he introduced the method, now generally adopted, of separating geography from astronomy, and beginning the former study by familiarizing the pupil with the description and surroundings of his own town, county, and State, advancing thence to national and foreign geography. He published a number of school books that had an enormous circulation, including a *Geography and Atlas* (1828) and *The National Preceptor* (1831). He served ten terms in the Connecticut Legislature, where he was an active worker in behalf of educational interests, and was elected State comptroller of public accounts in 1867. D. at Stratford, Conn., July 30, 1872.

Olney, RICHARD: lawyer; b. in Oxford, Mass., Sept. 15, 1835; was graduated at Brown University in 1856, and at Harvard Law School in 1859. He afterward received the degree of LL. D. from these institutions. He practiced law in Boston, serving in the Massachusetts legislature in 1874 till appointed Attorney-General of the U. S. by President Cleveland. He served from March 6, 1893, till June 8, 1895, and as Secretary of State from that time till March 4, 1897. He has since practiced law in Boston.

Olonetz': government of European Russia, S. W. of the government of Archangel; around the Lake of Onega. Area, 57,439 sq. miles. The ground is low, flat, and marshy, containing many large lakes, and covered with immense forests. Pop. (1897) 366,647. Capital, Petrozavodsk.

Olozaga, ō-lō'thaă-gaă, SALUSTIANO: statesman; b. at Logroño, Spain, in 1803; educated for the bar; elected to the Cortes 1833; reporter of the constitutional commission 1837, when he insisted on the retention of the senate; proposed and carried laws providing for electoral reform, the suppression of monasteries, the abolition of ecclesiastical tithes, and a general amnesty. He was president of the Cortes Mar., 1869, and Apr., 1871. D. at Enghien, France, Sept. 26, 1873.

Olshausen, ōls'how-zen, HERMANN: Bible commentator; b. at Oldeslohe, Holstein, Aug. 21, 1796; studied theology at Kiel and Berlin, and was appointed professor in 1827 at Königsberg and in 1834 at Erlangen, where he died Sept. 4, 1839. His *Biblischer Commentar über sämmtliche Schriften des neuen Testaments* appeared at Königsberg, 1830, *sqq.*, and was finished by his friends after his death; translated into English for Clark's Foreign Theological Library, and a revised edition of it (by A. C. Kendrick, D. D.) published in New York (6 vols.) in 1856–58. He defended the allegorical and typical methods, while not neglecting the grammatical and historical. Revised by S. M. JACKSON.

Olsson, ōl'sŭn, OLOF, D. D.: theologian; b. in Vermland, Sweden, Mar. 31, 1841; educated at Upsala and Leipzig, ordained 1863; emigrated to the U. S. 1869. His first pastorate was in MacPherson co., Kan., during which he was a member of the Legislature of the State; became Professor of Theology in Augustana Seminary, Rock Island, Ill., 1876–88; pastor Woodhull, Ill., 1889. He became president of Augustana College and Seminary in 1891. D. May 12, 1900.

Olszewski, KAROL: See the Appendix.

Olym'pia (in Gr. 'Ολυμπία): a plain in Elis, Peloponnesus, on the banks of the Alpheus, where the Olympian games were held, containing the Altis or sacred grove, which was said to have been inclosed by Hercules, and which contained the temple of the Olympian Zeus, with his statue by Phidias, and many other public buildings. Connected with the Altis were the stadium and the hippodrome. (See OLYMPIAN GAMES.) At the time of the Elder Pliny (23–79 A. D.) about 3,000 statues were standing; now the space is occupied with grain-fields, with a few scattered ruins. See Flasch's article *Olympia* in Baumeister's *Denkmäler* for the history of Olympia and the results of excavations made on the site by the German Government. See also the official work *Ausgrabungen von Olympia* (Berlin, 1875–81), and Bœtticher, *Olympia, das Fest und seine Stätte* (Berlin, 1883). J. R. S. STERRETT.

Olympia: city (settled in 1847, incorporated in 1859); capital of the State of Washington and of Thurston County (for location, see map of Washington, ref. 5–C); on Des Chutes river, Budd's inlet (the southern extremity of Puget Sound), and the Northern Pacific and the Port Townsend Southern railways; 36 miles S. W. of Tacoma, 121 miles N. of Portland, Ore. It is in a timber, coal, iron, sandstone, and copper region; is laid out with broad and regular streets; has direct steamship communication with the principal points on the sound and the Pacific coast; and contains water, sewerage, electric-light, and street-railway services. A bridge 520 feet long connects it with Tumwater, on the opposite side of the river, and another, 2,030 feet long, connects it with the west shore of the inlet. The city derives exceptional power for manufacturing from the river, which has three falls with a total descent of 85 feet in a distance of 1,500 feet, and was improved by the construction of a dam in 1890. Its principal manufactures are connected with the lumber industry, and include the only plant in the country for making water-pipe from yellow fir. There are 7 churches, 2 academies, State library with over 20,000 volumes, a public library, hospital, several secret society halls, 2 national banks with combined capital of $200,000, a State bank with capital of $60,000, and a daily and 3 weekly newspapers. The assessed valuation in 1893 was $3,437,096, and the total debt on Feb. 1, 1901, was $109,237. Pop. (1880) 1,232; (1890) 4,698; (1900) 4,961; (1901) estimated, 6,000.
J. O. SCOBEY.

Olym'piad [from Lat. *Olym'pias* = Gr. 'Ολυμπιάς, 'Ολυμπιάδος, Olympiad, deriv. of τὰ 'Ολύμπια, the Olympian games]: the period of four years between any two successive celebrations of the Olympian games. The Olympiad was early adopted as an era for the recording of the dates of events. The Olympiads were designated by numbers, the first being reckoned from the victory of Coræbus in the foot-race, B. C. 776; or, again, they took the name of the principal victor in the next previous Olympian games. Events are recorded as having happened in such and such an Olympiad, or in such a year of a certain Olympiad. To reduce Olympiads to dates according to our reckoning substract 1 from the number of the Olympiad, multiply by 4, add the number *in* the Olympiad minus 1, and then subtract from 776. When the date is after Christ proceed as before, but add the full number of the Olympiad and subtract therefrom 776. The 293d Olympiad, which was the last (Ol. 293·2), ended in 394 A. D. See GRECIAN GAMES.
Revised by J. R. S. STERRETT.

Olympian Games: the greatest national Greek festival. It was held quadrennially in honor of Zeus, in Olympia in Elis, Greece, and lasted five days, beginning just after the summer solstice. It is chiefly famous for its athletic contests and chariot-races. From the remotest antiquity Olympia was consecrated to religious rites, and there for centuries the Greeks lavished their wealth and their marvelous artistic skill in the erection of temples and shrines. They brought

thither, also, once in four years, the best they had in the way of physical development, and gradually contests of strength, endurance, and skill became the most prominent feature of the festivals. At the eastern end of the plain a level course, the stadium, was laid out in yielding sand, 600 Olympian feet (about 625 feet) in length, and for many years the contests were foot-races in a straight line along the stadium. Only free-born Greeks of unblemished reputation, who had trained during a prescribed period in a Greek gymnasium, were permitted to enter. Lots were drawn for position, and at the feet of the statue of Zeus each contestant swore a solemn oath to race fairly. The prize was a wreath of olive branches cut with a golden knife by a lad whose parents were still living from the sacred wild olive-tree in Olympia. The wreaths were placed on a table at the feet of the statue of Zeus in the temple. The victor, his head encircled with a fillet of wool, was crowned with the wreath and a palm-branch was placed in his hand. The name of the victor, of his father, and of his birthplace was proclaimed by a herald. To win the olive wreath was considered the highest possible honor. The victor could erect a monument in the sacred grove, and in some instances he was permitted to erect a statue of himself. Beginning with the fifteenth Olympiad, in addition to the original stadium race, a double race was run—that is, the course to the end of the stadium and back to the starting-place. Some Olympiads later there was a long-distance race twelve times around the stadium. In the eighteenth Olympiad the pentathlon was added. This was a combination contest consisting of running, jumping, disk-throwing, spear-throwing, and wrestling. Five Olympiads later boxing was added, and in the twenty-fifth chariot-races and the pankration, or combined wrestling and boxing match. The contests were originally confined to men, but gradually boys were admitted to the lighter ones, and at the 145th they were admitted to the severest of all, the pankration. By a truce established in the ninth century B. C., under the protection of Sparta, all competitors and spectators of Greek descent could attend the festivals unmolested even in time of war. Pilgrims from all the Greek cities and from the most distant colonies thronged to the games. Here poets and orators found appreciative audiences, sculptors found patrons, tradesmen sold their wares. The importance of the festivals diminished after the Peloponnesian war, although they were continued long after the Roman conquest. See the article GRECIAN GAMES.

See Curtius, *Olympia*; Boetticher, *Olympia, Das Fest und seine Stätte*; Laloux and Monceaux, *Restauration d'Olympie.* B. B. HOLMES.

Olym'pus [= Lat. = Gr. Ὄλυμπος], Mod. **Elymbo**: a lofty range of mountains which separated Thessaly from Macedonia. Their sides are clad with beautiful forests, but the tops are covered with snow for nine months of the year. The highest peak rises 9,754 feet, and on its broad, cloud-veiled summit stood, according to the oldest myths of Greece, the palace of Zeus and the other gods. Later, the abode of the gods was moved by a more refined sentiment to the celestial spheres, but Mt. Olympus still retained its charm for the imagination. See Heuzey, *Le Mont Olympe et l'Acarnanie* (Paris, 1860); Barth, *Reise durch das Innere der Europäischen Türkei*; Tozer, *The Highlands of Turkey* (London, 1869), ii. Revised by J. R. S. STERRETT.

Olyn'thus (in Gr. Ὄλυνθος), now *Aio Mamas*: an ancient city of Macedon; on the Toronaic Gulf; was at different periods dependent on Athens or Sparta, acquired great wealth from its excellent commercial position, but was taken in 347 by Philip of Macedon, who sold the inhabitants as slaves and destroyed its buildings. See Vömel, *De Olynthi situ* (Frankfort, 1829). J. R. S. S.

Omaha: city (laid out in 1854, incorporated in 1859); capital of Douglas co., Neb.; on the Missouri river, and the Burlington Route, the Chi., Rock Is. and Pac., the Chi., St. P., M. and Om., the Fremont, Elk. and Mo. Valley, the Mo. Pac., the Chi., Mil. and St. P., the Chicago and Northwestern, the Omaha and St. L., and the Union Pac., and Illinois Central railways; opposite Council Bluffs, Ia.; 476 miles N. by W. of St. Louis, 490 miles W. of Chicago (for location, see map of Nebraska, ref. 10–H). The city is built on a plateau about 80 feet above the river, is laid out with wide streets, of which more than 85 miles are paved, is lighted with gas and electricity, and has improved water and sewerage plants and electric street-railways. The river is here crossed by three bridges—one of steel, built by the Union Pacific Railroad Company, 66 feet above low water, cost $1,500,000; one of iron, connecting the city with Council Bluffs, for wagon and street-railway use: and one of steel, for steam-railway use, with the longest drawbridge in the world, between East Omaha and Council Bluffs, built by the East Omaha Land Company, cost $1.000,000. The city has laid out six magnificent parks, containing upward of 500 acres and connected by boulevards, at a total cost of more than $1,000,000. The city contains 106 churches, viz.; Presbyterian, 16; Methodist Episcopal, 14; Congregational, 9; Roman Catholic, 12; Baptist, 12; Protestant Episcopal, 11; Christian, 3; Unitarian and Latter-day Saints, 1 each; Evangelical, 5; Hebrew, 4; Lutheran, 13; Christian Science, 1; Universalist, 1; Adventist, 1; Greek, 1; Free Methodist, 1. The school census of Omaha for 1901 was 30,765. There are 45 buildings used for public-school purposes, and public-school property valued at over $2,000,000. The institutions for higher education include Creighton College (Roman Catholic), two medical colleges, Brownell Hall (Protestant Episcopal), Academy of the Sacred Heart (Roman Catholic), and St. Catharine's Academy (Roman Catholic). There are six libraries containing more than 67,000 volumes—the City Free Library, with upward of 57,000 volumes, occupies a beautiful building. The State Institute for the Deaf and Dumb is located in the city. In 1901 the city had 8 national banks with combined capital of $3,650,000, 2 savings-banks, and 3 daily, 28 weekly, 3 semi-monthly, and 11 monthly periodicals. Omaha, by reason of its railway and river connections, is the distributing center of a large area of country. It has a wholesale business of over $70,000,000 per annum, and it pays the Federal Government in internal revenue taxes over $3,500,000 annually. The machine, car-building, and repair-shops of the Union Pacific Railroad are here, and the city has extensive smelting and refining works, packing-houses, breweries, and boiler-works. The Board of Trade returns of 1900 showed that 175 manufacturing establishments reported. These had a combined capital of $30,000,000, employed 12,000 persons, paid $5,400,000 for wages and $84,000,000 for materials, and had products valued at $120,000,000. Omaha is the headquarters of the U. S. army Department of the Missouri. Pop. (1900) 102,555.—SOUTH OMAHA: city (founded in 1885); Douglas co., Neb.; adjoining Omaha on the south. It is the third largest meat-packing city in the U. S., and has extensive stock-yards and five large packing and rendering plants. The city contains 15 churches, 13 public-school buildings, public-school property valued at over $400,000, 3 national banks with combined capital of $640,000, 2 State savings-banks with capital of $50,000, several hotels, a handsome exchange building, a public park, and 4 daily newspapers. Pop. (1890) 8,062; (1900) 16,000.

Revised by IRVING F. BAXTER.

Omahas: See SIOUAN INDIANS.

Oman: a territory comprising the southeast portion of the Arabian peninsula. It has a coast-line of about 1,500 miles along the Persian Gulf, the Gulf of Oman, and the Arabian Sea. It contains eight badly defined districts or states, of which Muscat is the most important. The inhabitants, though professedly Mussulmans, are less intolerant than those of Western Arabia, and preserve ideas and customs derived from their original fire-worship. It was formerly a part of a powerful and extensive Arabic state or imamat, which consisted of Arabic, Persian, and African territories, but which in 1854, at the death of the Imam Said Seid, was divided between his two sons, one receiving the African territories, and the other the Asiatic territory, with Muscat for its capital. Oman now consists of a low, hot, but, if well watered, very fertile coast-land, producing cotton, sugar, rice, maize, watermelons, and bananas. Behind this coast-land rises a mountainous region consisting of bare and naked ranges inclosing beautiful and fertile valleys, where the coffee-tree grows, and figs, almonds, grapes, oranges, lemons, walnuts, and apples. On the inner slope of these mountains lies a row of oases, mostly inhabited by Bedouins, and behind the oases stretch the Arabian deserts. The area is 82,000 sq. miles and the population estimated at 1,500,000, but the authority of the sultan does not extend far outside his capital, Muscat. The state is practically under British protection. Revised by M. W. HARRINGTON.

Ö'man, VIKTOR EMANUEL, Ph. D.: poet, philologist, and publicist; b. in Sweden in 1833; studied at Lund and graduated at Jena in 1859. He has been chiefly engaged in newspaper work as contributor to and editor of the journals *Al-*

lehanda för Folket and *Nerikes Allehanda*, both published in Örebro, Sweden. His original literary productions are two small volumes of poems, *Lyriska blad* (1857 and 1868) and the poetic tale *Riddar Herbert och Jungfru Hilde* (1866). Öman has shown himself a fine translator in his reproduction in Swedish of Milton's *Paradise Lost* and Euripides's *Medea*, besides some of the masterpieces of Russian, Polish, Magyar, and Hindu poetry. In the philological field he has produced a *Lärobok i engelska språket* (Manual of the English Language, 1867) and *Svensk-engelsk Handordbok* (Swedish-English Dictionary, 1872; 2d ed. 1881), which have now been made antiquated by more recent and complete works. P. Groth.

O'mar, Abu Hafsah Ibn ul Khattab: the second Caliph of the Mussulmans; b. about 581. At first a bitter opponent of the Prophet, he was suddenly converted to Islam (617), and was ever afterward its zealous apostle. In 634 he was elected to succeed Abubekir. Considering the title of caliph, "successor," too exalted to be borne by one who did not come immediately after Mohammed, he assumed the title Emir ul Muniminn, "Commander of the Believers," which had been solemnly decreed him and which the caliphs have borne ever since. In 635 he adopted the Hejira (*q. v.*) as the beginning of the Mussulman era. Wholly devoted to the interests of his faith, by his great administrative and military talents he was the real founder of the vast Arabian empire. In 637 Syria and Palestine were conquered, and the mosque of Omar built at Jerusalem on the site of Solomon's temple. Egypt was subdued 639–641 and Persia in 642. In 640 the union of the Arabian tribes was completed, they for the first time being brought together in one religion under one chief. Omar was exceedingly simple in his habits, economical, and shrewd, a fanatic, yet tolerant of others, and generally fair and impartial. Nevertheless, an act of injustice provoked the resentment of a Persian slave, by whom he was stabbed to death (644). He was buried near the Prophet. E. A. Grosvenor.

Omar Khayyām: Persian poet; renowned as mathematician, astronomer, and philosopher. His full name is given as Ghiās uddīn Abul Fath Omar bin Ibrahīm al-Khayyām; the epithet Khayyām (tent-maker) is presumably due to his father's calling, or to his own occupation before he was in position to devote himself to literary and scientific work. Omar Khayyām was a native of Naishāpūr in Khorassan, and he flourished in the latter part of the eleventh and beginning of the twelfth century. According to tradition, his death took place in the year A. D. 1123 (A. H. 517), but there is ground for believing that it may possibly have occurred some twenty years earlier, as his collegiate friend and companion in years, the celebrated Vizir Nizām ul Mulk of Tūs, is stated to have been born A. D. 1017 (A. H. 408). An interesting story is preserved regarding Omar's first steps in the attainment of fortune, but there is not space for it here. A generous annuity provided for him through the favor of his friend at court, the Vizir Nizām ul Mulk, gave him the means and requisite leisure for pursuing his mathematical and astronomical researches; his work in Arabic on algebra, *Aljebr u al Mukabileh*, enjoyed the reputation of being a standard for several centuries. Merit raised him to an appointment as astronomer royal to the Sultan Malikshāh A. D. 1074, and under this monarch's patronage Omar Khayyām was instrumental in instituting a reform of the Persian calendar and introducing the new reckoning of the Jalālian era, the so-called *Tarīkh i Jalāli* or *Malikshāhi* from the reigning sultan, Jallāluddīn Malikshāh. It dates from Mar. 15, 1074 (10th Ramazān, 471 A. H.).

Greater even than his scientific fame is the renown which his philosophic poetry in the Lucretian or Voltairean vein won for him. It is by his *Rubā'yāt*, or *Quatrains*, that he is most generally known. Some 500 of these rhyming four-line stanzas are attributed to his pen; they breathe a spirit of free-thinking and often enough approach atheism and scoffing; at times the tone is mystical, and again metaphysical and pessimistic; sometimes the verses pulse with a warm rhapsodical beat and a thoroughly human touch; always they are characterized by a vigorous and poetic imagination. Many of the *rubā'is* which pass under Omar Khayyām's name are doubtless not really his, but there is difficulty in deciding, as there is no single uniform recension that can be adopted as exclusive authority, and the numerous manuscripts differ considerably in the number of quatrains they contain. At Naishāpūr the tomb of Omar is shown to travelers; it rests beneath the shadow of blossoming fruit-trees, and the spirit of the astronomer-poet's own prophecy is therefore fulfilled, that his grave should be situated where the wind should shower roses upon it.

Bibliography.—An edition and translation of Omar Khayyām's mathematical work, based on the Leyden and Paris copies, was brought out by Woepcke, *L'algébre d'Omar Alkhayyāmi* (Paris, 1851). For the poet's life and works, consult Rieu, *Catalogue of Persian Manuscripts in the British Museum*, ii., p. 546, and Garcin de Tassy, *Note sur les Rubā'iyāt de Omer Khaiyām* (Paris, 1857). Editions of the quatrains have appeared at Lucknow, Calcutta, Paris, and London. Among English translations is the well-known rendering into English verse by E. Fitzgerald (London, 1859, 1872, 1879; Boston, 1887), and one by E. H. Whinfield which gives also the Persian text (Trübner, London, 1883; 2d ed. translation 1893); there is likewise a prose-rendering by J. H. McCarthy (Nutt, London, 1889). A French version accompanying the Persian text was published by Nicolas (Paris, 1867). Translations of the *Rubā'yāt* have been made in a number of other modern languages, which bears witness to the popularity of Omar's writings also in later times and among foreign peoples.

A. V. Williams Jackson.

Omar Pasha: soldier; b. at Plaski, in Croatia, in 1806; son of an Austrian officer. He studied at the military school of Thurm and served in an Austrian frontier regiment, but in 1833 for some unknown reason escaped to Bosnia, embraced Islam, and changed his name, Michael Lattas, to Omar. Soon he became tutor to the sons of Husseïn Pasha. Going to Constantinople he was appointed a teacher in the military school, married a wealthy Ottoman lady, and was appointed writing-master to Abd-ul Medjid, the heir-apparent. On his pupil's accession he was rapidly promoted. He was sent as military governor to the Lebanon, was made a pasha, and assisted in suppressing rebellions in Bosnia and Kurdistan. During the dual occupation of the Danubian provinces (now Roumania) by Russia and the Ottoman empire, he commanded the Ottoman troops, whom he raised to a high degree of efficiency. In the Crimean war, as commander on the Danube, he several times defeated the Russians and forced them to raise the siege of Silistria. His attempt to relieve Kars was a failure. After the war he was governor of Bagdad, but, having been accused of maladministration, he was removed and banished to Kharput in 1859. He was restored and sent to Bosnia in 1861 and to Crete in 1867 to put down rebellions. For a time he was Minister of War (1869), and a member of the imperial Council till his death, Apr. 18, 1871. He was the ablest Ottoman general in the nineteenth century. E. A. Grosvenor.

Ombay', or **Allor**: an island of the Malay Archipelago, Solor group, N. of Timor; in lat. 8° 5′ to 8° 28′ S. and lon. 123° 43′ to 125° 15′ E. It is 65 miles long, 12 miles broad, high, volcanic, and inhabited by savage tribes of a mixed Negro and Malay origin. At Allor the Dutch have a settlement and carry on some trade in wax, edible birds'-nests, and pepper. Pop. estimated at 194,000.

Omdurman: See the Appendix.

Omen [from Lat. *o'men*, sign, omen < Old Lat. *osmen*; possibly connected with *augeo*, *auxilium*, *auctor*, in the sense of "authorization"; or possibly with *auscultare*, *auris*, in sense of "something heard"]: among the ancient Romans, a sign by which the gods were believed to indicate their favor or opposition to any proposed public or private action. The omens were publicly observed by the magistrates, assisted by haruspices and augurs, the former observing signs of the first, the latter of secondary importance. In the time of Cicero, and even before it, the whole matter of taking omens, of divining, soothsaying, and the like, had fallen into disrepute among the intelligent, but with the vulgar these arts were still of importance up to the time of the later empire.

Omentum [Mod. Lat. = Lat., adipose membrane, spec. the caul]: the membranous reflections of the peritoneum extending between certain abdominal organs and distinguished as the *great omentum*, a quadruple fold protecting the small intestine; the *gastro-hepatic omentum*, a double fold extending from the liver to the stomach; and the *gastro-splenic*, a double fold extending from the great pouch of the stomach to the spleen.

Omish: See Mennonites.

Ommyiades, ō-mī'yădz, or **Ommiades**: the first hereditary dynasty of caliphs, so named from their ancestor Om-

meyah, a remote kinsman of Mohammed. Moaviah, son of the Koreish chieftain, Abu Sophian, and former secretary of the Prophet, governor of Syria since 640, opposed in arms the succession of Ali (655). The latter being murdered (661), Moaviah, already master of Arabia, Egypt, and Syria, succeeded to the throne despite the opposition of the family of Ali. He made Damascus the capital of the Mussulman empire, rendered the succession hereditary though hitherto elective, and was followed by thirteen princes of his family. Under Moaviah I., Samarkand, Tunis, and Tripoli were subdued, and Kairouan, the "metropolis of African Mussulmanism," founded, but his troops were defeated in a seven years' siege of Constantinople (672–79). His son and successor, Yezid I., reigned three years, caring for little except dissipation. Moaviah II. and Mervan I. were both poisoned soon after accession. Abd-ul Malek I. conquered Irak and Persia from the partisans of the dead Ali, crushed all internal opposition, and captured Carthage (704). The reign of Walid I. (705–715) was in every way the most brilliant of the Ommyiade rule. His general Hassan subdued the Moors and accomplished their enthusiastic conversion to Islam, and Tarik defeated the Visigoths, and with Mousa subdued the entire Peninsula of Spain as far as the Bay of Biscay. Meanwhile in the East Tartary was subjugated and the Mussulman arms carried victoriously to India. The next two caliphs were Suleïman I., a zealous and incapable prince, and Omar II., famous for his ascetic virtues. Under the latter France was invaded (719) and Constantinople again besieged in vain (717–719). Yezid II. was succeeded by Hashem I., whose general, Abderrahman, captured Nîmes in France (730), but was utterly defeated at the decisive battle of Tours by Charles Martel (732). Walid II. was feeble and contemptible. Yezid III., Ibrahim I., and Mervan II., altogether reigned six years; Mervan II. was deposed (750) by Abul Abbas the Bloody, founder of the Abasside dynasty. The surviving Ommyiades were all butchered save two, one of whom, Abderrahman I., founded the Ommyiade caliphate of Cordova in Spain (755), where his family reigned till 1031. The universal caliphate of the Ommyiades had lasted eighty-nine years. Notwithstanding the general intellectual and military brilliancy of their reign, it was disastrous for Islam. They represented the worldly and ambitious element, in opposition to the simple faith and practices of earlier days, and by the civil wars they fomented or occasioned, and even by their foreign conquests, rendered dismemberment of the Mussulman empire inevitable. E. A. Grosvenor.

Omnibus: See Carriages.

Omniscience [Lat. *om'nis*, all + *sci're*, know]: an attribute of God, in consequence of which he knows of all that has been, all that is, and all that shall be. In its last phase, as Foreknowledge (*q. v.*), it has occasioned several very subtle theological distinctions.

Omsk: capital of the government of Omsk, Siberia; at the confluence of the Om and the Irtisch (see map of Asia, ref. 3–E). It contains military schools, hospitals, manufactories, and mining works, and is the residence of the governor-general. Its fortress, constructed in 1766, is the strongest in Western Siberia. Pop. (1897) 37,470, exclusive of the garrison, which numbers 6,000. E. A. G.

On (Egypt. *An*; Gr. *Heliopolis*): the name applied by the Hebrews (Gen. xli. 45, 50; xlvi. 20) to the famous city of the sun, Heliopolis (*q. v.*), which was also known by them as Beth-Shemesh, House of the Sun (Jer. xliii. 13), of which Heliopolis is simply a translation. The same Hebrew letters that spell On when differently vocalized give *Aven* (Ezek. xxx. 17), which thus becomes, erroneously, a second Hebrew name of Heliopolis. C. R. G.

Oña, ōn'yăă, Pedro, de: poet; b. at Los Confines, on the Biobio river, Chili, about 1565. He studied at the University of San Marcos in Lima, and passed most of his life in that city, where he was *fiscal* of the audience. His best known work is the epic *Arauco domado* (1st ed., Lima, 1596). It relates to the Araucanian wars, and is an evident imitation of Ercilla's *Araucana*; though inferior to the latter in poetical merit, it has considerable historical value. Oña also published *Temblor de Lima* (1609); *Ignacio de Cantabria* (1639), etc. D. at Lima about 1640. H. H. S.

On'ager: a species of wild ass (*Equus onager*, or *E. hemippus*) inhabiting the plains of Central Asia. It is reddish in summer, gray in winter, with a streak of black along the center of the back, crossed by a second bar over the shoulders.

Oñate, ōn-yaa'tā, Juan, de: settler of New Mexico; b. at Guadalajara, Mexico, about 1555. He was a man of wealth and position, son of the founder of Guadalajara, and married to a granddaughter of the conqueror Cortés. His proposition to conquer and colonize the region N. of the Rio Grande was first accepted by the Viceroy Velasco in 1595; but delays ensued because Velasco's successor, Monterey, refused to give him full powers as governor. The objections were finally overcome, and Oñate left Zacatecas Jan. 20, 1598, with 130 soldiers, a large force of Indians, 83 wagons, and 7,000 cattle. On Apr. 20 the expedition reached the Rio Grande, probably at El Paso del Norte. Oñate crossed, and after some exploration founded San Juan, the first capital of New Mexico, in August. During the first year there were several conflicts with the Pueblo and other Indians, who were finally defeated; subsequently the colony prospered greatly. In 1599 and again in 1604 Oñate explored portions of Arizona, following the Gila river to the sea in the latter year. There is evidence that he ceased to be governor about 1608, but the date of his death is unknown. Some accounts say that he led an expedition eastward in 1611. Herbert H. Smith.

Onawa: town; capital of Monona co., Ia. (for location, see map of Iowa, ref. 4–D); on the Sionx City and Pac., the Chi. and N. W., and the Green Bay, Winona and St. P. railways; 37 miles S. by E. of Sioux City. It is in an agricultural and stock-raising region, and has a public library (1867), a State bank with capital of $50,000, and three weekly newspapers. Pop. (1880) 882; (1890) 1,358; (1900) 1,933.

Onchidium, ŏn-kid'i-ŭm [Mod. Lat., incorrectly formed from Gr. *ὄγκος*, angle]: a genus of slug-like pulmonate molluses, noticeable chiefly from the fact that one of its Indian species has the whole dorsal surface covered with eyes formed on the vertebrate type. This species lives on the shore between tide-marks, and the eyes are supposed to enable it to escape the fishes which feed upon it.

Oncken, Johann Gerhard: missionary; b. at Varel, Oldenburg, Germany, about 1800; was in early life a domestic servant; lived for a time in England, where he became a member of an Independent church; opened a bookstore at Hamburg as agent of the Edinburgh Bible Society and the Lower Saxony Tract Society; organized a Baptist church, of which he became pastor 1834; was appointed a missionary of the American Baptist Convention 1835; visited many parts of Germany, Austria, Switzerland, and Denmark, preaching, baptizing, distributing the Scriptures, and founding churches; was several times imprisoned; edited religious journals in English and German; visited the U. S. in 1852 and in 1865. D. in Zurich, Jan. 2, 1884.

Ondricek, Franz: See the Appendix.

One'ga: a large lake in the government of Olonetz in Western Russia. Next to Lake Ladoga, it is the largest lake of Europe, covering an area of 4,830 sq. miles. It is connected with the Volga and the Dwina by canals, and communicates with Lake Ladoga by the Sweer. It abounds in fish. Onega is also the name of a river of Northern Russia not connected with the lake, but occupying the basin next E.; also of a town near the mouth of this river, and of the great bay of the White Sea into which this river empties. Revised by M. W. Harrington.

Oneida, ō-nī'da: village; Madison co., N. Y. (for location, see map of New York, ref. 4–G); on the N. Y. Cent. and Hudson River and the N. Y., Ont. and W. railways; 26 miles E. of Syracuse. It is in an agricultural and hop-growing region, and contains a union school, 2 national banks with combined capital of $165,000, a State bank with capital of $50,000, a savings-bank, a private bank, several large manufactories, and 2 semi-weekly and 2 weekly periodicals. Pop. (1890) 6,083; (1900) 6,364.

Oneida Community: a society of religious communists, consisting of about 300 members, formerly established on Oneida creek, Madison co., N. Y. At the time of its dissolution in 1881 it owned a fine estate of 650 acres, also a commodious mansion, and several mills and manufactories. A smaller branch society was located at Wallingford, Conn.

History.—The founder of this Community (see Noyes, John Humphrey) and the circle of believers he had gathered around him at Putney, Vt., devoted themselves at first exclusively to the development and publication of their religious views, and had no thought of becoming a community; but their intimacy of relationship and unity of faith

gradually led them to adopt the communistic manner of life. In 1846 they began the experiment of complex marriage, but this step gave such offense to their neighbors that the little Community was compelled to disband. In the following spring, however, in response to the invitation of another community, which had recently been started under the influence of the Putney school, the members of the latter were once more united on the banks of the Oneida creek. Here they were allowed to carry out their communistic views for nearly thirty years with comparative freedom from molestation. During the first seven or eight years of its existence poverty and apostacy several times brought the Community to the verge of failure; but by 1855 the members had become disciplined by hardship and labor, and a number of lucrative business enterprises had been started, the most important of which were the manufacture of game-traps and the packing of fruits and vegetables. As the project of maintaining an expensive publishing branch at Brooklyn, N. Y., had in the meantime, after three years' trial, been abandoned, the Community soon found itself settled upon a firm financial basis. During the next twenty years the Oneida Community formed a conspicuous feature in the social life of the U. S., and its prosperity, both domestic and financial, was unquestioned. Education was always one of the leading objects of the Community, and an opportunity for intellectual culture was afforded every member. The paper which for more than forty years was published as the organ of the society was a constant channel for thought and literary effort. Soon after 1873 the troubles began which led to its dissolution. The men and women who were admitted to membership after the prosperity of the Community had been assured were by no means so whole-hearted in their devotion to the cause of Christian communism as were those who had joined in the face of poverty and disgrace. Furthermore, some of the leaders among the young people had already begun to lose their faith in the religious principles which lay at the foundation of the Community polity, and consequently Noyes was, to a large extent, deprived of their support in the series of trials upon which the Community was about to enter. In the spring of 1879 the clergy of New York State convened at Syracuse for the purpose of initiating judicial and legislative proceedings against the Oneida Community, and in August of that year Noyes, who had withdrawn to Canada in consequence of threatened arrest, perceiving that it would be inexpedient to hold out further against the public sentiment of the State, wrote a letter to the Community proposing that the obnoxious social features of the institution be abandoned. This proposition was acceded to with scarcely a dissenting voice, and was carried out in good faith. The entire dissolution of the Community soon followed. On Jan. 1, 1881, the property was divided, and the members were incorporated under the laws of New York State as a joint-stock company, in which capacity they have since carried on the business of the old Community. The peace and equity which prevailed in the division of the Community estate may be largely ascribed to the influence of Noyes.

Religion.—In 1834, when the religious movement which culminated in the Oneida Community was started at New Haven, Noyes and his followers were called Perfectionists, in consequence of their belief that salvation from sin was attainable in this life; but soon other varieties of Perfectionists sprung up, whose doctrines and tendencies differed widely from those of the New Haven brethren, and the name ceased to be distinctive. The principal theological doctrine of Noyes and of the Oneida communists was that the second coming of Christ is already past, having taken place about the year 70 A. D. in connection with the destruction of Jerusalem by the Romans; and from this they argued that the primitive Church is now alive and accessible, and that it is able, by virtue of its own victory over sin and death, to accord the same victory to every true seeker after righteousness. They looked forward to a third coming of Christ at the end of the "times of the Gentiles," and expected that the final and general judgment of the world would then take place. In regard to the Godhead Noyes maintained that it consisted of two beings, the Father and the Son, whose relation to each other was analogous to that of man and woman. He taught that the devil had existed and sinned from eternity, and that God is in no way responsible for evil. In his doctrines concerning baptism, regeneration, and the functions of law and grace, Noyes was a close follower of St. Paul. In fact, his entire theological system was based largely on St. Paul's writings.

Social Organization.—All property in the Oneida Community was held in common, and the education and subsistence afforded to the members was considered a just equivalent for their labor. Hence no accounts were kept between the members, except such as might be kept between the members of any ordinary family. For government and discipline the Oneida communists relied chiefly upon the power of their religion, but for the better application of that power they devised a system of public censorship called by them "mutual criticism," which was found to work admirably as a substitute for the laws and penalties of ordinary society.

The social organization embraced also a scheme of "pantagamy," or complex marriage, which has often been wrongly confused with the practices of "free-lovers" and other licentious persons. In every essential particular wherein marriage morality differs from prostitution, viz., in respect to sacredness and permanence of union, care and provision for women and children, and the exclusion of irresponsible connections, the Oneida Community stood on the side of marriage. The mortality among the children born under this system between the years 1869 and 1878 was less than one-third that of the corresponding mortality in the U. S.

Bibliography.—J. H. Noyes's *History of American Socialisms* (1870); Nordhoff, *Communistic Societies of the United States* (1875); Hepworth Dixon, *New America* (1867); *The Berean*, by J. H. Noyes (1847); also the following pamphlets by J. H. Noyes: *The Bible Argument*, *Salvation from Sin*, *Mutual Criticism*, *Male Continence*, and *Scientific Propagation*. Also an article by Dr. Van de Warker in *The American Gynæcological Journal*, Aug., 1884.

G. W. Noyes.

Oneida Lake: a body of water in Oneida, Oswego, Madison, and Onondaga cos., N. Y.; 20 miles long and 6 miles wide. Its surface is 369 feet above the sea. It abounds in fish. It formerly, with its outlet, Oneida river, was the channel of an important navigation, but it is superseded by railways. The river is a deep, sluggish, tortuous stream, 18 miles long, with low banks. It falls into Oswego river.

Oneidas: See Iroquoian Indians.

Oneon'ta: village (settled in 1786, first schoolhouse built in 1790, first mill started in 1795, first church built in 1816); Otsego co., N. Y. (for location, see map of New York, ref. 5–H); on the Susquehanna river, and the Del. and Hudson Railroad; 60 miles N. E. of Binghamton, 82 miles W. by S. of Albany. It is the seat of a State normal school (burned and rebuilt at a cost of $175,000 in 1894); has 7 churches, a State armory, a public library with over 4,000 volumes, 2 national banks, and a daily, a monthly, and 3 weekly newspapers, and contains the repair, car, and machine-shops of the Del. and Hudson Railroad, 3 planing-mills, 2 foundries, 2 grain elevators, knitting-mill, and sash and door, piano, cigar, and shirt factories. Pop. (1880) 3,002; (1890) 6,272; (1900) 7,147.

Editor of "Herald."

Onesan'der [= Lat. = Gr. Ὀνήσανδρος]: a Platonic philosopher under Nero; the author of a Στρατηγικὸς λόγος, dedicated to Quintus Veranius, consul in 49 A. D., which treats of the duties of a commander, and the style of which is based on that of Xenophon. The work was first published in a Latin translation, often reprinted; the first edition of the Greek text was by N. Rigaltius (Paris, 1599); best editions by Schwebel (Nuremberg, 1762, fol.) and A. Köchly (Leipzig, 1860). B. L. G.

Onion [from Fr. *ognon*, *oignon* < Lat. *u'nio*, *unio'nis*, a single large pearl, an onion, liter., unity, oneness (whence Eng. *union*), deriv. of *u'nus*, one]: a cultivated biennial herb and its bulbous foot, the latter composed of leaf-elements in a thickened condition; the *Allium cepa*, a plant of the order *Liliaceæ*, cultivated in Egypt and Asia from immemorial time, and thence introduced into nearly all civilized countries. The onion differs from the garlic especially in having the elements of its bulb disposed in concentric layers and not in separate cloves. Among the marked types are the potato onion, grown from off-set bulbs growing near the root, and the top onion, produced from similar bulbs growing at the top of the flower-stalk. Ordinary onions are raised in the first season from seed, or in the second year from the small *sets* or incompletely grown bulbs of the previous year's crop. The onion has an aromatic sulphur oil containing allyl. The bulb is highly nutritious. The crop requires a fertile soil, and clean culture, and as it is very

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Matagamshing L.
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Chelmsford
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Sudbury
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Wahnapitae R.
Hillcrest
Markstay
Sturgeon
Veuve River
Verner
Sturgeon Falls
Meadowside
Beaucage
North Bay
Nipissing L.
Nipissingan
Callander
Powassen
Trout Creek
South Riv.
L. Neppewasing
Wahwasikamog L.
French R.
Stobie Riv.
Bruce Mines
Thessalon
Dayton
Algoma
Cooks Mills
Kenabutch
Mississauga R.
Lit. White R.
Massey
Birch River
Spanish R.
Wallace Mine
Penace L.
Long L.
Wahnapitae
NORTH CHANNEL
Mississauga
DRUMMOND
CLAPPERTON I.
CLOCHE I.
Killarney
Rutherford
Waddles Mills
Cockburn I.
BARRIE I.
Kagawong Village
Little Current
Sheguindale
L. Manitou
GRAND MANITOULIN ISLAND
Owen Channel
FITZWILLIAM I.
Cononaning
Cariboo L.
Commanda
Magnetawan R.
PARRY SOUND
Magnetawan
Sundridge
Berridale
Burkes Falls
Katrine
Kearney
Novar
Dunchurch
Fairholm
Midlothian
McKellar
Waubamik
Blairs Falls
Burdville
Beggsboro
Seguin Falls
Scotia
Ilfracomb
Huntsville
Keatesville
Parry Sd.
Parry Sound
Pt. Cockburn
Rosseau
Utterson
L. Rosseau
MUSKOKA
Bracebridge
South Falls
Gravenhurst
Severn R.
Port Severn
Washago
GEORGIAN BAY
WESTERN IS.
CHRISTIAN I.
C. Hurd
Wingfield Pt.
Greenough Pt.
Cape Croker
BRUCE
Mar
Colpoys Bay
Wiarton
N. Keppel
Hepworth
Owen Sound
Pt. William
Meaford
Nottawasaga Bay
Thornbury
Craigleith
Collingwood
Penetang
Midland
Victoria Har.
Wyevale
Waubaushene
Coldwater
Orillia
Longford
Sturgeon Bay
Uhthoff
Creighton
Couchiching
Saurin
Batteaux
Stayner
Elmvale
Craighurst
Hendrie
Minesing
Gowan
SIMCOE
Barrie
Allandale
L. Simcoe
Beaverton
Sutton
Southampton
Port Elgin
Allenford
Tara
Kilsyth
Rockford
Chatsworth
Arnott
Williamsford
Keady
Inverhuron
Tiverton
Pt. Douglas
Turners
Paisley
Desboro
GREY
Duncan
Duntroon
Nottawa
New Lowell
Avening
Glencairn
Airlie
Maxwell
Flesherton
Proton
Dundalk
Rosemont
Shelburne
Everett
Lisle
Tioga
Alliston
Colwell
Utopia
Thornton
Bradford
Holland Ldg.
Newmarket
Kincardine
Pinkerton
Dunkeld
Elmwood
Hanover
Pomona
Priceville
Durham
Varney
Orchard
Holstein
Walkerton
Neustadt
Ayton
Mildmay
Pt. Clark
Lurgan
Ripley
Amberley
Lucknow
Wingham
Teeswater
Clifford
Harriston
Mount Forest
Palmerston
Arthur
Kenilworth
Amaranth
Waldemar
Orangeville
DUFFERIN
Mono Mills
Palgrave
Kettleby
Aurora
YORK
Markham
ONTARIO
Port Albert
Dungannon
Nile
Goderich
Blyth
Belgrave
Bluevale
Brussels
Listowel
Ethel
Gowanstown
Moorefield
Garafraxa
Alma
Elora
Fergus
WELLINGTON
Church Falls
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PEEL
Caledon E.
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Londesborough
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Bayfield
Varna
Brucefield
Seaforth
Hollen
Glenallen
Elmira
Millbank
Milverton
Hawkesville
Guelph
Rockwood
Georgetown
Streetsville
Cooksville
Port Credit
Oakville
HALTON
Milton
Dublin
Mitchell
PERTH
Kippen
Zurich
Hensall
WATERLOO
Waterloo
Berlin
Baden
Petersburg
Gad's Hill
Shakespeare
Stratford
Galt
Ayr
Preston
Hespeler
Puslinch
Lake View
Grand Bend
Port Franks
Kettle Pt.
Exeter
Woodham
St. Marys
Tavistock
Drumbo
Paris
Bronte
Burlington
Burlington Bay
Hamilton
WENTWORTH
Dundas
Strabane
Hillsborough
Thedford
Park Hill
Clandeboye
Granton
Lucan
Thorndale
Ilderton
OXFORD
Ingersoll
Woodstock
BRANT
Brantford
Caledonia
Grimsby
LINCOLN
St. Catharines
Niagara
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WELLAND
Pt. Edward
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Watford
Strathroy
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London
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Pt. Huron
LAMBTON
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Oil City
Courtright
Sombra
St. Clair R.
Port Lambton
Oil Springs
Wilkesport
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Longwood
Aughrim
St. Thomas
ELGIN
Aylmer
Sparta
Port Stanley
Port Bruce
Delhi
Simcoe
NORFOLK
Vittoria
Port Dover
Port Ryerse
Port Burwell
Vienna
Houghton
Long Point Bay
LONG POINT
Port Rowan
Nanticoke
Selkirk
Jarvis
Cayuga
HALDIMAND
Dunnville
Port Maitland
Port Colborne
Welland Canal
Mt. Clemens
Wallaceburg
Dresden
Bothwell
Newbury
Wardsville
Highgate
Ridgetown
Bismarck
Tyrconnell
Pt. Talbot
Aldborough
Lake St. Clair
WALPOLE I.
Detroit R.
Windsor
Sandwich
Belle R.
Tilbury
Buxton
Chatham
KENT
Stoney Point
Blenheim
Morpeth
Rondeau
Clearville
Pt. Aux Pins
Maidstone
Woodslee
Comber
Dealtown
ESSEX
Essex Cen.
Wheatley
Romney
Amherstburg
Kingsville
Ruthven
Colchester
Oxley
Pigeon Bay
Pt. Pelee
PT. PELEE I.
LAKE HURON
MICHIGAN
Alpena
Harrisville
Tawas City
Bad Axe
Sanilac Centre
Monroe
Toledo
Port Clinton
Sandusky
OHIO
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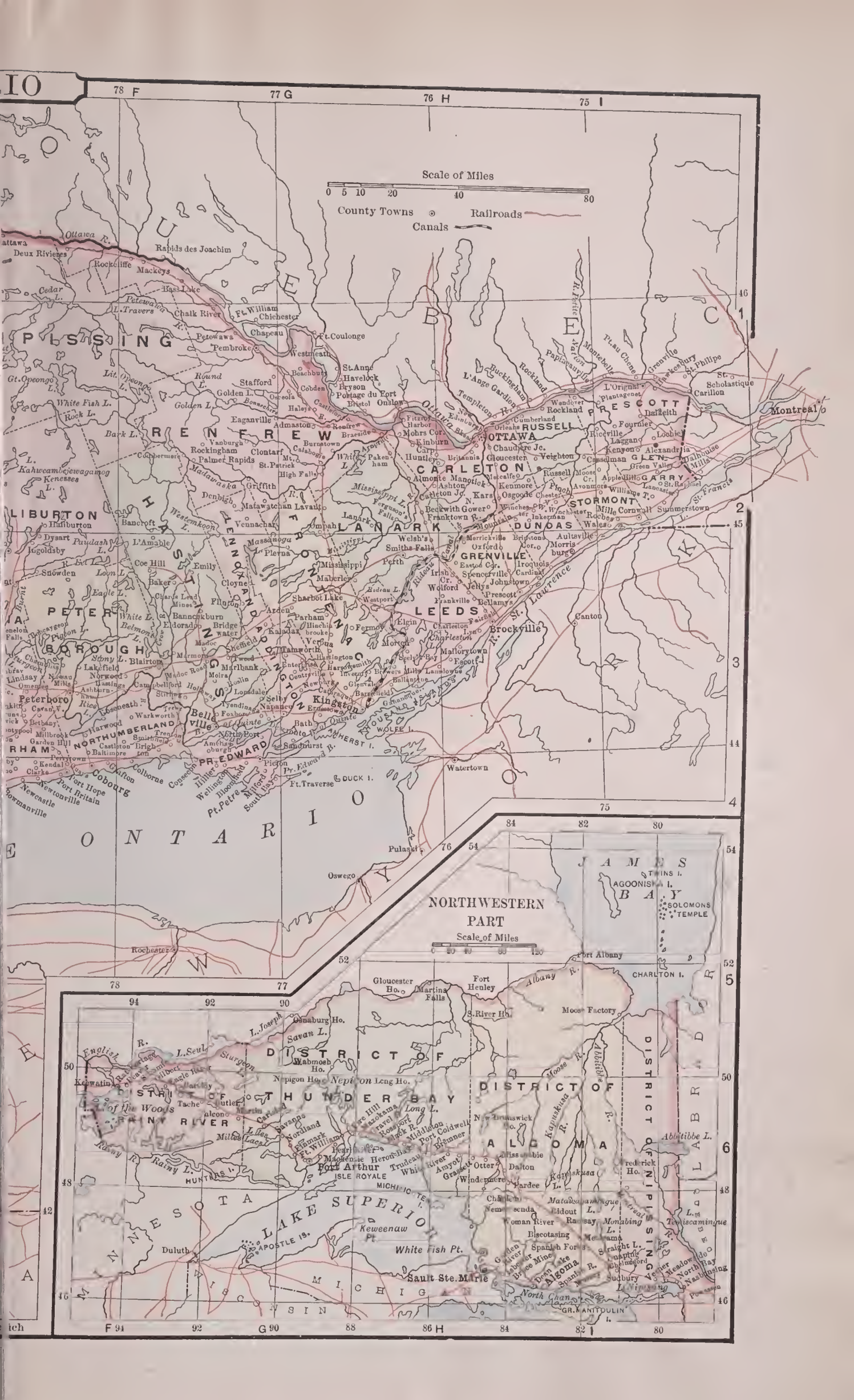
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County Towns
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Cedar L.
Petewawa R.
L.Travers
Chalk River
Ft.William
Chichester
Chapeau
Ft.Coulonge
NIPISSING
Petewawa
Pembroke
Westmeath
St.Anne
Havelock
Bryson
Portage du Fort
Bristol
Onslow
Gt.Opeongo L.
Lit. Opeongo L.
Round L.
Stafford
Golden L.
Osceola
Cobden
White Fish L.
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PRESCOTT
Dalkeith
Fournier
Lochiel
Alexandria
Dalhousie Mills
RUSSELL
OTTAWA
Cumberland
Orleans
New Edinburgh
Fitzroy Harbor
Mohrs Cor.
Kinburn
Carp
Chaudiere Jc.
Gloucester
Vankleek Hill
Riceville
Kenyon
Laggan
Casselman
Veighton
GLEN
GARRY
Green Valley
Apple Hill
Avonmore
Williams T.
St. Raphael
Lancaster
St. Francis
Summerstown
Bark L.
RENFREW
Vanburgh
Rockingham
Palmer Rapids
Combermere
Clontarf
St.Patrick
Mt. St.Patrick
Calabogie
Burnstown
High Falls
White L.
Pakenham
Huntley
Britannia
CARLETON
Metcalfe
Russell
Moose Cr.
Kahwecambejewagamog
Kenesses L.
Madawaska
Griffith
Mississippi L.
Almonte
Manotick
Ashton
N.
Kenmore
Osgoode
Finch
Chesterville
STORMONT
Mille Roches
Cornwall
HALIBURTON
Haliburton
Denbigh
Matawatchan
Lavant
Carleton Jc.
Ferguson Falls
Beckwith
Gower
Franktown
R.
Winchester
Inkerman
Dysart
Bancroft
Westemkoon L.
Vennachar
Ompah
Lanark
LANARK
Mountain
DUNDAS
Wales
Aultsville
Purdash L.
Ingoldsby
L'Amable
Massanoga
Plevna
Welsh's
Smiths Falls
Merrickville
Oxford
Bristons Cor.
Morrisburg
Iroquois
Cardinal
Johnstown
GRENVILLE
Easton Cor.
Spencerville
Jellys
Prescott
Bellamys
Irish Cr.
Wolford
Frankville
Loon L.
Snowden
Coe Hill
Emily
Cloyne
Mississippi
Maberley
Perth
Rideau Canal
Rideau L.
Westport
Sharbot Lake
Eagle L.
Baker
Chards Lead Mines
Flinton
Arden
Parham
PETERBOROUGH
Bannockburn
Eldorado
Bridgewater
Hinchinbrooke
Fermoy
LEEDS
Elgin
Charleston
Charleston L.
Fairfield
Brockville
St. Lawrence R.
Canton
White L.
Belmont L.
Kaladar
Verona
Morton
Mallorytown
Pigeon L.
Fenelon Falls
Bobcaygeon
Chemung L.
Sturgeon L.
Stony L.
Blairton
Marmora
Madoc
Sheffield
Tamworth
Harrington
Harrowsmith
Seeleys Bay
Escott
Lakefield
Norwood
Hastings
Madoc Road
Tweed
Marlbank
Enterprise
Centreville
Inverary
Brewers Mills
Lansdowne
Ballantyne
Lindsay
Nassau Mills
Omemee
Ashburnham
HASTINGS
Moira
Roslin
Lonsdale
Newburg
Glenvale
Barriefield
Ganonoque
Peterboro
Cavan
Rice L.
Campbellford
Stirling
Hollyway
Selby
Napanee
Camden
Kingston
Erdestown
THOUSAND ISLANDS
Bethany
Pontypool
Millbrook
Garden Hill
Harwood
Warkworth
Trent
Tyendinaga
Foxboro
Belleville
Bath
WOLFE I.
Castleton
Baltimore
NORTHUMBERLAND
Smithfield
Brighton
Trenton
Bay of Quinte
North Port
Ameliasburgh
Deseronto
Adolphustown
Sandhurst
AMHERST I.
Watertown
DURHAM
Perrytown
Kendal
Clarke
Cobourg
Grafton
Colborne
Consecon
PR.EDWARD
Picton
Hillier
Wellington
Bloomfield
Milford
Pt.Petre
South Bay
Pt.Traverse
Pr.Edward B.
DUCK I.
Port Hope
Port Britain
Newtonville
Newcastle
Bowmanville
ONTARIO
Pulaski
Oswego
Rochester
NEW YORK
46
45
44
1
2
3
4
5
6
75
76
78
77
NORTHWESTERN PART
Scale of Miles
0 20 40 80 120
84
82
80
54
52
50
48
46
JAMES BAY
TWINS I.
AGOONISKA I.
SOLOMONS TEMPLE
Port Albany
Albany R.
CHARLTON I.
Moose Factory
Gloucester Ho.
Martins Falls
Fort Henley
S.River Ho.
Osnaburg Ho.
L. Joseph
Savan L.
English R.
L.Seul
Sturgeon
DISTRICT OF THUNDER BAY
Wabmoeb Ho.
Nepigon Ho.
Nepigon
Long Ho.
Long L.
Keewatin
Rat Portage
DISTRICT OF RAINY RIVER
L. of the Woods
Tache
Falcon
Martin
Carlstad
Savanne
Nordland
Port Arthur
Ft.William
Mackenzie
Heron Bay
Port Coldwell
Middleton
Rossport
Trudeau
White River
Amyot
Grassett
Otter
Brunner
Rainy R.
Rainy L.
HUNTERS I.
ISLE ROYALE
MICHIPICOTEN I.
LAKE SUPERIOR
DISTRICT OF ALGOMA
Moose R.
Abitibbe R.
Kapuskasing R.
New Brunswick Ho.
Missanabie
Dalton
Windermere
Pardee
Kapuskasing L.
Chapleau
Nemegosenda
Woman River
Ridout
Ramsay
Biscotasing
Matagamasing L.
Metagama
Monabing L.
Straight L.
Spanish Forks
Bruce Mines
Algoma
Spanish R.
Sudbury
Verner
Meadowside
North Bay
Nasbonsing
Powassan
L. Nipissing
Garden River
Echo Bay
Dean Lake
Chelmsford
North Chan.
GR.MANITOULIN I.
Sault Ste.Marie
White Fish Pt.
Keweenaw Pt.
APOSTLE IS.
Duluth
MINNESOTA
WISCONSIN
MICHIGAN
DISTRICT OF NIPISSING
Abittibe L.
Frederick Ho.
L. Temiscamingue
Mattawa R.
QUEBEC
LABRADOR
94
92
90
88
86
F 94
G 90
86 H
82 I
42
A
ich

hardy it should be sown early. In medicine it is a stimulating expectorant, valued in domestic practice, especially in diseases of children. Revised by L. H. Bailey.

Onomas'ticon: See Dictionary.

Onomatopœ'ia [Gr. *ὀνοματοποιία*, the creating of a name; *ὄνομα*, name + *ποιεῖν*, make]: the formation or modification of a word in imitation of a sound. The simplest and clearest cases of onomatopœia are contained in words which are direct names of sounds, as *boo-hoo*, *ding-dong*, *bang*, *bow-wow*, *moo*, *coo*, *baa*. Individual cases in which such words come to serve as verbs and nouns are undeniable; as *buzz*, *chuck*, *chuckle*, *hiss*, but they are so likely to become then conventional, and therefore to submit to the regular phonetic laws of the language, that it is necessary carefully to distinguish between words that are actively onomatopœtic and such as are only historically so. For instance, the verb *cackle* was doubtless in its origin imitative, but comparison with M. Eng. *cakelen* and Low Germ. *kākeln* shows that it can not be wholly the result of recent imitative action. It is often impossible to determine whether such correspondences may not be due to independent imitative action in the separate languages; thus *boom*, *bum*, *bumble-bee*, *hum*, *humble-bee*; cf. Germ. *bummen*, *hummen*, *summen* (also M. H. Germ.), *hummel* (O. H. Germ. *humbal*), "humble-bee," M. Eng. *humbelbee*, Dutch *hommelen*, etc. Words of this sort are generally so near their imitative source as to be continually subject to renewal. Such readaptation of historical material is distinctly an act of language-creation, and may well serve to illustrate the original processes in the generation of language; cf. differentiations like *crack*: *crash*, *clack*: *clash*, *smack*: *smash*. The historical name of the *cuckoo*, O. Eng. *gēac* > M. Eng. *geke* (cf. dial. *gowk*) : Germ. *gauch* < M. H. Germ. *gouch* : O. N. *gaukr*, has yielded in English to the more expressive *cuckoo*, older *cuccu*, which probably represents the Fr. *cucu*, *coucou*, and in Germ. *kuckuck*, a loan-word from Dutch *cuccūc*. Probably the French and perhaps the Dutch form is imitative, but in the light of forms in other languages, e. g. Gr. *κόκκυξ*, Lat. *cucu'lus*, it is practically impossible to tell where borrowing leaves off and where direct imitation of sound begins. The material collected in the writings of Hensleigh Wedgwood, e. g. in the introduction to his *Dictionary of English Etymology* (3d ed. 1878), is confused and uncritical; the best introduction to the subject will be found in Paul, *Principles of the History of Language* (2d ed. 1886), chap. ix.

Benj. Ide Wheeler.

Ononda'ga Indians: See Iroquoian Indians.

Onondaga Lake: a body of water in Onondaga co., N. Y. It is 5 miles long, 1 mile wide, and has a maximum depth of 65 feet, but its southern part is very shallow. Its waters are stagnant, and their level is 361 feet above tide. They flow into Seneca river. The lake has a natural puddling of marl, which keeps the brine of the Onondaga limestone from its waters. The lake was probably formed by the dissolving out of salt rock, and the subsequent falling in of the roof of the cavern thus formed.

Onosander: same as Onesander (*q. v.*).

Ontario (formerly Upper Canada): the wealthiest and most populous province of the Canadian Dominion. It received its present name in 1867, when it joined Quebec (formerly Lower Canada) and the two chief Maritime Provinces, New Brunswick and Nova Scotia, in the political union of the British North American provinces. It embraces an area of 222,000 sq. miles (2,350 water surface), extending from E. to W. fully 1,200 miles, i. e. between the meridians 74° and 95° W. of Greenwich, and N. and S. nearly 700 miles, or approximately from 42° to 53° N. lat. The older and more settled portions of the province, which date from 1791, are those which lie immediately N. of Lakes Erie and Ontario. As the country was opened up and the western waterways were utilized for commerce, settlement gradually took possession of undefined areas in a northwesterly direction. This territorial expansion was facilitated by the acquisition in 1868 of the vast area which for two centuries had owned the sway of the Hudson Bay Company. The northern and western limits of Ontario were without precise determination until 1878, when arbitrators, at the instance of the Dominion, in agreement with the provincial governments, made an award, which after a time was accepted by all parties interested, and settled the precise boundaries of the province. These are, on the E. and N. E., the Ottawa river, the Province of Quebec, and a line separating Ontario from the Northeast Territory, running N. to Hudson Bay from Lake Temiscaming, close to the meridian 79° W.; on the N. and N. W., Hudson Bay, the waterways of the Albany river, Lake Joseph, and Lac Seul, and the English river to a point of intersection with the meridian line drawn from the northwest angle of the Lake of the Woods, on the U. S. boundary; on the S. W. and S., Rainy and Pigeon rivers, Lakes Superior, Huron, St. Clair, Erie, and Ontario, with their connecting waterways (the St. Mary, St. Clair, Detroit, and Niagara rivers), and the St. Lawrence.

Physical Features.—The physical conformation of the older organized sections of the province has little to distinguish it. Nowhere do the elevations exceed 1,000 feet. The Niagara escarpment extends from the Blue Mountains, on Nottawasaga Bay, to the Niagara river, and there is a slight elevation trending S. E. from the Georgian Bay to the St. Lawrence, thence into the State of New York. N. of this hydrographical basin of the St. Lawrence the aspect of the province is bolder and more rugged. Here the Laurentian Hills, trending northwestward, cross the province, though reduced now to a hummocky plateau, locally termed the Height of Land. This ancient ridge parts the waterways N. into Hudson Bay, E. into the Ottawa, and W. into Lakes Nepigon and Superior. Among the many interior lakes besides Nepigon, which is situate N. of Lake Superior, are Lakes Nipissing, Muskoka, and Simcoe, all E. of Georgian Bay.

Geology.—Geologically, Ontario partakes of the characteristics which belong to the area extending from the Atlantic coast to Lake Superior. It is composed almost entirely of rocks belonging to the Archæan and Palæozoic divisions. Throughout the later geological ages these rocks have remained exempt from important disturbance, but have been subjected to prolonged processes of denudation, so that the more resistent rocks form the higher points. E. of Kingston and Ottawa the surface is based on horizontal beds of Silurian rocks, generally limestones, and S. of a line drawn from Kingston to the northern part of Georgian Bay it is based on rocks of the Palæologic age, but the series include strata as high as those of the Devonian period. The mineral-bearing area, which extends from Georgian Bay to Lake Winnipeg and northward, consists of Laurentian gneissic and granitic rocks, within which are many areas of plutonic and volcanic rocks, and of metamorphic slate of Huronian age. Overlying these occur the sedimentary and volcanic rocks of the Animike, Nepigon, and Keewanian group, whose nearly horizontal stratification contrasts sharply with the almost vertical older rocks upon which and against which they rest. In the upper Ottawa valley the lower and middle divisions of the Laurentides are overlaid unconformably by continuous and perfectly conformable series of sedimentary strata of the Cambro-Silurian system. Some of the clays abound in nodules holding remains of the seal, fishes, insects, shells, and plants. The great Huronian belt runs across the country from S. W. to N. E., and includes crystalline schists, breccias, conglomerates, argillites, and syenites, traversed by diabase dikes remarkable for their length.

Climate.—The summers are warm and the winters cold; but the cold is extreme only in the uninhabited northern portion, while even there the rigor is moderated by the snowfall and the absence of blizzards. In the populous parts of the province the cold is pleasant and bracing, while the snow is of much service to the lumberman as well as to the farmer. Of the length of the winters there is much popular misconception outside the province. Sometimes there is a late spring, but the average winter in the Ontario peninsula is not more than three months long. At Toronto the "close" season for navigation is usually from Dec. 15 to Mar. 15. The following table indicates the extremes of the provincial climate in widely separate sections:

PLACES.	Latitude.	Longitude.	Elevation above the sea.	MEAN TEMPERATURE.	
				Summer.	Winter.
Goderich (Lake Huron)	43·45	81·43	728	65·3	23·7
Port Arthur (head of Lake Superior)	48·27	89·12	611	58·0	9·0
Ottawa (Ottawa river)	45·26	75·42	236	65·3	15·4
Toronto (Lake Ontario)	43·39	79·23	350	64·1	24·6

Note.—The summer temperatures are taken from the months of July, August, and September, and those of the winter from January, February, and March.

The precipitation (rain and snow) for the year 1892 in three of the above places was as follows: Port Arthur, rain 16·06, snow 26·8 inches—total, 18·74; Ottawa, rain 23·10, snow 106·0—total, 33·70 inches; Toronto, rain 25·28, snow 42·2—total, 29·50 inches.

Soil and Products.—Over 100,000 sq. miles is still in forest, though in the older districts the woodland is chiefly young or second-growth timber—spruce, maple, and pine. Of the 23,000,000 acres of occupied and assessed land, about one-half is cleared, over 8,000,000 acres are woodland, and nearly 3,000,000 acres are marshes. Of the cleared land, 8,000,000 acres are under crop, 2,500,000 acres are in pasture, and nearly 200,000 acres are devoted to orchards and gardens. The soil and the climate admit of the cultivation of nearly all the useful food grains and roots, and of many marketable fruits. The assets of the farmers of Ontario in 1899 were given in the annual report of the Bureau of Statistics as follow: Land, $563,271,777; buildings, $213,440,281; live stock, $115,806,455; implements, $54,995,857. The total was $847,513,360. The following is the value of crops produced on the farms of Ontario in 1899: Hay and clover, $27,010,003; oats, $24,901,670; fall wheat, $9,631,365; peas, $8,675,673; potatoes, $6,538,144; barley, $5,858,202; turnips, $5,807,839; spring wheat, $4,682,476; husking corn, $4,291,300; silage or fodder corn, $3,395,510; mangolds, $1,671,871; rye, $1,142,423; buckwheat, $2,501; beans, $703,090; carrots, $459,254; total, $104,771,321.

The fruit crop for all but the hardier fruits is somewhat precarious, except in the Niagara district, where the peach is grown to fair perfection. Apples are usually a fine and profitable crop throughout the older parts of the province, as are cherries and plums, while strawberries, grapes, and small fruits are raised in great abundance in the Lake Erie and Lake Ontario counties. The forests and woodlands have contributed considerably to the exports of the province, besides affording material for some of its important industries. Now they are chiefly valuable to the crown for the revenue derived from timber dues and the rents accruing from leases to lumbermen. Where the timber limits are sold outright, the revenues will in future years shrink in value.

Mineral Resources.—The mineral wealth of Ontario is large, though economic conditions have hitherto not been favorable to its development. The chief exports of mineral ore have been to the U. S., and the duties imposed by that country have largely handicapped the industry. The area richest in minerals is that stretching from Sudbury district, in the neighborhood of Lake Nipissing, W. to Port Arthur, at the head of Lake Superior, and on to the Lake of the Woods. Within this region are gold, silver, copper, nickel, iron, galena, plumbago, and zinc ore, mica, and apatite, besides large deposits of granite, marble, and freestone. W. of Port Arthur is an argentiferous region of great richness. Many of the central and eastern counties also are rich in most of the metals named, and also in phosphates and other mineral fertilizers. In the western peninsula are salt, petroleum, gypsum, and materials for building, including large deposits of clays for terra-cotta and pressed brick. Mineral products of the province for 1899, exclusive of the yield from the precious metals, was about $6,000,000, one-third of which was expended for labor. Of this amount $2,700,000 represents the value of the building-stone mined during the year, including rubble, lime, cement, pottery, brick, and tile. A like amount represents the value of salt, petroleum, and natural gas. The gold production in nine months of 1899 was 20,210 oz.; silver, 98,000 oz.; nickel, 4,608,000 lb.; copper, 4,642,000 lb.; pig iron, 48,216 tons. The rush to incorporate mining companies in 1897, which resulted in 140 with a capital of $101,531,000, was not maintained in 1898. The total number in the latter year was 49 with a capital of $30,762,998. The revenue derived by the Government from sales and rentals was $109,140 for the year ending June 30, 1899. The number of men employed in 1898 was 7,495; the wages paid were $2,464,239.

Live Stock.—Ontario has paid special attention to the breeding of carriage and saddle horses, and care for the sanitary condition of cattle has enabled shippers to command good prices in Great Britain, as well as to save themselves the annoyance of embargoes. The total value of the live stock in the province in 1899 was estimated at $120,000,000, while sales within the year amounted to $38,457,018, divided as follows: Cattle, $17,303,426; hogs, $14,157,394; horses, $3,204,006; sheep, $2,629,201; poultry, $1,162,991. The wool trade increases steadily, the total clip for 1892 amounting to over 5,500,000 lb., the average weight per fleece in the Lake Ontario counties reaching 6·22 lb. The cheese and butter industries show a like advance. Bee-culture is also a growing industry, and honey has become a considerable source of revenue.

Population (including races and religion).—The population of Ontario in 1891 was 2,114,321, or more than half that of the Dominion W. of the Maritime Provinces. Of this number 1,708,702 are native born, 329,037 are British subjects (chiefly English, Scotch, and Irish), while 23,440 were born in Germany, and 42,702 in the U. S. The increase in population since 1881 has been slight, the province having lost heavily by emigration to the U. S. and the Canadian Northwest. Classified by religions, there were 647,518 Methodists, 452,712 Presbyterians, 385,999 members of the Church of England, 358,300 Roman Catholics, 96,969 Baptists, 45,029 Lutherans, 16,879 Congregationalists, and 10,320 members of the Salvation Army.

Divisions.—Ontario is for municipal purposes divided into 42 counties and 6 provisional districts. The former are comprised within the older organized sections of the province; the latter (Muskoka, Parry Sound, Nipissing, Algoma, Thunder Bay, and Rainy River) extend northwestward from the northern provisional counties to the prairie Province of Manitoba. Ninety-two electoral divisions return each a member in the Provincial Legislature, which consists of but one Chamber.

COUNTIES AND COUNTY-TOWNS, WITH POPULATION.

COUNTIES.	* Ref.	Pop. 1881.	Pop. 1891.	COUNTY-TOWNS.	Pop. 1891.
Brant	5-D	33,869	36,445	Brantford	12,753
Bruce	3-C	65,218	64,603	Walkerton	3,061
Carleton	2-H	64,103	77,630	Ottawa	44,154
Dufferin	4-D	22,093	22,311	Orangeville	2,962
Dundas	2-I	20,598	20,132	Cornwall ‡	6,790
Durham	4-E	36,265	32,427	Port Hope	5,042
Elgin	5-B	42,361	43,377	St. Thomas	10,366
Essex	6-A	46,962	55,340	Sandwich	1,352
Frontenac	3-G	42,384	47,009	Kingston	19,264
Glengarry	2-I	22,221	22,447	Cornwall ‡	6,790
Grey	3-C	70,539	71,214	Owen Sound	7,497
Haldimand	5-D	24,980	23,440	Cayuga	822
Haliburton	2-E	5,911	6,350	Minden	1,182
Halton	4-D	21,919	21,982	Milton	1,450
Hastings	3-F	55,061	59,084	Belleville	9,914
Huron	4-B	76,526	66,781	Goderich	3,839
Kent	6-B	54,310	58,904	Chatham	9,052
Lambton	5-B	52,034	57,925	Sarnia	6,693
Lanark	2-H	33,975	37,725	Perth	3,136
Leeds and Grenville	3-H	61,175	60,888	Brockville	8,793
Lennox and Addington	3-G	26,484	24,750	Napanee	3,433
Lincoln	5-D	31,573	30,079	St. Catharines	9,170
Middlesex	5-B	93,081	92,344	London	31,977
Norfolk	5-C	33,527	30,992	Simcoe	2,674
Northumberland	3-F	41,123	38,035	Cobourg	4,829
Ontario	3-E	48,812	45,355	Whitby	2,786
Oxford	5-C	50,159	49,849	Woodstock	8,612
Peel	4-D	26,175	24,871	Brampton	3,252
Perth	4-C	53,693	51,716	Stratford	9,501
Peterborough	3-F	30,472	34,597	Peterboro	9,717
Prescott	1-I	22,857	24,173	L'Orignal	1,002
Prince Edward	3-G	21,044	18,889	Picton	3,287
Renfrew	1-G	38,166	46,976	Pembroke	4,401
Russell	2-I	13,080	18,289	Russell	3,918
Simcoe	3-D	74,803	82,727	Barrie	5,550
Stormont	2-I	23,198	27,156	Cornwall ‡	6,790
Victoria	3-E	33,655	32,991	Lindsay	6,081
Waterloo	4-C	42,740	50,464	Berlin	7,425
Welland	5-E	31,771	30,631	Welland	2,035
Wellington	4-C	64,632	59,371	Guelph	10,539
Wentworth	5-D	66,952	77,114	Hamilton	48,980
York	4-D	153,113	245,101	Toronto	181,220
DISTRICTS.				CHIEF TOWNS.	
Algoma †	6-H	24,014	41,856	Sault Ste. Marie	2,567
Rainy River †				Rat Portage	1,806
Thunder Bay †				Port Arthur	2,698
Muskoka †	2-D	14,391	17,651	Bracebridge	1,419
Nipissing †	1-E	2,090	13,163	North Bay	1,937
Parry Sound †	1-D	12,813	19,167	Parry Sound	1,982
Totals		1,926,922	2,214,321		

* Reference for location of counties, see map of Ontario.
† Provisional districts with county organizations.
‡ Cornwall, in Stormont Co., is the county-town for the three counties of Dundas, Glengarry, and Stormont.

Cities.—The population of the 12 cities in 1891 was as follows: Toronto, 181,220; Hamilton, 48,980; Ottawa, 44,154; London, 31,977; Kingston, 19,264; Brantford, 12,753; Guelph, 10,539; St. Thomas, 10,366; Windsor, 10,322; Belleville, 9,914; Stratford, 9,501; St. Catharines, 9,170.

Government.—The administration of provincial affairs is

intrusted to an executive and a legislative assembly, which together form the parliament of the province, with a lieutenant-governor, who is advised by a cabinet, composed of eight members. Toronto is the seat of the Provincial Government. The Executive Council comprises the Attorney-General (Premier), Commissioner of Crown Lands, Commissioner of Public Works, Minister of Education, Minister of Agriculture, Treasurer, Secretary, and Registrar, and another cabinet officer without portfolio. The Legislature has by law a duration of four years, unless sooner dissolved by the lieutenant-governor. It is governed by the constitutional principles which guide the Federal Government and parliament at Ottawa, and has exclusive jurisdiction in questions relating to property and civil rights, education, municipal government, and all other matters of local concern. Matters of a general character are under the jurisdiction of the Dominion authority and parliament, in the latter of which Ontario is represented by 24 members in the Senate, appointed by the crown, and by 92 members in the Commons, elected by the people. The higher legal machinery of the province is grouped under the Supreme Court of Judicature for Ontario. This court is divided into two branches—the court of appeal and the high court of justice. The latter is again subdivided into the three divisions—queen's bench, chancery, and common pleas courts. The judges are appointed by the Dominion Government. Toronto is the seat of the higher courts.

Education.—In 1891, of the adult population of the province only 3·83 per cent. were unable to read and 5·20 per cent. were unable to write. Though separate schools continue to be recognized and aided by the province, the educational system is in the main unsectarian, and the public schools are free to all. The chief source of the school maintenance is local taxation, aided by Government grants from the public chest. In 1898 the province expended over $4,000,000 upon public schools alone. These were 5,932 in number, with an enrollment of 478,394 and an average attendance of 273,451. In charge of these schools there were 9,209 teachers (6,466 female and 2,743 male), the average salary being $297 for the former and $421 for the latter. Of Roman Catholic (separate) schools, there were in 1898 345, with 41,667 pupils and 700 teachers. Besides the public schools, the province maintains 130 high schools, of which 35 are collegiate institutes, employing in both 571 highly qualified teachers, with a registered enrollment of 23,301 pupils and an average attendance of 14,066. There are also 69 teachers' institutes, 2 well-appointed normal schools (one in Toronto and one in Ottawa), besides a number of city and county model schools, a school of pedagogy, a provincial agricultural college and experimental farm, and a school of practical science. In addition to all these the province gives aid to a number of industrial schools and eleemosynary institutions, and maintains schools for the blind and the deaf and dumb. It also gives legislative aid to mechanics' institutes, free public libraries, and art schools. The entire school system is under the administration of a department of the Provincial Government, at the head of which is the Minister of Education. School boards, under the supervision of the provincial department, are intrusted with the local administration.

At the head of the educational system of the province stands the national institution, Toronto University and College. This institution has dual functions, viz.: (1) An examining and degree-conferring body, governed under the crown by a board of trustees, senate, and convocation; and (2) a teaching body, directed by a university council, composed of the president and professorial staff. Since 1850 it has been undenominational and has attracted toward it, under the University Federation Act, a number of theological colleges, schools of medicine, of science, of music, agriculture, dental surgery, and pharmacy, which take advantage of its comprehensive art course, laboratory work, etc. The affiliating denominational colleges are Victoria University (Methodist), Knox College (Presbyterian), St. Michael's College (Roman Catholic), Wycliffe College, and Huron College (Episcopalian).

The other colleges of the province are Queen's University, Kingston (Presbyterian); McMaster University, Toronto (Baptist); Trinity University, Toronto (Episcopalian); Woodstock College (Baptist), Alma College, St. Thomas; Albert College, Belleville; and Upper Canada College, Toronto. The last named, an old historic, residential school for boys, was founded by Sir John Colborne in 1829 upon the model of the great public schools of England.

Railways and Canals.—The province has been liberal in its subventions for the construction and equipment of local railways. The total railway mileage of Canada in operation in 1899 was 17,358 miles, about half of which run through Ontario. The characteristics of the vast inland navigation of Canada have necessitated canals over many of its waterways. The Dominion Government has undertaken the construction of a new canal on the St. Mary river, to give access to Canadian traffic in its passage in and out of Lake Superior. The existing canals of the St. Lawrence system, which lie almost wholly within the province, are over 70 miles in length; the total height directly overcome by locks is 533 feet. The available depth, with the exception of that in the Welland Canal, is (1894) limited to 9 feet. The Murray Canal connects the Bay of Quinté and Lake Ontario. The Rideau Canal, which connects the Ottawa river with Lake Ontario, was undertaken at an early period for military purposes. The U. S. has reciprocal privileges over the Canadian canal system, and utilizes it largely as against the privilege Canada enjoys in the railway bonding system over U. S. territory.

Finance.—Ontario, unlike the other provinces of the Dominion, has no debt, if we except subventions to local railways to the extent of about $1,500,000, which has a period of forty years for its redemption. What debt she had, as a partner with Quebec in the old Province of Canada, was assumed by the Dominion at confederation. Under the arrangement by which the province entered the union, Ontario receives an annual subsidy from the Federal Government of $1,196,873, and had in 1900 a surplus of assets over liabilities presently payable of $1,957,873. The indebtedness of the municipalities amounted in 1890 to nearly $50,000,000, with assets slightly in advance of this sum.

Commerce and Business Interests.—So far as can be known, the trade of the province for the year 1893 was as follows: Exports, $33,850,873; imports, $48,243,756; duty paid on the latter, $8,661,581. (These figures can be only approximately correct, since much of the provincial export and import trade passes through the ports of Montreal, Quebec, and Halifax, and no separate record is kept of it.) The two chief customers of the province are the U. S. and Great Britain. There are 76 loan, building, and investment companies, with a subscribed capital of over $80,000,000, doing business in Ontario. Of the 39 banks making returns to the Federal Government on Jan. 1, 1893, 10 had their headquarters in Ontario. At that date the total liabilities of the 39 banks amounted to $217,195,975, and the total assets to $302,696,715. The crisis in banking and commercial circles in the U. S. in 1893 was little felt in Ontario, owing to the conservative efforts put forth by Canadian banking and monetary men to strengthen their financial resources and act cautiously with regard to credits. Ontario has a large export and domestic trade in manufactures of all kinds, including agricultural implements, machinery, edged tools, musical instruments, sewing-machines, besides woolen goods, tweeds, cottons, undressed furs, leather goods, woodenware manufactures, etc.

History.—Canada, even long after the conquest, had but a mere fringe of settlement along the St. Lawrence and the Bay of Fundy. Adventurous spirits, however, had probed the waterways to the far West and the region that, after the passing of the Constitutional Act of 1791, was to become a new colony of the crown, as yet an almost unbroken wilderness. The close of the Revolutionary war brought bands of Loyalists into the country, and these located themselves partly in Acadia in the E., and partly along the upper St. Lawrence and about the mouth of the Niagara river in the W. To give the western-settling Loyalists a country and a home, the British Government divided Canada into two provinces, Western or Upper Canada being set off from the old French province on the St. Lawrence, the Ottawa river forming a rough dividing-line. Gen. Simcoe, an old Revolutionary campaigner, was sent out as lieutenant-governor, and established his seat of Upper Canada government for a time at Niagara, where the first parliament of the province met, and afterward at York, which subsequently resumed its old Indian name of Toronto. Toronto was founded in 1793, and has since, with an occasional brief interruption, been the provincial capital. The war of 1812 bore hardly upon the fortunes of the province, and it was also hindered by its long battle against the paternalism of the mother-country, or rather against the tyranny of a bureaucratic colonial executive, which stood in the way of progress and the attainment of responsible government. The union of

the two Canadas, which occurred in 1841, proved unfortunate, for to the strife of political factions was added a war of races which made legislation impossible and brought about political deadlock. The solvent was confederation, which took place in 1867, and made Upper Canada (now Ontario) a self-governed province of the Dominion. Territorial expansion brought advancement, not only political and economical, but intellectual and social as well.

AUTHORITIES.—McMullen's *History of Canada*; Goldwin Smith's *Political History of Canada*; Dent's *Last Forty Years*; Collins's *Life of Sir J. A. Macdonald*, edited by G. Mercer Adam; *Toronto, Old and New*, by the latter author; *Picturesque Canada*; *Canadian Almanac*; *Star Almanac*; Statistical Year-books of Canada, Reports of the Bureau of Industries for Ontario, Reports of the Bureau of Mines for Ontario, Reports of the Minister of Education for Ontario (1893); *Educational System of the Province of Ontario*, by John Millar, B. A. (Toronto, 1893).

G. MERCER ADAM.

Ontario, Lake: the easternmost and smallest of the Great Lakes drained by the St. Lawrence. Its area, as determined from the maps of the U. S. Lake Survey, is 7,104 sq. miles; another estimate from the same data gave an area of 7,240 sq. miles. The hydrographic basin, including the lake surface, has an area of 30,790 sq. miles. The mean elevation of the surface of the lake is 247 feet above sea-level, and 326 feet lower than the surface of Lake Erie. The maximum depth is 738 feet. The lake is 190 miles long and 55 miles wide. Its discharge is estimated at 300,000 cubic feet per second. As is the case with all large lakes, it is subject to fluctuation of level, due to annual variation in rainfall and evaporation, to secular climatic changes which are irregular both in amount and in time, to changes in the direction and force of the wind, and to variations in atmospheric pressure. The amount of these various oscillations have not been studied in Lake Ontario, but are believed to have a mean range of 5 or 6 feet, with the exception of local changes due to strong winds, which may be 10 or 15 feet. Lake Ontario is connected with Lake Erie by the Welland Canal and with Montreal by the St. Lawrence, which can be descended by steamers, the return being accomplished by means of a series of canals. The lake seldom freezes except near the shore, and is the highway of an extensive commerce. For a sketch of the later geological history of the Great Lakes, see ST. LAWRENCE RIVER. I. C. RUSSELL.

Ontog'eny [from Gr. *ὤν, ὄντος*, being + root *γεν-*, produce]: a term introduced by Haeckel, and now in general use, for the development of the individual, as opposed to phylogeny or the development of the race. See MORPHOLOGY and EVOLUTION.

Ontol'ogy [Gr. *τὰ ὄντα*, the things that exist (neut. plur. of *ὤν, ὄντος*, pres. partic. of *εἶναι*, be) + *λόγος*, reason, discourse]: the science of being in general or of the essence of things. It is sometimes identified with metaphysics, but usually is made one of its divisions, and co-ordinate with rational psychology, cosmology, and theology, according to the nomenclature of Wolf, who established this fourfold division of metaphysics. The Aristotelians and the Scholastics treated under physics the problems of rational cosmology, and under metaphysics those of ontology. Aristotle called the latter (metaphysics) *πρώτη φιλοσοφία*, and included under it also theology. His *De Anima*, or at least the portions of the third book that treat of reason (*νοῦς*), may be regarded as the first work (and as still the best, according to some) on rational psychology, but psychology was generally classed among the natural sciences by his followers. Logic, however, as treating of the mere forms of thought, should belong under rational psychology, and be contrasted with ontology, which treats of real being and of the essence of things: (*a*) *of being*, as quality, quantity, infinite and finite, etc.; (*b*) *of essence*, as identity and difference, form and matter, ground and sequence, noumenon and phenomenon, cause and effect, substance and attribute, possibility and necessity, and similar relations. The general problem of ontology is to find the highest principle, or that which is true in and for itself—the Absolute. Inasmuch as psychology, with the problem of certitude, has come to the front rank in modern philosophy, it has happened that the latest systems of ontology, notably those of Germany since Kant, have striven to unite ontology with psychology, and thus create an ontological logic which should give the *a priori* laws and conditions of thought and being. Kant's work was negative in this respect, and denied the possibility of knowing things in themselves, hence of all ontology; it confined all *a priori* knowledge to the forms of the mind, and made all objects of knowledge subjective and phenomenal; but since he included among these subjective forms of the mind such universal, logical conditions of existence as time and space, quality, quantity, relation, and mode—these categories being the *a priori* conditions of existence *for us*—it was possible to construct a science of ontology within the subjective or psychological province. In fact, no room was left for the possibility of objective being outside of mind. Hence arose the systems of Schelling and Hegel and their followers, whose ontology is based on psychology. See PHILOSOPHY, HISTORY OF. WILLIAM T. HARRIS.

Onychoph'ora [Mod. Lat., from Gr. *ὄνυξ, ὄνυχος*, claw + *φορός*, bearing]: a group of animals, containing the single genus *Peripatus*, of very doubtful position. First described as a mollusc, it was later transferred to the worms, and upon the discovery by Moseley (1875) of the existence of tracheæ it was elevated to a class—*Protracheata*—and regarded as the ancestor of all true insects. The genus *Peripatus* occurs in South and Central America, in the West Indies, at the Cape of Good Hope, and in Australia and New Zealand, a distribution which indicates great antiquity. The animal, which has a length of an inch or two, has a worm- or caterpillar-like body, with distinct head and a varying number of pairs of fleshy feet, each terminated with a double claw. On the head are a pair of eyes, a pair of antennæ, and a pair of horny jaws. The greatest interest pertains to its internal structure. The nervous system consists of two widely separated cords connected by the brain in front and a supra-intestinal loop behind and numerous cross bands in the body. The alimentary canal is straight; respiration is effected by numerous bunches of tubular air-tubes (tracheæ) scattered over the surface. Instead of the excretory tubes (*vasa Malpighii*) of ordinary insects, excretory products are removed by means of segmentally arranged nephridia like those of Annelids. The animals live in decaying wood, and for protection secrete an enormous amount of slime from a pair of slime glands opening on either side of the mouth. The young are born alive, but the different forms present great differences in their development. As will be seen, in some features the *Onychophora* resemble the true insects (Hexapods), while in others they present features not found elsewhere outside of the group of Annelids. For a general account of anatomy, development, and classification, see Sedgwick, *Quarterly Journal Micros. Science* (1885–88). J. S. KINGSLEY.

Onychoteu'thidæ [Mod. Lat., named from *Onychoteuthis*, the typical genus; Gr. *ὄνυξ, ὄνυχος*, claw + *τευθίς*, cuttlefish, squid]: a family of cuttlefishes (Cephalopods), embracing some of the squid, in which the eye has a sinus above and the water bathes the lens. On the New England coast, N. of Cape Cod, one member of the family, *Ommastrephes illicebrosa*, is the most abundant squid, and is caught in large quantities as bait for codfish.

Onyx, ō'nix [= Lat. = Gr., a veined gem, liter., fingernail]: a variety of chalcedonic quartz, composed of parallel layers of chalcedony of some shade of brown, green, red, or other color alternating with layers of white. When the red is a rich brownish-red chalcedony (*sard*) and the white bands pure and translucent, the variety is known as *sardonyx*; when quartz and gray chalcedony are in combination, *chalcedonyx*; when the ground is black and the bands are very thin and grayish white, *onicolo*. The varieties of onyx were highly prized by the ancients for the manufacture of cameos, one of which, said to be the largest known, measuring 11 inches by 9, is preserved in the Museo Borbonico at Naples: other great cameos are at Vienna, in the British Museum, and in the Bibliothèque Nationale, Paris. Onyx is now much used in jewelry, but nearly all modern onyx is the result of artificial staining or dyeing. *Mexican onyx*, so called, is like aragonite, being essentially a carbonate of calcium containing small quantities of iron and manganese, to the distribution of which are due the beautiful variegated colors for which the stone is so much admired. Its hardness is 3, its specific gravity 2·9. It is formed on the floors of caves, being the result of a deposition of calcareous waters, either cold or hot, between the successive layers of which the iron and manganese is deposited. It was used by the ancient Mexicans, who carved it into masks, idols, and a variety of objects, but was first brought to general notice at the Centennial Exposition at Philadelphia in 1876, where a magnificent series of specimens was shown by the Mexican commission.

On account of the softness of the material it can be readily carved with a knife, and at Puebla and other places in Mexico is extensively worked into trays, crucifixes, inkstands, fruit, fish, and other natural objects, many of the latter being copied with remarkable skill in the representation both of form and color. The so-called *mosaic agate* is, properly speaking, a ruined aragonite, the original material having been broken up into irregular pieces and recemented by a secondary deposition of Mexican onyx. See AGATE and CHALCEDONY. Revised by G. F. KUNZ.

O'ölite [Gr. *ᾠόν*, egg + *λίθος*, stone, modified by confusion with ending *-ite*]: See LIMESTONE.

O'öphore: See FERNWORTS.

Oosterzee, ōs'ter-zā, JAN JACOB, van: theologian; b. at Rotterdam, Holland, Apr. 17, 1817; studied theology at Utrecht, and after holding prominent pastorates he became professor there in 1862. D. while on a visit at Wiesbaden, July 29, 1882. He led the evangelical party in Holland. Of his numerous writings several have been translated into English, among which are *The Image of Christ as represented in Scripture* (3 vols., 1855–61; London, 1874); *Theology of the New Testament* (1867; London, 1870); *Christian Dogmatics* (1870–72; London, 1874); *Year of Salvation* (1874); *Moses* (1876); *Practical Theology* (1878). Revised by S. M. JACKSON.

Opah: See KINGFISH.

Opal [from Fr. *opale* < Lat. *o'palus*, from Gr. *ὀπάλλιος*, opal]: a gem consisting of natural silica and containing some water, sometimes up to 11 per cent. It is never crystallized, but always amorphous, with a marked conchoidal fracture. Several varieties are recognized, of which *precious* or *noble opal* is the most highly prized. Its value arises from its remarkable and exquisite play of colors. The general aspect is whitish or milky, and the opalescence consists of countless gleams of many-colored light or "fire." A more transparent variety, with broader reflections of color—red, yellow, blue, green, or violet—is more brilliant, though less highly valued as a gem, and is known as *fire-opal* or *girasol*. Black opals are almost invariably the result of an artificial staining of a poor white opal. The name *lechosos* is given to those showing much green light, and *zeasite* to those that have much red. The noble and the fire opal are the only kinds used in jewelry. Other varieties of various colors, but lacking the opalescence, are *common opal* (translucent), *semi-opal* (nearly opaque), and *wood-opal* or *opalized wood*, which is formed by the replacement of wood by silica in solution, and sometimes occurs in considerable amount in the form of fossil tree-trunks, etc., like agatized and jasperized wood. Opal occurs in igneous rocks—amygdaloidal, trachytic, and porphyritic—and the wood-opals, etc., in regions of hot siliceous springs derived from volcanic rocks. The finest noble opal has been mined for a long time in trachyte near Dubnik, Hungary, and of late abundantly in a jaspery ironstone on the Barcoo river in Queensland, Australia, and near Wilcannia, New South Wales; also in amygdaloid near Colfax, almost on the State line of Washington and Idaho. Mexico and Honduras yield very fine fire-opal in trachytic rock, also the Queensland locality above named, and Oregon. See HYALITE. GEORGE F. KUNZ.

Opeli'ka: city; capital of Lee co., Ala. (for location, see map of Alabama, ref. 5–E); on the Cent. of Ga. and the West. of Ala. railways; 28 miles N. W. of Columbus, 66 miles E. N. E. of Montgomery. It is in a grain and cotton-growing region, annually handles large quantities of cotton, dry goods, and groceries, has several large cotton-warehouses, flour-mills, and other industrial establishments, and contains a national bank with capital of $75,000, a State bank with capital of $100,000, and a daily and a weekly newspaper. Pop. (1880) 3,245; (1890) 3,703: (1900) 4,245.

Opelousas: town; capital of St. Landry parish, La. (for location, see map of Louisiana, ref. 10–D); on the S. Pacific Railroad; 45 miles W. by N. of Baton Rouge. It is in a cotton, rice, corn, and stock raising region, and contains the Academy of the Immaculate Conception (Roman Catholic), a State bank with capital of $50,000, and three weekly newspapers. Pop. (1880) 1,676; (1890) 1,572: (1900) 2,951.

Opera [=Ital., liter., work, composition < Lat. *o'pera*, neut. plur. of *opus*, work]: a drama which is sung with accompaniment of instrumental music. Dramas occasionally interspersed with songs to familiar airs are called vaudevilles; dramas occasionally accompanied by instrumental music are called melodramas. On its dramatic side the form of the opera does not differ widely from that of the spoken drama. Inasmuch, however, as it is to be sung, the text of an opera, the *libretto*, must be of much smaller extent than that of an ordinary drama.

It is on its musical side that the opera presents its most clearly marked peculiarities of form. There are, or at least were until the time of Wagner, several sharply distinguished forms which serve to make up the vocal part of the composition. The chief of these are the recitative, aria, duet, trio, and chorus. The recitative is the least elaborated musical form of the opera, and is designed for the more rapid prose passages of the dialogue, as opposed to the finished lyrical parts. It is not, strictly speaking, melody at all, but the voice moves through a few notes only, including frequent chromatic intervals, and having little unity of key or tonality. Moreover, there is no clear division of time, such as is secured by the division into bars, but the series of notes proceeds with abruptly changing movement, divided merely by a few strongly accentuated resting-points. The aria is a theme for a solo voice, being a complete melodic subject, and having divisions of strophe, verse, etc. Duets and trios (*duetti*, *terzetti*) are combinations of two or three voices in a complete melodic subject. In addition to these there are the ensemble pieces, in which all the principal actors and singers (commonly from four to six in number) unite in some harmonized strain. The finale is an example of an ensemble movement. Lastly, there is the full mass of harmonized voices as given in the chorus. In this the several parts are each rendered by a number of voices, supplied by a band of subsidiary actors specially set apart for this purpose. The instrumental part of operatic music requires a large orchestra to render it adequately.

The opera is pre-eminently a modern art, being developed, as might be expected, later than the simple forms of modern music itself. It grew up in Italy at the beginning of the seventeenth century, during the period of the Renaissance, and when polyphonic music had pretty well exhausted its resources, and a basis had been laid by Palestrina for our present system of harmony. It was in Florence, about the year 1600, that the first opera appeared. Certain patrons of art set themselves in the spirit of the Renaissance to rediscover the vocal music of the Greek drama, and by the help of certain singers and composers, among whom were Caccini and Peri, they invented recitative as the nearest representative of Greek dramatic intonation. This first opera, the earliest known example of which is a piece entitled *Eurydice*, composed by Peri, consisted of recitative, or, as the Italians called it, *aria parlante*, choruses, a few duets and trios, together with instrumental prelude and interludes. This early recitative has more of equal-time division than our present mode. For fifty years this opera remained the luxury of nobles, being performed only before courts during special festivities; after that it gradually became a popular entertainment. The instrumental part of the opera was greatly improved by Monteverde, who added the overture (*toccata*). Later in the century the melody of the aria was enriched by two composers named Cavalli and Cesti. It was indeed in connection with the opera that our modern style of melody developed itself. Before the invention of this new form of art music had consisted almost exclusively of skillful combinations of distinct themes in intricate contrapuntal arrangements, with little regard to harmony and no thought of a single ruling melody. The opera, by stimulating solo-singing and by reviving a taste for the beauties of popular melody, supplied the necessary incentive for the elaboration of sweet-sounding and finished melodic themes. In the following (the seventeenth) century A. Scarlatti clearly marked off the aria from the recitative, and gave it the triple division which it retained for nearly a century. The later Italian operas—namely, the works of Piccini, Paesiello, and Cimarosa—do not display any great change of style. In the works of Verdi, however, covering as they do a period of many years, we find a marvelous progress and development. (See VERDI.) Later, a young composer named Pietro Mascagni attracted the attention of the world as the representative of young Italy, plainly showing the influence of Wagner. His first great success was with the one-act opera *Cavalleria Rusticana* (Rustic Chivalry, 1890).

In France the earliest operas, those of Lulli (end of the seventeenth century) and of Rameau (beginning of the eighteenth century) were little more than imitations of the Italian style. The basis of French opera was laid by Gluck (1773–87), who set himself to rectify the evils of the existing Italian opera by confining the exercises of the vocal art

within due limits, and by bringing into greater prominence the dramatic character of opera. He shortened the aria-form, expunged the numerous bravura passages with which it was laden, and reduced the number of airs in the opera by elevating the recitative to a higher rank, rendering it richer in a musical aspect and more impressive dramatically. Gluck also greatly improved the quality of the operatic chorus, making it a more conspicuous element of the opera, and added to the instrumental part, seeking to bring it into closer unity with the dramatic subject. The French classic opera ("grand opera") after Gluck scarcely fulfills the expectations raised by such an admirable foundation; but it must be admitted that the French school has always been faithful to the teaching of Gluck in seeking to do justice to the dramatic claims of opera. The French recitative is characterized by great energy and freedom of movement, and admirably adapted to dramatic effect. Among those composers who have written solely or mainly for the French stage are Méhul, Cherubini, Spontini, Meyerbeer, Rossini, Gounod, and Thomas. Perhaps, however, it is in the lighter style of opera that the French have excelled. The early vaudeville, which is the forerunner of the opéra bouffe, was light, graceful, and piquant. Rousseau's *Le devin de Village* is a good example of this genre. The first composer of the opéra comique, strictly so called, was A. F. Boieldieu. Other writers of this lighter style of French opera are Hérold, Halévy, Auber, Adam, and Offenbach. The modern French opera composers, Massenet, Saint-Saens, Bizet, etc., are really to be classified with the modern German school, so far as the harmonic treatment of their various works is concerned, and also their modes of orchestration.

In Germany, until the rise of Wagner, the opera was marked by less of national originality than in France. Keiser did little more than carry out Italian traditions, and Mozart was the first great opera-writer in Germany. He united Italian sweetness of melody with German richness and depth of harmony, and his operatic music, as pure music, has never been equaled. Passing by Beethoven's *Fidelio*, we find that the German opera after Mozart sank for a while to a low ebb. The one worthy attempt to raise its character came from the romanticists—namely, Spohr, Weber, and Marschner—who sought to give a national tone to German opera by taking half-legendary subjects from early German history. To Weber especially will remain the glory of having first founded a distinct German operatic style. Wagner is the successor of Weber in more than one sense. See WAGNER, WILHELM RICHARD. Revised by DUDLEY BUCK.

Operti, GIUSEPPE: See the Appendix.

Ophid'ia: an order of reptiles containing the serpents, characterized by the large number of vertebræ, numerous ribs, and absence of sternum. Fore limbs are never present, but in a few species the hind legs are present as mere rudiments. See SERPENTS.

Ophidi'idæ [Mod. Lat., named from *Ophi'dium*, the typical genus, from Gr. *ὀφίδιον*, dimin. of *ὄφις*, serpent]: a family of teleocephalous fishes belonging to the sub-order *Acanthopteri*, and distinguishable from all others by a peculiar modification and position of the ventral fins. The body is more or less elongated, almost eel-shaped, with the tail long, the scales small and partly imbedded, the head moderate, the teeth small, mostly villiform, the dorsal and anal fins low, united with the caudal, without spiny rays; ventral fins inserted at the chin, having each the form of a bifid filament. The species are mostly small in size, and several occur in deep water. Revised by D. S. JORDAN.

Ophiocephal'idæ [Mod. Lat., named from *Ophioce'phalus*, the typical genus; Gr. *ὄφις*, serpent + *κεφαλή*, head]: a family of teleocephalous fishes of the sub-order *Acanthopteri*, distinguished by a peculiar union of characters. The body is elongated and anteriorly subcylindrical; the scales of moderate size; the lateral line with an abrupt curve; the head depressed, oval above, and covered with shield-like scales, the general appearance being that of a mullet; dorsal and anal fins long, and without spines; caudal round, separated from the dorsal and anal; ventrals thoracic (and composed of one simple but partly articulated and five branched rays) or absent. The skeleton has numerous (fifty-two to sixty-one) vertebræ; the caudals are provided with ribs, the abdominal cavity being continued to below the caudal portion; four gills are developed, but no pseudobranchiæ; a cavity accessory to the gill-cavity is developed, in which water is retained, but no super-branchial organ is present; pyloric appendages may be either present (two in number) or absent. The family is composed of fresh-water fishes peculiar to Southern and Southeastern Asia. Above thirty species are known. The peculiar accessory gill-cavity contains a supply of water, which serves to keep moist the gills of the fish for a long time after being taken out of water. The species are therefore well adapted to withstand prolonged deprivation from that element.

Revised by D. S. JORDAN.

O'phir [cf. Sanskr. *Abhīra*, name of a people anciently found on the lower Indus]: the name (in Gen. x. 29) of the eleventh of the thirteen sons of Joktan, all of whom appear to have settled in Arabia; also the name of a place or region famous in the commercial history of the Hebrews, from which, or perhaps only by way of which, came gold, almug-wood, and precious stones (1 Kings x. 11). The voyage thither and back, or perhaps the voyage which only took Ophir in its way, required three years (1 Kings x. 22). Ophir can hardly have been a general name for remote southern countries, nor can it have been any such far-off place as Peru, but should be looked for either in Africa (Bruce, Robertson, Petermann), or in India (Vitringa, Reland, Ritter, Ewald), or, more probably, in Arabia (Michaelis, Niebuhr, Forster, Knobel, Kalisch). See A. Soetbeer, *Das Goldland Ofir* (Berlin, 1880). Revised by S. M. JACKSON.

Ophites, ō'fīts [from Gr. *ὄφις*, serpent], or **Serpent-worshipers**: a sect of Gnostics who joined the worship of the serpent to the general characteristics of the faith and practice of other Gnostics. They honored the serpent because he tempted Eve to eat of the forbidden fruit—an act which they believed to be highly advantageous to the human race. They kissed the serpent and fed it with the Eucharistic bread; but others rejected Christianity, and honored Cain, Judas Iscariot, and other wicked personages. It has been supposed that the sect was of Jewish origin, but the sharp antithesis which they set between Judaism and Christianity, and the copious element they evidently had drawn from Greek philosophy, seem to indicate a pagan origin. Their speculations have a certain resemblance to the mythologies of Babylon (the seven-headed serpent) and Persia.

Ophitic Structure: See DIABASE.

Ophiuroi'dea [Gr. *ὄφις*, snake + *οὐρά*, tail + suff. *-oid*, like]: a class of ECHINODERMATA (*q. v.*), embracing those forms popularly known as "brittle stars" or "serpent stars." The Ophiurans differ from the other starfishes (Asteroidea), among other features, in having a well-marked central disk from which radiate the long and nearly cylindrical arms. These latter are flexible, and are far more rapidly moved than are those of the true starfishes. In the true serpent stars (Ophiuræ) they are simple, but in the "basket fishes" (Euryalæ) they are branched many times, so that when incurled the whole animal quite closely simulates a shallow basket. Less conspicuous but equally important differences are the total absence of a vent and the inclusion of the ambulacral plates on the inside of the arms, the small tube feet projecting upon the sides. The Ophiurans are all marine, and live creeping about among the "roots" of the seaweeds, etc. A few bring forth living young, but most species lay eggs, and the young when hatched bear not the slightest resemblance to the adults. These young, known as *plutei*, at first swim freely, but later they become quiescent, and undergo a metamorphosis which results in the assumption of the adult form. See for the species Lyman, *Ophiuridæ and Astrophytidæ* (Cambridge, 1864); for development, Apostolides, *Archives de Zoologie Expérimentale*, x. (1882).

J. S. KINGSLEY.

Ophthal'mia [Mod. Lat. = Lat. = Gr. *ὀφθαλμία*, deriv. of *ὀφθαλμός*, eye]: a term which should be restricted to inflammations of the conjunctiva—i. e. the membrane lining the eyelids and covering the exposed surface of the eyeball. It is synonymous with conjunctivitis, and is divided into *simple* or *catarrhal*, *purulent*, *membranous*, *phlyctenular*, and *granular ophthalmia*.

Catarrhal ophthalmia (catarrhal or muco-purulent conjunctivitis) is the mildest form of inflammation of the conjunctiva. It may be caused by over-use of the eyes, by the contact of irritating substances, by riding in the wind, and by "catching cold," or it may be associated with certain diseases, as nasal catarrh, bronchitis, typhoid fever, rheumatism, and especially measles and scarlet fever. The symptoms are inability to use the eyes, a feeling of a foreign body in the eye, and the development of a secretion, at first mucous and afterward muco-purulent, which gums the eyelids

together. The eyeballs look very red, and upon everting the eyelids their lining membrane is found to be still more reddened, and to have a somewhat velvety appearance. Usually there is not much dread of light. This affection does not imperil the eyesight if properly treated. The disease is commonest in warm and changeable weather, and, if the secretion is free, is markedly contagious. Some of the special varieties of it are distinctly epidemic; one, often occurring in the spring and fall, should be known as epidemic conjunctival catarrh, but is vulgarly called "pink eye." Mild cases of catarrhal ophthalmia should be treated by removing the cause, washing the eyelids and eyes frequently with soap and water, and keeping the discharge cleaned away with some mild collyrium; an excellent one is a solution of common table salt in the proportion of a teaspoonful to the pint. Boracic acid and borax are much used for the same purpose. In the severe types very decided treatment may be necessary, especially the application of strong astringents like nitrate of silver.

Purulent ophthalmia is a very dangerous disease. It is customary to describe it under two forms, as it occurs in the new-born, *ophthalmia neonatorum*, and in adults, *gonorrhœal ophthalmia*. The ophthalmia of new-born infants generally begins about the third day after birth, at first as a simple conjunctivitis, but rapidly develops into a violent inflammation, characterized by the free secretion of thick pus, which is exceedingly contagious, swelling of the conjunctiva, and great pressure upon the blood-vessels supplying nutrition to the cornea, which often becomes ulcerated, causing permanent loss of sight. An inflammation of this kind is due to contagion occurring either during the birth or immediately after it. The active principle of this contagion is a micro-organism which was originally discovered by Neisser, and is called the *gonococcus* of Neisser. When a similar inflammation occurs in adults it is also due to contagion carried to the eye by soiled fingers which have been in contact with a discharge in which these micro-organisms exist. In infants generally both eyes are affected; in adults usually the right eye, although the left very often also becomes involved. Only the most vigorous and active treatment will save such eyes from destruction. This consists, in brief, of iced compresses, frequent irrigation of the inflamed eye with a mild antiseptic fluid, at the proper time painting the swollen conjunctiva with nitrate of silver solution, and of the use of atropine and eserine to combat the corneal involvement. Not a moment's delay should take place in turning over cases of this kind to the hands of a competent physician, because eyesight may most rapidly be destroyed. *Prophylactic measures* should be exercised immediately after the birth of the child. The chief method is the one known as Crédé's method, which consists in careful cleansing of the eye immediately after birth, and dropping into it a 2-per-cent. solution of nitrate of silver. This should never be omitted if there is the least suspicion of contagion, and in large institutions should be adopted as the routine practice. It has been the means of saving thousands of eyes.

Membranous ophthalmia is a violent inflammation of the conjunctiva, in which a false membrane forms upon its surface. It is most often seen in connection with diphtheria, and is almost sure to mar the sight of the eye. Very active treatment of the character already described is necessary, except that nitrate of silver is not so efficacious as in other cases.

Phlyctenular ophthalmia is an inflammation of the conjunctiva which is characterized by great dread of light, and, in addition to the ordinary symptoms of conjunctivitis, the formation of minute blisters, or pimples, which scatter themselves over the conjunctiva, or are arranged around the margin of the cornea. It generally occurs in scrofulous children, and is often seen in connection with measles. It is brought about by errors of diet, and in a great majority of cases is associated with disease of the nose—for example, catarrh. In addition to mild antiseptic eye-lotions, and occasionally atropine, constitutional measures should be adopted, especially the use of iron, arsenic, and cod-liver oil. It is a troublesome affection, and often relapses, and as the little pimples break down and form ulcers, they leave scars on the cornea which disturb the visual acuity.

Granular ophthalmia. See GRANULAR LIDS.

The occurrence of catarrhal, purulent, or granular ophthalmia in a school, reformatory, or other public institution, among children or adults, is often due to ignorance or carelessness on the part of the attendants, and should be subjected to rigid inquiry and the evil corrected. Many scores of children contract eye diseases, which ultimately result in hopeless blindness, in the schools and reformatories of large cities. Over-crowding and insufficient provisions for isolating initial cases are mainly to be blamed for this result.

G. E. DE SCHWEINITZ.

Ophthalmol'ogy [from Gr. *ὀφθαλμός*, eye + *λόγος*, discourse, reason]: the science of the eye, including its anatomy, functions, diseases, and treatment. See EYE, OPHTHALMIA, OPHTHALMOSCOPE, etc.

Ophthal'moscope [Gr. *ὀφθαλμός*, eye + *σκοπεῖν*, view, observe]: an instrument for examining the interior of the eye; invented by Heinrich Helmholtz, Professor of Physics in the University of Königsberg in 1851. The discovery of the principles upon which this invention was based was the result of close observation, careful experiment, and mathematical calculation. "Its origin," says Zander (*The Ophthalmoscope*, 1864), "may be traced to successive endeavors to solve two problems—the first being why the eyes of men and animals sometimes shine with a reddish luster; and the second, why the interior of an eye more usually appears dark." Owing to the fact that the portion of light passing into the eye, which is reflected from its inner surface, is so reflected that it emerges in the same direction, ordinarily no illumination from the bottom of the eye is visible, and consequently no image is seen. Helmholtz employed an instrument, consisting of three pieces of plane glass, from which the reflection was made at an angle of 56°, set in a frame and open behind, where the observer placed his eye. Ruete, in 1852, used a mirror with a hole in the center of it, and a convex glass to obtain an aërial image. An important modification was made by a mechanician named Rekoss, who adjusted to it what is called the Rekoss disk. The latest improvements have consisted principally in modifications of this disk, and in adding to the number of lenses it originally contained.

Description of the Instrument.—The ophthalmoscope, in its simplest form, consists of a small circular mirror with a central perforation. Liebreich's instrument is a concave mirror of 8 inches focal length, with a central perforation about a line in diameter, mounted on a handle about 6 inches long. If we place back of this mirror a Rekoss disk, its margin set with numerous convex and concave lenses of suitable focal lengths, and so made to revolve that each of these lenses may be readily brought opposite to the central hole in the mirror, we have an ophthalmoscope of the most approved pattern. Among the most useful patterns of the instrument, now ordinarily used and sometimes called "refraction ophthalmoscopes," the one constructed by Loring is the most serviceable.

Uses.—In examining the eye with the ophthalmoscope, the interior of the organ is illuminated by reflecting through the pupil, by means of the ophthalmoscopic mirror, the rays from a strong light placed a little behind and to one side of the patient's head, in such a position that the light falls upon his temple, but not upon the eye. If the observer thus illuminates the eye, resting the rim of the ophthalmoscope against his brow and looking through the hole in its center, the pupil of the illuminated eye will appear red. This is the reddish reflex from the bottom of the eye. Let the observer now approach to within an inch, or less, of the eye he is examining, keeping the red reflex in view, and (there being no error of refraction or exercise of accommodation in either the observed or the observing eye) he will distinctly see a small portion of the fundus under an enlargement of some fifteen diameters. This is called the *direct* method, and the image seen is called the *virtual* erect or upright image. If the observer places his eye at a distance of 12 or 15 inches from the observed eye, and, having obtained the red reflex, interposes a 2-inch double convex lens at a little less than its focal distance from the eye, he will see a much larger portion of the fundus than by the method already described, but much less magnified, the enlargement being only about four diameters. This is called the *indirect* method, and the image seen is the *real*, inverted, aërial image. By these methods we may examine the crystalline lens, the vitreous humor, the optic nerve, the retina, and the choroid, and any deviation from a condition of health may be readily detected. The optical condition of an eye may also be determined by means of the ophthalmoscope, independently of the statements of the patient. This is of great advantage in examining the eyes of young children, as well as eyes that are partially or totally blind. In examining the interior of the eye for the causes of impairment

of vision, we frequently find appearances which lead to the detection of grave diseases of other important structures, as, for instance, the kidneys, heart, blood, brain, and spinal cord. Anomalies of refraction are also frequently discovered by means of the ophthalmoscope which would otherwise remain undetected, and by a suitable combination of spherical and cylindrical glasses good sight is restored.

Much light may be thrown by the ophthalmoscope upon the diagnosis of cases of tumor of the brain and of inflammatory changes at the base of the brain; but many of the statements of those who profess to solve questions of insanity by the use of the ophthalmoscope, as a method of ascertaining the vascular condition of the brain, are entirely destitute of scientific basis. Ophthalmoscopic examination finds its greatest field of usefulness, independently of purely ocular affections, in the study of diseases of the nervous system, but is important in many general diseases as a diagnostic agent. See *The Ophthalmoscope* (by Zander), already quoted. Revised by G. E. de Schweinitz.

O'pie, John: painter; b. at St. Agnes, near Truro, England, in May, 1761; gave proofs of artistic talent in childhood which attracted the attention of Dr. Wolcott, of Truro ("Peter Pindar"), by whom he was taken to London; acquired fame by his skill in portraiture; received from the leading members of the nobility more commissions than he could execute; devoted himself successfully to severe study to correct the defects of his earlier style of painting, which were now sufficiently obvious; produced several admired historical pictures; became Professor of Painting at the Royal Academy 1806, and began a series of lectures Mar., 1807, but died in London before completing the first course, Apr. 9, 1807. Four *Lectures* were published, with a memoir by his widow, in 1809. His best-known pictures are the *Murder of David Rizzio* and his own portrait in the Dulwich Gallery, but other historical pictures are known by the engravings in Boydell's *Shakspeare*. Besides his lectures, he published a *Life of Reynolds* and a letter on *The Cultivation of the Fine Arts in England*.—His second wife, Amelia Alderson Opie, whom he married in 1798 (b. at Norwich, Nov. 12, 1769), acquired a great reputation by her delineations of English home-life in a series of novels: joined the Society of Friends after she became a widow. D. at Norwich, Dec. 2, 1853. Revised by Russell Sturgis.

Opisthobranchia'ta [Mod. Lat., from Gr. ὄπισθεν, behind + βράγχια, gills]: an order of molluses in which the gills, when present, are behind the heart. See Gasteropoda.

Opisthoc'omi [Mod. Lat., named from *Opistho'comus*, the typical genus, from Gr. ὀπισθόκομος, wearing the hair long behind, in allusion to the flaring crest]: an order of birds containing but a single family, *Opisthocomidæ*, represented by a single species, the anomalous Hoactzin (*Opisthocomus cristatus*. (See Hoactzin.) The skull resembles that of gallinaceous birds, especially in the imperfect development of the maxillo-palatines. The sternum is much cut away in front; the furcula ankyloses with the manubrium below, and with the coracoids above. There is an enormous, muscular crop, divided by a partial constriction. The bird has affinities with the pigeons and *Gallinæ*, and in some points approaches the plantain-eaters, *Musophagidæ*. The order corresponds to Huxley's *Heteromorphæ*. F. A. L.

Opistho'mi [Mod. Lat.; Gr. ὄπισθεν, behind + ὦμος, shoulder]: an order of fishes of the sub-class of teleosts, distinguished by the separation of the shoulder-girdle or scapular arch from the head, and its consequent posterior position, whence the name. The skull has its several bones developed in nearly the same manner as the ordinary spiny-rayed fishes; the supraoccipital projects forward between the parietals; the jaws are normally developed, the maxillary arch being bounded above by the premaxillary, and at the sides by the supramaxillary bones; a distinct symplectic bone exists; the branchial apparatus is complete, the superior branchihyal and pharyngeal bones ossified, four superior pharyngeals, three basal branchihyals, and a pair of inferior pharyngeals being developed; the scapular arch is entirely dissevered from the connection exemplified in most fishes, and (in some cases at least) is connected with the anterior vertebræ; the mesocoracoid is absent; no interclavicles are developed; the ventral fins either abdominal (the pubic bones being far removed from the scapular arch) or wanting. The order is represented by two families, *Mastacembelidæ* and *Notacanthidæ*. It is not certain, however, that these two families are closely related, or even that they belong to the same order. Revised by D. S. Jordan.

Opitz, Martin: poet; b. at Bunzlau, Silesia, Dec. 23, 1597; studied at Frankfort-on-the-Oder and Heidelberg, but at the outbreak of the Thirty Years' war went to Holland, and thence to Denmark. In 1621 he returned to Silesia and lived in various positions as teacher, pirvate secretary, diplomatic agent, and historiographer at the courts of several influential princes; was knighted by the Emperor Ferdinand in 1628, and died of the plague at Dantzic, Aug. 20, 1639. Though mediocre as a poet he marks an important epoch in the history of German literature, and for more than a century he was called the "father of German poetry." This great influence on the literature of Germany he attained chiefly by his theoretical and critical writings, of which his *Aristarchus sive de contemptu Linguæ Teutonicæ* (1617) and his *Buch von der deutschen Poeterey* (1624) are the most important. The rules he laid down in the latter book concerning the proper use of the language of poetry, and especially concerning the metrical system, practically guided the development of modern German poetry up to the classical period. The highly developed metrical art of the thirteenth century having degenerated in the course of time, Opitz's discovery that accentuation and not quantity constituted the essential feature of German verse-structure was all the more important. He had a high conception of the poet's vocation, the final aim of which appeared to him in the attainment of fame and immortality, and for more than a century his ideal of the poet inspired his followers and admirers. The head of the so-called first Silesian school of poets, he fought for the honor and purity of German language and literature as a true patriot in the midst of the devastation wrought by the Thirty Years' war, and by pointing to the ancients as the greatest literary models he inaugurated that epoch in German literature which culminated in the classic era of the eighteenth century. See K. Weinhold, *Martin Opitz von Boberfeld* (1862); Palm, *Beiträge zur Gesch. der d. Literatur des 16 und 17 Jahrhunderts* (1877); Borinski, *Die Poetik der Renaissance* (1886); Witkowski, *Aristarchus und Buch v. d. d. Poeterey* (1888); W. Scherer, *Kleine Schriften*, ii., 375; K. Burdach, in *Forschungen zur deutschen Philologie* (1894).

Julius Goebel.

Opium [= Lat. from Gr. ὄπιον, poppy-juice, dimin. of ὀπός, juice, sap]: a concrete juice obtained from the unripe capsules of the poppy (*Papaver somniferum*). Opium has been known as a drug from a remote period, distinct accounts of its collection as a branch of industry in Asia Minor being found in the writings of Dioscorides, about the year 77 B. C. From the countries bordering on the Mediterranean the use of opium was carried East through Asia, probably by the Arabians. Though the poppy is naturalized as a garden flower in Europe and America, yet opium is produced as an article of commerce only in India, Persia, Egypt, and Asia Minor. It is obtained by making a shallow horizontal incision in the unripe poppy-head a few days after the fall of the petals. This is done in the afternoon, and the milky juice that oozes from the cuts is scraped off next morning and made into lumps of varying size, ranging in weight from an ounce to several pounds. Good Turkey opium is a hard, tenacious solid of compact texture and a reddish-brown or fawn color. It has a strong, peculiar odor and a rather bitter, somewhat acrid, taste. Its medicinal virtues reside in certain alkaloids, of which *morphine* is the most important, as it occurs in greatest quantity and most perfectly represents the properties of the crude drug. This alkaloid was discovered by Sertürner, an apothecary in Hanover, in 1816. It exists in opium combined with a peculiar acid called *meconic*, and in good Turkey opium is found in the proportion of from 12 to 15 per cent. Pure morphine exists in small, colorless, shining crystals, inodorous, but of a bitter taste. It is almost wholly insoluble in water, but its salts are readily soluble, and hence are used in medicine in preference to the pure alkaloid. The acetate, sulphate, and hydrochlorate are officinal in the *United States Pharmacopœia*. The other alkaloids of opium known to affect the human system are *codeine*, *narceine*, *narcotine*, and *papaverine*, but twelve besides these have been obtained from the drug, although they seem to be only chemical and physiological curiosities. *Thebaine*, for instance, produces in the lower animals violent tetanic convulsions, and *cryptopine* wild delirium with *dilated* pupils. Besides these sixteen alkaloids, a neutral principle, *meconine* or *opianyl*, and pectine, albumen, mucilage, sugar, and wax are all constituents of opium.

The effects of opium upon the animal system are as complex as the composition of the drug. In general its influence falls upon the nervous system, the symptoms being all functional nerve-disturbances, and these prove by their peculiar character that, in kind, the opium influence is a conjoint irritation and paralysis. The resultant clinical effect varies in different parts of the nervous system, and also is modified by circumstances of dose, individual idiosynerasy, temperament, habit, etc. The symptoms produced by opium under ordinary circumstances are as follows: With a small dose there is experienced relief from any feelings of discomfort that may be present at the time of taking. In the Asiatic, physical fatigue, mental exhaustion or distress, small pains and aches, hunger, etc., all tend to disappear, leaving a feeling of general comfort, calm, and peace; but this frequently is not seen in the European, who often experiences from the first the secondary symptoms, which are some little tendency to loss of appetite, coated tongue, slight headache, and constipation. With larger quantities the feeling of relief from discomfort is speedily succeeded by the characteristic feature of opium narcosis—namely, a conscious intellectual dullness, accompanied by a drowsiness, which upon every opportunity casts the subject into a state of unconsciousness analogous to ordinary sleep in very many respects, but differing from it in certain others. When thus affected the perceptive cerebral centers are blunted, and a pre-existing severe pain will not be so acutely felt. After a number of hours the patient awakes to a feeling of general misery, with disordered stomach, dry coated tongue, headache, and constipated bowels. Indeed, under the opium influence all the natural secretions, save that of the skin, tend to diminish. As a result of idiosyncrasy, many persons of very "nervous" temperament, instead of experiencing the ordinary effects, are thrown by opium into a state of morbid wakefulness with excessive agitation, their minds being filled with horrible imaginings; so great is the distress experienced that persons thus affected will endure almost any pain rather than seek relief from opium. Others, of highly imaginative temperament, like the Orientals, pass into a beatific state of mind, with pleasing fancies and visions of delicious and gorgeous imagery, as so graphically described by De Quincey; but with Europeans or Americans these tempting effects are rarely produced, simple progressive stupefaction being the whole expression of the cerebral influence of the drug. Still others, especially children, manifest a strong convulsive tendency which may even culminate in severe general convulsions, with tetanic rigidity of the whole body. In some of the lower animals, as in frogs, tetanus is the normal expression of the opium influence, because the effect on the spinal cord is stimulant and the spinal cord of the frog dominates his brain, whereas the reverse holds true in man. Intolerable itching of the whole skin, vomiting, syncope, are other abnormal effects of opium occurring in certain individuals. The influence of bodily state and habit upon the effects of the drug is astonishing. In severe pain, in the prostration from great loss of blood, and other morbid states, the relation between dose and effect changes so that quantities fatal in health may produce no more than a mild influence. Precisely the same result follows the habitual taking of opium, and confirmed opium-eaters often take in a day enough to kill ten or twenty ordinary persons. Of the alkaloids, the effects of morphine differ only in minor points from those of crude opium, and those of narceine and codeine also conform to the same general type. Narcotine causes many of the disagreeable after-effects of opium-taking.

Large doses of opium or morphine may be fatal, though many circumstances conspire to make the effects exceedingly uncertain, such as vomiting or non-absorption of the whole quantity taken. Enormous draughts of opiates, administered with deadly intent, are therefore often recovered from; generally 4 grains of opium or their equivalent are reckoned as a dangerous quantity, and 5 grains have killed. The salts of morphine are estimated as four times more powerful than the same quantity of opium. The prominent symptoms of opium-poisoning are deep coma, with flushed or pale and ghastly face, contracted pupils, slow, stertorous breathing, and slow, full pulse. Death occurs from stoppage of breathing through paralysis of the respiratory center in the medulla oblongata. The treatment, after evacuation of the poison left in the stomach through emetics or the stomach-pump, is especially directed toward keeping up the breathing. The patient is aroused by any means, however rough, such as the cold douche, forced walking, shouting at the patient, and beating him with whips. If he can swallow, hot black coffee is given freely. If in spite of all means he sinks into coma and respiration begins to fail, artificial breathing and hypodermic injections of strychnine (a powerful excitant of respiration) are cautiously employed. No case should be given up till actual death.

In India, besides its use as a mere luxury, the drug is much employed in non-narcotic doses simply to sustain the strength in lieu of food and sleep during hard physical work. As to its value or otherwise in this respect there has been much discussion and difference of opinion, and the Indian Government in 1893 appointed a commission to inquire into the matter. In China opium is consumed to an enormous extent by all classes, the mode of taking it being to smoke an aqueous extract in a peculiarly formed pipe. Opium-smoking began in China in the latter half of the seventeenth century, and, in spite of all the Government's efforts to prevent it, rapidly spread till it may now be called a national practice. China thus consumes nine-tenths of all the opium exported from India, besides a considerable quantity from Asia Minor, and the whole of that produced within her own dominions. In medicine opium and morphine fulfill a variety of purposes, some of which could hardly be divined from the effects of the drug on the healthy system. These may be summarized as the support of life, and invigoration and maintenance of the heart's action in circumstances of great prostration and where ordinary food can not be digested; the cure or relief of pain, spasm, and general nervous irritability; the induction of sleep; repression of excessive secretion, as in diarrhœa; and curative influence of an unknown character in certain inflammatory diseases. In the fulfillment of most of these indications the induction of the physiological narcotic effects of opium is both unnecessary and harmful. The pharmaceutical preparations of opium are very numerous: the two most familiar are *laudanum*, a simple tincture of opium, of which 13 minims (about 25 drops) is the equivalent of a grain of opium; and *paregoric*, a camphorated tincture, compounded of opium, camphor, benzoic acid, oil of anise, honey, and dilute alcohol. Half a fluid ounce of this tincture represents very nearly a grain of opium. The salts of morphine are also very largely used, and their administration in solution by hypodermic injection has in certain circumstances advantages over opiates given by the mouth.

Revised by H. A. Hare.

Opobalsamum: See Mecca Balsam.

Opodel'doc [cf. Gr. *ὀπός*, juice, sap]: the common name of the "camphorated soap liniment" of the *United States Pharmacopœia* of 1850. It is compounded of common soap, camphor, oil of rosemary, oil of origanum, and alcohol. When cold it has the consistence of a soft ointment. It is essentially the same as the "soap liniment" of the present *Pharmacopœia*, and may be used as an anodyne and gentle rubefacient application in sprains, bruises, etc.

Opop'anax [= Lat. = Gr. *ὀποπάναξ*; *ὀπός*, juice, sap + *πάναξ*, a kind of plant (cf. *πανακής*, all-healing)]: the inspissated juice of the *Pastinaca opoponax*, a plant closely resembling the common parsnip. It is a fetid gum resin, resembling assafœtida in its powers, but much feebler. It has a very limited use in medicine. The best comes from the Levant.

Opor'to: city of Portugal; capital of the province of Minho; situated on both sides of the Douro, 3 miles from its mouth; 174 miles N. by E. by rail from Lisbon (see map of Spain and Portugal, ref. 14–A). Entrance into the Douro is difficult on account of a shifting sandbank in its mouth, and the river is subject to extraordinary and dangerous freshets, but at Oporto it forms an excellent harbor, lined with elegant quays and crossed by many beautiful bridges. Oporto is one of the most picturesque cities in the world, built on a steep acclivity, which it climbs through terraces covered with strikingly colored houses. Some of the streets are narrow, crooked, dirty, and so steep that no carriage can pass through them, but others are broad, airy, clean, and lined with magnificent houses. Among the buildings the cathedral, the Gothic Church of Cedofeita (originally founded in 559), the bishop's palace, and the Hospital of St. Anthony are most noticeable. Oporto possesses a polytechnic academy, a medical school, two picture-galleries, and a library with 200,000 volumes and 9,400 MSS. There are manufactures of gold and silver ware, glass, pottery, leather, linen, woolen, silk, and cotton fabrics, and tanning, brewing, distilling, cork-cutting, and sugar-refining are

carried on; but Oporto derives its chief importance from its commerce. It is the center of trade for a large part of Portugal. The annual value of its imports amounts to about $9,000,000, and that of its exports to over $17,000,000. Its trade is chiefly with England and Brazil, and the principal article of exportation is wine, the so-called port wine, red and white, of which by far the largest and best portion is exported to Great Britain. Pop. (1878) 105,838.

Opossum (Amer. Ind. name): any animal of the family *Didelphidæ*, a group of marsupial mammals peculiar to America. The most familiar species is the common or Virginia opossum, *Didelphys virginiana*. It has a pointed head, wide gape, many sharp teeth, a rough tongue, large and naked ears, small eyes, a long, tapering, flexible, and prehensile tail, and its toes are armed with sharp, strong, and curved claws. It has a well-developed pouch, and is about the size of a large cat, but its shape is low and squat; it is of a grayish-white color; the face, near the snout, is pure white, and the ears are black. It is mostly nocturnal and arboreal in its habits, and feeds on insects, eggs, small birds, and fruits. It sometimes destroys poultry. It is much hunted for food and for its skin, and shows much dexterity in escaping by creeping away in the grass. It has a remarkable habit of feigning death when captured, hence the proverbial expression "playing 'possum," and bites severely when defending itself. It is slow in its movements, and often suspends itself from the branch of a tree by its tail. It is very prolific, producing from six to fifteen at a birth, which, as soon as born, are put by the mother into her pouch, where they remain attached to the nipple until they are able to move about. In winter, if the climate is cold, the opossum becomes sluggish, but not torpid like the marmot. There are numerous South American species, some of them with no pouch. Revised by F. A. Lucas.

Opossum.

Op'peln: town of Prussia, in the province of Silesia; on the Oder; 51 miles S. E. of Breslau (see map of German Empire, ref. 5–I). It has some manufactures of linen, leather, pottery, and tiles, and an important trade in timber and cattle. Oppeln was formerly the residence of the Dukes of Silesia, whose castle stands on an island in the Oder. Pop. (1890) 19,206.

Oppenheim, Hermann, M. D.: physician and author; b. at Warburg, Westphalia, Prussia, Jan. 1, 1858; educated at Göttingen, Bonn, and Berlin; was head physician and temporary director of the Neue Klinik der Charité in Berlin 1883–91. Among his published works are numerous contributions to the *Archiv für Psychiatrie* (from 1885 on); *Beiträge zur Pathologie der multiplen Neuritis und Alcohollähmung* (*Zeitschrift für Klinische Medicin*, 1886); *Die traumatischen Neurosen* (1889; 2d ed. 1892); *Zur Kenntniss der syphilitischen Erkrankungen des centralen Nervensystems* (Berlin, 1890). S. T. Armstrong.

Op'pert, Jules: Orientalist; b. July 9, 1825, at Hamburg, of Jewish parentage; studied first law at Heidelberg, then Oriental languages at Bonn and Berlin, where in 1847 he published *Das Lautsystem des Altpersischen*; was appointed Professor in German at the lyceum of Laval in 1848, and at that of Rheims in 1850; accompanied the scientific expedition to Mesopotamia, sent out in 1851 by the French Government, and was appointed Professor in Sanskrit at the schools of the national library in 1857, and 1874 Professor of Assyriology in the Collège de France. In 1881 he was elected member of the Académie des Inscriptions. His principal works are *Les Inscriptions des Achéménides* (1852); *L'Expédition scientifique de France en Mésopotamie* (1859–64); *Grande Inscription du Palais de Khorsabad* (1863); *Éléments de la grammaire assyrienne* (1860; 2d ed. 1868); *Rapports de l'Égypte et de l'Assyrie* (1868); *Documents juridiques de la Chaldée* (1875); *Le peuple et la langue des Mèdes* (1879); *La chronologie de la Genèse* (1879); *L'ambre jaune chez les Assyriens* (1880); *Etudes sumériennes* (1881). Revised by Benj. Ide Wheeler.

Oppia'nus (Gr. Ὀππιανός): poet; b. at Anazarbus, in Cilicia; flourished under Marcus Aurelius, and composed a didactic poem on fishing, Ἁλιευτικά, in five books. The versification is smooth, the style ornate. Another poem on hunting (Κυνηγετικά) was long ascribed to this Oppianus, but the style is dry and the versification halting, and it is generally believed to be the production of a later poet of the same name. The works of Oppianus have been edited by J. G. Schneider (Leipzig, 1813) and F. S. Lehrs (Paris, 1846). B. L. G.

Op'pius, Gaius: an intimate friend of Julius Cæsar, who intrusted to him and Balbus the management of affairs while he was absent in Spain. He was the author of lives of Cæsar, Cassius, Scipio Africanus the elder, which are only known to us through citations. The *Bellum Alexandrinum* has also been attributed to him, and by Niebuhr the *Bellum Africanum*, a view now abandoned. M. W.

Oppolzer, Theodor, von: astronomer; b. at Prague, Austria, Oct. 26, 1841; d. Dec. 26, 1886. He took an active part in geodetic measurements, but is best known as the author of a great work in two volumes entitled *Bahnbestimmung der Planeten und Cometen* (1870–80). It is the standard work of the nineteenth century on theoretical astronomy. Of more popular interest is his *Canon der Finsternisse*, published by the Vienna Academy of Sciences in 1887, and containing tables of all total and annular eclipses of the sun visible in the northern hemisphere from 1200 B. C. to A. D. 2160, with charts showing the path of the shadow or annulus for each eclipse. S. Newcomb.

Optatia'nus, Publilius Optatianus Porfyrius or Porphyrius: a Latin poet of the fourth century, perhaps of African birth, who, while in exile about the year 325, addressed a panegyric to the Emperor Constantine, by which he secured his recall. The collection is prefaced by a letter of the emperor to the author and the author's reply. The poems, twenty-eight in number, while prosodically not very faulty, show a great decline in taste, and are chiefly remarkable for their artificiality, including acrostics, telestichs, hexameter-squares (with as many verses as there are letters in each verse), and other whimsical forms. They have been edited by L. Mueller (Leipzig, 1877). M. Warren.

Optative Mood: See Syntax.

APPENDIX.

Mechanicsburg: borough (incorporated in 1826); Cumberland co., Pa. (for location of county, see map of Pennsylvania, ref. 6–F): on the Cumberland Val. Railroad; 8 miles W. of Harrisburg. It is in an agricultural and mining region; has a variety of manufactories; and contains the Irving Female College (Lutheran, chartered in 1856), graded schools, library, 2 national banks with combined capital of $150,000, and a monthly and 4 weekly newspapers. Pop. (1880) 3,018; (1890) 3,691; (1900) 3,841.

Mechanicsville: a village of Virginia, about 7 miles N. E. of Richmond, which gives its name to a battle fought near by between the Confederate and Federal forces June 26, 1862, also known as the battle of Beaver Dam Creek (see map of Virginia, ref. 6–H). On the authority of Gen. Longstreet, Swinton places the loss of the Confederates between 3,000 and 4,000. The Federal loss was less than 400. See Gaines's Mill, Battle of.

Mechanicville: village; Saratoga co., N. Y. (for location of county, see map of New York, ref. 4–J); on the Hudson river, the Champlain Canal, and the Del. and Hudson and the Fitchburg railways; 18 miles S. of Saratoga, 20 miles N. of Albany. It has good water-power, manufactories of linen thread and of other articles, a national bank with capital of $50,000, and 2 weekly newspapers. Pop. (1880) 1,265; (1890) 2,679; (1900) 4,695.

Mechlin, mek'lin (Germ. *Mecheln*, Fr. *Malines*): city of Belgium; in the province of Antwerp, on the Dyle; 14 miles S. S. E. of the city of Antwerp (see map of Holland and Belgium, ref. 9–E). It is the see of the archbishop primate of Belgium, and has an ecclesiastical seminary and several other educational institutions. Its cathedral is a magnificent edifice, erected in the twelfth century, and adorned with paintings by Rubens and Vandyke. Mechlin has manufactures of linen, woolens, needles, lace, and beer. In the fourteenth century it was one of the manufacturing centers of Europe. Pop. (1891) 51,558.

Meeker, Joseph Rusling: artist; b. in Newark, N. J., Apr. 21, 1827; studied art at the National Academy of Design; has worked chiefly in St. Louis, Mo., and has devoted himself to Southern scenery, especially Louisiana landscapes. His paintings include *The Indian Chief*; *The Acadians in the Atchafalaya*; *The Vale of Cashmere*; *The Lotos-Eaters*; *Louisiana Bayou*; and *The Noonday Rest* (from Longfellow's *Evangeline*).

Meeks, Eugene: artist; b. in New York city in 1843; studied art at home and abroad, his professional life having been passed chiefly in Florence, Italy; is an associate of the Florence Academy. His more notable pictures include *Little Nell and her Grandfather*; *Bridal Chamber in Palazzo Manzi-Lucca*; *A Gondola Party*; and *Halt at the Golden Lion*.

Meilhac, mā'lăăk', Henri: dramatist; b. in Paris, Feb. 25, 1831; educated at the Lycée Louis-le-Grand; employed as a humorous illustrator and writer for the periodical press 1852–55; began his career as a dramatist in 1855, at first with little success, but becoming one of the most skillful and prolific of French playwrights. He wrote many of the operettas of which Offenbach composed the music, including *La Belle Hélène*, *La Vie Parisienne*, *La Grande Duchesse*, *La Périchole*, and *Les Brigands*. Nearly all of his work was done in collaboration, mainly with Ludovic Halévy (*q. v.*). Some of his most successful unaided productions were *Ma Cousine*, *Décoré*, and *Petite Marquise*. He also wrote for the *Revue de Paris*. He received the decoration of the Legion of Honor in 1869, and was promoted to be an officer in 1884. He was admitted to the French Academy in 1888. D. in Paris, July 6, 1897.

Melba, Nellie (*Mitchell*): singer; b. in Melbourne, Australia (from which she takes her stage name), May 19, 1865, of wealthy parents. After studying at home, she went to Paris and studied under Madame Marchesi. She made her first appearance in Brussels in Oct., 1887; appeared in London, May, 1888; Paris, May, 1889; St. Petersburg, May, 1890; Nice and Palermo, 1892; Milan, Mar., 1893; Stockholm, Oct., 1893; Copenhagen, Oct., 1893; New York, Dec., 1893. At all of these places she achieved great success. In her early youth she married William Armstrong, but soon separated from him. He died subsequently. Since her first appearance in New York, she has been re-engaged each season. Her voice is a brilliant bravura soprano. D. E. H.

Memorandum of Association: a document subscribed by seven or more persons for the purpose of forming a corporation or joint-stock company under the Companies Act of Great Britain, setting forth the particulars, such as the name of the company, place of its registered office, object of its formation, the liability assumed by the parties, amount of capital, etc. It corresponds to the *certificate of incorporation* of companies organized under the statutes of the several States in the U. S. See Corporations and Joint-stock Companies, and the authorities there referred to.

F. Sturges Allen.

Mental Hygiene: As the term indicates, mental hygiene has to do primarily with the conditions that favor the normal functioning of the various mental processes. But since psychology assumes that every psychic process has its correlative in a physical process—or, in technical language, that there is no psychosis without a corresponding neurosis—and since even popular opinion looks upon the mind as in some way dependent upon the brain, mental hygiene has come to include the hygiene of the nervous system, and especially cerebral hygiene. Moreover, as the body is a federated union of tissues, and the nervous tissues not only control the condition of the other tissues, but, in turn, are affected by it, cerebral hygiene presupposes somatic hygiene. The subject has received special attention from physicians and psychologists in modern times. The development of the science of psychiatry has produced a vast amount of technical literature more or less bearing upon the subject, and many physicians have given sensible advice in popular writings. For example, among the older writers may be mentioned Feuchtersleben, whose *Diätetik der Seele* passed through some fifty editions, and among more recent writers Mitchell, whose little book on *Wear and Tear* is well known.

Our definite knowledge of the physiological changes that accompany mental activity was slight before the investigations of the Italian physiologist Mosso. By the perfection of the plethysmograph, an instrument for testing the volume of circulation of the blood, and by his investigations, clinical and experimental, he made a great advance in methods of studying the subject. Without noting exceptions or going into details, he found that every psychic process, such as sensation, emotion, and intellectual activity—as in performing an arithmetical operation—is accompanied by an increase in the blood-supply to the brain and a decreased flow to the periphery. Emotion especially is accompanied by increase in the cerebral blood-supply. This result of ordinary experiments with the plethysmograph and the like was corroborated by testing the intracranial circulation directly in the case of patients where the skull had been opened by disease. Investigations of the temperature of the brain both in men and animals were made. Here, too, the temperature of the brain was taken directly and compared with that of the body. In the case of a young girl with a hole in her skull, a clinical thermometer could be inserted within the dura mater. From careful tests, both while the

patient was asleep and while awake, it appears that excitement is accompanied by a marked increase in the cerebral temperature, and that ordinary mental activity is accompanied by a slight increase, although liberation of heat in the latter case is largely due to processes of nutrition and disaggregation. Extended investigations of muscular and nervous fatigue led also to the theory that certain toxic products are formed during the functional activity of the nerve-cells, and that these pass into the blood and poison the tissues generally.

A number of other investigators have since studied this subject. The most thorough and extended work, besides that of Mosso, has been done by Binet and his students in the laboratory of the University of Paris. Binet has studied by special apparatus, using the plethysmograph, the sphygmograph, and the like, the rapidity of the heart-beat, the rhythm of the heart, the capillary circulation, the blood-pressure, temperature of the body, respiration, muscular power, and nutritive changes during intellectual work. From the result of these investigations it appears that under the influence of mental work greater or less modifications in the most important physiological functions of the organism occur. A certain number of these modifications are produced by very short mental work; others are observed only after prolonged and intense activity. In all cases it appears that no intellectual work can be accomplished without an effect on the organism. The duration and intensity of this effect vary according to the amount of mental work and according to the physiological functions studied. After a short period of work, the heart-beat is accelerated; if the work continues long enough, the heart-beat is retarded. In the same manner, the form of the pulse becomes sometimes accentuated during a short piece of work, and when the work continues many minutes the dicrotism is weakened. Circulation in the hand is similarly affected. At the beginning of the work a vaso-constriction is noticed, and after some minutes a vaso-dilatation. For the respiratory function the same phenomenon is produced. At first there is an acceleration of the respiratory movements, and after some minutes a retardation. Finally, the muscular power seems also to be increased after a short piece of mental work, and, on the contrary, to diminish after mental activity of an hour. It seems, then, that for a certain number of physiological functions short mental work produces certain modifications and prolonged mental work produces opposite modifications.

It is probable that mental activity is accompanied by definite physical changes in the individual nerve-cells of the brain involved. Although the nerve-fibers seem capable of functioning for an indefinite period, as shown by Bowditch and others, and the effect of work upon them is not yet apparent, the nerve-cells undergo remarkable changes during continued activity. After electrical stimulation of ganglion-cells in frogs and cats, Dr. Hodge found a remarkable shrinking of the nerve-cells, particularly of the nuclei. But the cell recovers after a sufficient period of rest. After rather severe work for five hours the nucleus has shrunk to about half its normal size. By complete rest for six hours the cell recovers about half what it lost; but at least twenty-four hours of rest is necessary for complete recovery. The same conditions of fatigue can be reached in less time by increasing the stimulus. In further experiments Dr. Hodge extended his observations to other animals, and studied the effects of ordinary diurnal fatigue, as shown in the brain as well as in the cord and spinal ganglia. A remarkable difference was found between the condition of the cells in the morning and their condition at night. For example, in the brain-cells of honey-bees taken at night the nuclei had shrunken about a third. We must suppose that something similar occurs in man. Functional activity exhausts the nerve-cells, and they recover slowly.

Thus in the present state of scientific investigation it appears that during intellectual activity the blood-supply to the brain is increased; at least during excitement an increased liberation of heat occurs; the substance of the nerve-cells is actually used up, and probably certain toxic products are formed. A rough analogy exists between the conditions of work in the muscles and in the nerves. According to Lagrange the conditions are the same for the brain that thinks and the muscle that contracts. In the long run, the amount of work one's nervous system can do depends not alone upon its initial character, but upon the efficiency of the rest of the body (1) in furnishing the material for those processes of anabolism that must continually go on in the nervous substance to supply the waste involved in its functional activity, and (2) in carrying away the poisonous products that result from that activity.

These results put the problems of mental hygiene on a definite basis. Once clearly seen that every intellectual process is accompanied by organic changes, and hence by expenditure of energy, the problem of hygiene becomes an economic one of adjusting expenditure to income. The nervous system is a mechanism for the storage and distribution of energy. But its power of storing energy is limited. Hence at any moment only a limited amount of energy is available. If more goes to one form of activity, less can be expended in another. Moreover, when any one phase of consciousness predominates, the other forms of consciousness are likely to be weakened. For example, during intense emotion intellectual activity is at a minimum, and during intense intellectual activity extreme emotion is impossible. It is evident that the essential thing is the maintenance of the proper balance between the storage and the expenditure of energy. How may it be known when this balance is disturbed, when the expenditure exceeds the income? To a normal person the sensation of fatigue is the sign. In the case of muscular work the warning is so strong that there is little danger of over-exertion. In case of nervous work the warning is not so easily recognized. It should be stated, however, that the first essential to mental health is work. The unused muscle atrophies. The same is true of the nerves. But in muscular activity both nerve and muscle are involved, so that one can not use the muscles without also exercising and developing the nerve-centers. Fatigue is the natural result of the expenditure of energy, and entirely normal. Over-fatigue, permanent fatigue, is pathological.

The symptoms of fatigue noted by different writers are legion. The most characteristic are perhaps the following: Restlessness; lack of the power of co-ordination, whether of the vocal organs, making one stumble in speech, or of the other muscles of the body, causing uncertainty in the use of the limbs; twitching movements and the like; also decreased sensibility, especially of sight and hearing, and various vaso-motor phenomena, such as flushing, unusual color of the ears, and so on; and on the mental side irritability, loss of memory for common things, loss of curiosity and of the power of attention, and disturbance of sleep.

Something more than mere observation, however, is necessary, and in recent years special investigations have been made by physicians, psychologists, and teachers using different methods studying fatigue in individuals and in groups. The chief general problems are three: First, to obtain a series of tests of the functional ability of an individual—that is, his psycho-physic characteristics as regards rapidity in mental work, ability to improve by practice, susceptibility to fatigue, etc.; second, to find a standard test of the condition of the nervous system, so that a physician may determine when an individual is suffering from over-pressure; and, third, to determine the most favorable rhythm of periods of work and rest to enable one to do the maximum amount of intellectual work within the limits of health.

It is very difficult to get good tests of the condition of the central nervous system. But although, to use Mosso's figure, the human body is like a laboratory where one meets "No admittance" at every door and corner, still methods of studying nervous fatigue already devised promise to give a more satisfactory answer to the problems of mental hygiene than has hitherto been possible. Two classes of methods have been used: First, those that test the physical concomitants of mental activity or the physical effects of mental fatigue; second, those that test the quantitative and qualitative variations in the mental work done in different periods under definite conditions. Of the first class of methods two have been most used. First, the method of the ergograph, which consists in testing the cerebral fatigue by testing the muscular power in a group of muscles before and after a period of mental work. The ergograph, devised by Mosso, is a simple apparatus in which the arm is placed in a horizontal position and a weight lifted by contracting one of the fingers. The amount of contraction is registered by a pen that writes a curve on a revolving drum, and the amount of work done by the muscle is easily estimated from this curve. It is customary to contract the muscle in a certain rhythm, say every two seconds, marked by the strokes of a metronome, and to continue the work to the point of exhaustion—i. e. until voluntary contraction of the finger is no longer possible. The unit of measure is usually

the kilogrammeter—the power required to raise a weight of one kilogramme one meter. The amount of work done indicates the condition of the neuro-muscular mechanism, and the curve on the drum registering this is called the fatigue-curve. Using this method, Mosso and his assistants have made interesting tests of the effects of mental work. Dr. Maggiora tested his muscular power with the ergograph after a lecture. The work accomplished by his middle finger before exhaustion was only 5·055 kilogrammeters, while at the same hour of the preceding day the work done amounted to 7·161 kilogrammeters; that is, as a result of the intellectual exertion the work done by the finger was diminished 2 kilogrammeters. Again, he made a number of tests of his muscular strength before and after conducting examinations. The normal curve of work, as shown by tests before the examination, represented 6·087 kilogrammeters. After the first examination the amount of work done was only 2·745 kilogrammeters. The examinations continued for several days. On the last day Dr. Maggiora again wrote his fatigue-curve with the following result: Before the examination the work done was 5·694 kilogrammeters; after the examination it was only 1·086 kilogrammeters.

The second method of this class consists in testing the cerebral fatigue by testing the sensibility. Dr. Griesbach has tested cerebral fatigue by testing the discriminating dermal sensibility. If two compass-points are brought in contact with the skin, they must be separated a certain distance to be perceived as two. The distance at which the compass-points must be separated on any part of the body in order to be distinguished gauges the discriminative dermal sensibility for that locality. Griesbach's experiments indicate that the greater the fatigue the less the dermal sensibility; that is, the farther apart the compass-points must be placed to be perceived as two. Extended investigations have been made upon school-children, testing fatigue by this method. The results found by Griesbach have been corroborated by investigations made by Vannod and others; but more recent investigations have cast doubt upon the reliability of this method, and Kraepelin and others say that now they put no confidence in it.

The quantitative and qualitative variations in mental work done under the influence of fatigue are tested by a great variety of methods. Among those which have been commonly employed are the following: Writing from dictation; the performance of simple arithmetical operations; writing from memory numbers heard once; the filling of gaps in mutilated sentences; mental operations similar to those in ordinary school work, such as performing simple problems in algebra, the inflection of Greek verbs, and the like. Kraepelin's method of testing the mental ability and the condition of fatigue is the most elaborate and scientific of all the varieties of this class. He has at least made a definite beginning in investigation of the functional ability of the psycho-physical mechanism. He aims at nothing less than definite data in regard to the personal characteristics of the individual, and the care with which he has worked out his method and made corrections for the various sources of error commend his work as of prime importance. His method is, briefly, as follows: The subject is given a note-book containing simple sums for addition, in which he adds without intermission, sometimes for several hours at a time. At a signal sounded every five minutes, the subject draws a line behind the number last added; by this means after the experiment it is very easy to determine how many numbers were added by the individual each five minutes. It is relatively easy to obtain results by this method, but difficult to interpret them. Recent experiments indicate that at least four important factors modify the results: practice, excitement or a warming-up process, voluntary effort, and fatigue. The first three tend to increase the amount of work done; the fourth factor, fatigue, decreases the amount of work. In interpreting results it is difficult to determine how much influence each of these factors has; but by making corrections for the effect of the first three the influence of fatigue can be determined approximately.

The chief significance of these studies of fatigue is perhaps in the way of developing methods, and yet a few practical inferences are justified by the results already obtained. In the main they agree with every-day experience, but the studies of nervous fatigue have made emphatic, definite, and tangible what were before the platitudes of observation. It appears from these investigations that fatigue is a general condition of the physical organism, that it is not local except in relative degree, and, moreover, that it is the normal concomitant of activity. It increases inevitably when one is awake. Nutrition, drugs, change, and rest all modify its course, but apart from such influences it increases continually during the period of waking life. It has been shown that to do the maximum amount of work involving nervous activity intervals of rest must alternate with periods of work. The length of rest required depends upon the length of the preceding period of work, the intensity of the activity, and the efficiency with which the other bodily tissues work in carrying away the toxic products formed and in bringing up nutritive material. The most striking result is the range of individual variation demonstrated. All investigators by different methods have found evidence of this. Kraepelin finds two distinct classes—those who do their best work in the morning and fall off in ability to work during the day, and another class who do their best work at night—and of course many individuals who fall between these two distinct classes. Kemsies also, in studies among school-children, finds most striking individual differences in susceptibility to fatigue: some whose ability to work falls off from the very first, others who improve, others who attain their maximum ability at some definite hour in the day. The susceptibility to fatigue is a fundamental characteristic of the individual. Mosso likens these individual differences to the different ways in which different people are affected by drugs, such as ether and chloroform. It has been shown also that one may be in a condition of permanent fatigue without knowing it; and, further, that physical activity, while important for health, is not a rest from mental work, but that any violent exercise decidedly increases the mental strain. Perhaps the most important result has been to show the absolute importance of a suitable alternation of periods of work and rest in mental activity.

Closely connected with the problem of rhythm of work and rest is that of the relation of excitement to nervous health. This is a most critical question. Of course the word excitement may be so defined that it applies merely to what is injurious to health, and some milder term—extreme interest, extreme enthusiasm, or the like—may be used for the emotional states that are not injurious; but it is more in harmony with current usage, and sufficiently accurate for the present purpose, to use the word excitement as a more general term. Using the word in this wider sense, it can not be said that a person in health should avoid excitement. The man who avoids all exciting stimuli is likely to become like the invalid who by avoiding the air is always in danger of taking cold. He becomes weakened so that small stimuli excite. He merely reduces his emotional level, but he can not avoid excitement. On the other hand, Nature protects and hardens the man who does not fear excitement. A certain amount of mental stimulation is necessary. Excitement of moderate degree, the "warming up" noticed in experimentation, is for the nerves what vigorous exercise is for the muscles. We crave excitement. The race has developed through excitement of every kind. We can not avoid it. The nervous system loses tone without it. Many men must have at least the mild stimulation of some fad or the like to offset the monotony of their routine life. So far as hygiene is concerned, of course, if one can find help from a general platitude, the rule is moderate but not extreme excitement. More concretely, the points to be emphasized are as follows: In case of children special care should be taken to avoid premature excitement of every kind. All forms of artificial excitement—by means of opium, alcohol, and the like—should be avoided both by children and by adults. Again, the degree of excitement desirable and healthful depends upon the individual store of energy. The only general rule is that when excitement interferes with sleep and nutrition the danger-signal has appeared. But while we can not avoid excitement, relaxation is of prime importance for the hygiene of the nerves. It indicates strength rather than weakness, and a habit of periodic relaxation is a great safeguard against nervous breakdown. A matter of special importance seems to be the maintenance of the proper rhythm between excitement and relaxation. A breaking of this rhythm seems to be a positive injury to health. Popular opinion at least could furnish a long list of illustrations, from the general belief that running for a train is more dangerous if one misses it to the general consensus of physicians that disappointment in a love-affair is a common cause of nervous prostration. In other words, there should be the normal reaction to excitement. And in general artificial interference

with the normal reaction to emotion of any kind is likely to be injurious to health. This, however, is only one side of the matter. It by no means follows that one should give way to passion or let emotion run riot. Another aspect requires the consideration of self-control.

The hygienic importance of self-control is obvious enough upon a little reflection. Self-control is the great safeguard against nervous disorder. In most cases of neurasthenia it is probably safe to say that lack of self-control was not merely the result, but one of the causes of the disorder. One who has self-control does not worry, does not waste his strength by passion, does not fritter away his energy by attention to the unessential. Self-control might almost be defined as a well-established habit of conserving nervous energy. How far one can be trained to self-control directly is a difficult problem. But there is great possibility of developing self-control indirectly. We inhibit impulse and passion in one direction by turning attention to vital interests in some other subject. Every interest is potentially a means of self-control. The number and intensity of our interests gauge in large degree our power of self-control. Hence the development of manifold and enthusiastic interests in literature, art, science, athletics, and the like is important not only morally, but of great advantage also to health, as furnishing frequently the only adequate means for controlling injurious tendencies and passions. The normal method of inhibiting emotion is by turning attention to some vital interest foreign to the occasion of our emotion.

Another essential for mental hygiene is freedom from worry. Taken in its broadest sense this includes a great deal. The extreme form of worry is chronic fear; and in all forms worry is related to fear. The injury to health from the latter is too obvious for special comment; but even the milder form may be almost equally injurious, and it is this that demands special discussion. Any analysis of the mental process of worry must be arbitrary, but some aspects of it may be distinguished. Worry, besides its emotional coloring that relates it to fear, has two essential characteristics: (1) confusion, or the interference of mental associations; (2) automatic repetition of the mental processes that cause the confusion or the fear. The confusion, or interference of association, is of all degrees from the mere hesitancy of the normal man between two alternatives to the pathological cases known as *folie de doute*, the insanity of doubt. The extreme form throws light on the more common, milder forms. In a typical case an alternative always presents itself, and the patient is always distracted by doubt. It is largely this confusion of association which causes the fatigue when one has to do unfamiliar work and puzzles over alternate methods of action. The habit of weighing arguments pro and con, of balancing on the knife-edge of judicial indecision as regards the details of action, is an extremely fatiguing habit, which in the normal individual is the counterpart of the insanity of doubt. In fact, there is no hard-and-fast line between the two. The second characteristic is automatic repetition. Whether we worry about a friend, our own health or reputation, our business, the task we have to perform on the morrow, or whether it be the racking of our brains with a problem or a puzzle, or the mere interference of association from the insistence of a distracting train of thought or a doggerel rhyme, the process repeats itself over and over. The image of the friend in distress, of our own chagrin or loss, of the unwelcome task, the distracting idea, or the feeling of running against the same unsolvable difficulty, occur again and again, and, like repetition of anything else, must perforce cause fatigue, even apart from the accompanying unpleasant feelings. Of course, it is as true that ill health causes worry as that worry causes ill health; but, whichever be primarily cause and which effect, much may done by mental regimen. It is specially important in the education of the young that the methods should be such as to avoid confusion of association, and children should be trained to clear-cut speaking and acting and the forming of definite decisions. Those who show a special tendency to balance arguments and shiver before decisions should have special training in decisive action.

Apart from an active life, the most important preventive of worry is a settled philosophy of life. It may be in the form of stoicism, of Christian self-surrender, of pantheistic mysticism in its various forms, of Titanic resistance to evil fate, or of a mere agnostic faith that the universe is sound at the core. But something of the kind is essential, and the degree of one's surrender to this philosophy of life is the measure of one's freedom from worry. The more truly religious this philosophy the better, because the religious instinct is one of the deepest things in human nature, and the deeper and more vital the philosophy the more it will make the thought and activity straightforward and decisive. In another way this philosophy of life is seen to be essential. The tale of the occasions of worry would be a long one; but in general the great cause of worry is the great gap between our ideals and our practice. We enter upon our tasks with ideals adjusted to ideal conditions. We soon find that conditions are not ideal, our friends are not ideal, our own performance is not ideal. All this is a constant source of worry. We can not change the conditions. Honor forbids us to lower our ideals. Here religious faith and a settled philosophy of life are helpful.

The common-sense verdict of experience and the results of scientific investigation agree in showing the importance of the obvious principles of mental hygiene—the necessity of activity, of sleep, of a proper alternation of periods of work and of rest, the folly of working beyond one's normal period, the danger of artificial stimuli in place of rest and sleep, the advantage of regularity, permanent interests, ideals, decision, faith, and a clear conscience. The prevalence of nervous diseases and insanity emphasizes the importance of mental hygiene; but its value is not merely as a preventive of such disorders. Regard for its teachings is essential to happiness and efficiency in work, and it is an important factor in the prevention and cure of other diseases. Recent investigations especially emphasize the great importance of mental suggestion in the cure of disease. A great number of undoubted cases of cure by Christian science, by faith-healing, by quack physicians of various kinds, and especially by hypnotic suggestion, as well as the experience of medical practitioners, show that medicine can not ignore the psychology of therapeutics, and demonstrate in most convincing manner what Kant in the last century called the power of the mind in controlling disease. All these investigations indicate that a perfect mental hygiene would be one of the greatest safeguards against physical disease.

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WILLIAM H. BURNHAM.

Meredith, EDMUND ALLEN: statesman; b. in Ardtrea, County Tyrone, Ireland, Oct. 7, 1817; graduated at Trinity College, Dublin, in 1837. He was admitted to the Canadian bar in 1844. He was appointed Professor of Mathematics in McGill University in 1846, and resigned the following year to become Assistant Provincial Secretary of Upper Canada. In 1867 he was appointed Under Secretary of State for the Provinces, and in 1873 First Deputy Minister of the Interior. Among his essays and papers are *An Essay on the Oregon Question*; *Influence of Recent Gold Discoveries on Prices*; *Talfourd's Tragedy of Ion*; *Essay on Friendless and Neglected Children*; *Compulsory Education in Crime*; *Emendations in Shakespeare*; *National Language and National Manners*; *Work of Recent Prison Congresses*; *Miss Dix, Philanthropist and Asylum Reformer.*

Meredith, WILLIAM RALPH, LL. D.: jurist; b. in Middlesex, Ontario, Mar. 31, 1840; educated at the local grammar school and at Toronto University, where he received the degree of LL. D. in 1872; was called to the bar in 1861,

and was made queen's counsel in 1875 and 1880; in 1888 became an honorary member of the law faculty of Toronto University; in 1889 was made corporation counsel of Toronto, to which place he had removed; was elected to the Legislature in 1872, in which year and subsequent years he was identified with legislative measures exempting workmen's wages, creating statutory mechanics' liens, granting workingmen compensation for injuries, etc.; in 1878 was leader of the Opposition; in 1882 opposed the Government on educational and ecclesiastical matters; in 1894 was made chief justice of the common pleas division of the high court of justice of Ontario; in 1895 was elected to the senate of the University of Toronto; in 1896 was appointed a member of the committee for the revision of the provincial statutes. F. STURGES ALLEN.

Meriwether, LEE: statistician; b. in Columbus, Miss., Dec. 25, 1862; was educated in the public schools of Memphis, Tenn.; with an elder brother, founded the *Free Trader*; at the age of nineteen made a walking tour in Europe to study the condition of workingmen and the effect of protective tariffs; was commissioned by the U. S. Labor Bureau to report on the condition of European labor, the report being published in 1886, after the completion of which work he was retained in the service of the Government to collect statistics relative to labor in the U. S. He is the author of *A Tramp Trip: How to See Europe on Fifty Cents a Day* (1887).

Merriam, HENRY CLAY: soldier; b. in Houlton, Me., Nov. 13, 1837; graduated at Waterville College; was commissioned captain in the Twentieth Maine Infantry in 1862, appointed captain in the Eightieth U. S. (colored) Infantry in 1863, lieutenant-colonel of the Eighty-fifth (colored) Infantry in 1864, and was transferred to the Seventy-third (colored) Infantry the same year; was mustered out of service in 1865, commissioned major of the Thirty-eighth Infantry in 1866, transferred to the Twenty-fourth Infantry in 1869, became lieutenant-colonel of the Second Infantry in 1876, and colonel of that regiment in 1885; was promoted to brigadier-general in 1897, and advanced to major-general at the beginning of the war with Spain. He is the inventor of the "Merriam pack."

Merrill, FREDERICK JAMES HAMILTON, Ph. D.: geologist; b. in New York city, Apr. 30, 1861; graduated at the School of Mines, Columbia University, in 1885; served as an assistant on the Geological Survey of New Jersey 1885–87, and was fellow in geology at Columbia 1886–90, receiving in June, 1890, the degree of Ph. D. Dr. Merrill was made assistant State geologist of New York in Oct., 1890, and soon afterward received the appointment of assistant director of the New York State Museum, in connection with which work he was, during 1892 and 1893, director of the scientific exhibit of the State of New York at the World's Columbian Exposition. In 1894 he was made full director of the New York State Museum, and in 1898 became State geologist. Dr. Merrill is a fellow of the Geological Society of America, of the New York Academy of Science, and of the American Association for the Advancement of Science, as well as a member of various other scientific and historical societies. He has contributed scientific articles, mostly on geology, to the *Proceedings* of the societies of which he is a member, and to the *American Journal of Science* and the *Popular Science Monthly*, in addition to which he is the author of the following bulletins of the New York State Museum: *Salt and Gypsum Industries in New York* (Albany, 1893); *Mineral Resources of New York* (1896); *Road Materials and Road Building in New York* (1897); *Guide to the Study of the Geological Collections of the New York State Museum* (1898); and of a *Report on the Scientific Exhibit of the State of New York at the World's Columbian Exposition* (1894). MARCUS BENJAMIN.

Merrill, GEORGE EDMANDS, A. M., D. D.: minister and educator; b. in Charlestown (now Boston), Mass., Dec. 19, 1846; prepared for college in the Cambridge (Mass.) high school; A. B., Harvard, 1869; A. M., Harvard, 1872; graduated at Newton Theological Seminary, 1872; D. D., Colby University, 1896; pastor of Baptist churches in Springfield, Mass., 1872–77; Salem, Mass., 1877–85; Colorado Springs, Col., 1885–87; Newton, Mass., 1890–99; became president of Colgate University, Hamilton, N. Y., in 1899; author of *The Story of the Manuscripts* (1881); *Crusaders and Captives* (1890); *The Reasonable Christ* (1893); *The Parchments of the Faith* (1894).

Merrill, STEPHEN MASON, D. D., LL. D.: M. E. bishop; b. in Jefferson co., Ohio, Sept. 16, 1825; joined the Ohio Conference of the M. E. Church in 1864 as an itinerant; became editor of the *Western Christian Advocate* in 1868; was consecrated bishop in 1872; received the degree of D. D. from Wesleyan University in 1868, and LL. D. from Northwestern University in 1886. His works embrace *Christian Baptism* (1876); *The New Testament Idea of Hell* (1878); *The Second Coming of Christ* (1879); *Aspects of Christian Experience* (1882); *Digest of Methodist Law* (1885); and *Outlines of Thought on Probation* (1886).

Merritt, ANNA (*Lea*): artist; b. in Philadelphia, Pa., Sept. 13, 1844; studied art in Dresden and London; received diploma and medal at the Philadelphia Centennial Exhibition in 1876; published a memorial of her husband after his death, entitled *Henry Merritt's Art Criticism and Romance, with Recollections and Twenty-three Etchings* (1879), to furnish a portrait for which she studied etching, afterward adopting it as a profession. Other etchings of hers are two portraits of Mary Wollstonecraft; *View on the Thames*; a portrait of Sir Gilbert Scott; and Ellen Terry as Ophelia. Among her exhibited paintings are *A Scene on the Grand Canal, Venice*; *Eve Overcome by Remorse*; *The Pied Piper of Hamelin*; *St. Cecilia*; *A Bacchante*; *A Girl with Doves*; and *Camilla*.

Messiter, ARTHUR HENRY: organist; b. in Frome, England, in 1834; studied and practiced his profession in England till he was twenty-four years old, and then went to New York, sang tenor in Trinity Church choir, and in June, 1866, succeeded Dr. Henry Stephen Cutler as organist and choirmaster. He retained this position until May 1, 1897, when he was retired on a pension. D. E. HERVEY.

Metargon: a gaseous element obtained from the atmosphere by Prof. William Ramsay and Dr. Morris W. Travers, of London, England. In the liquefaction of large volumes of argon, using liquid air as the cooling agent, it was found that a white solid appeared on the sides of the bulb and in the liquid. The gas obtained by this method, after the liquid had boiled away, gave a spectrum which was entirely different from that of argon, though resembling it in general character. With low dispersion it gave a banded spectrum, but with a grating single equidistant bright lines appeared with the intermediate spaces filled with dim lines. The density of the gas was found to be almost identical with that of argon, being 19·87, and it is monatomic. As the gas had a different spectrum from argon and behaved somewhat differently at low temperatures, Prof. Ramsay concluded that it was elementary, and gave it the name of metargon. It holds the same relation toward argon that nickel does to cobalt, having approximately the same atomic weight, but different properties. According to Sir William Crookes, the atomic weight of this element would be about 40. See NEON. MARCUS BENJAMIN.

Method in Education: Method comprehends everything that pertains to the system employed in the presentation of subjects of instruction to pupils. *General method* considers the fundamental principles upon which all instruction should be based; *special method* develops the application of these principles to the several subjects constituting the programme of studies. General method takes account of the mental operations by which knowledge is received and assimilated, and proposes to present to the mind new materials for knowledge in accordance with the mind's mode of operation, so that the process of acquisition may be facilitated. General and special method together embrace what is sometimes included under the science and art of teaching, or the philosophy of teaching. It is within comparatively recent times that method has been scientifically worked out and become entitled to respect as a matter of serious study. Properly included in general method are a considerable number of special forms of more or less general application, such as the *Socratic method*, which is essentially the art of giving instruction by questions, and consists in asking the question in such a way as to arouse the intelligence of the listener and prompt him to an appreciation of the truth without its being stated to him dogmatically. It takes its name from the first great exponent of this method, Socrates, and may properly be classified as the method of questions. As questioning forms a part of all instruction, the principles of the Socratic method are interwoven with all phases of the art of teaching. Another method is the *heuristic method*, or the method of discovery. This method aims to have the pupil retrace the steps gone over in the original discovery of the truth to

be imparted. The teacher places the materials before the students and suggests the method of procedure, leaving them to discover the principles independently. It affords a welcome variation from the purely dogmatic method, in which the teacher continually imparts instruction, filling the pupil's mind without calling for original effort on his part. The recapitulation theory, or reverberatory theory of biology, which assumes that each individual reproduces *in petto* the experience of the philogenetic series, supports the heuristic method of instruction according to which each mind should repeat the psychogenetic order. The obvious criticism is that the range of learning is too large, and the heuristic method can be developed to a limited extent only. The *monitorial method* (or the *mutual method*), developed by ANDREW BELL and JOSEPH LANCASTER (*qq. v.*), was purely a device of school management, and not in any proper sense a method of instruction. The *inductive method*, of which much has been written, takes its origin from the philosophy of Bacon, though it was clearly recognized by Aristotle. Since Bacon's day it has been the method of scientific investigation, but only recently has it become prominent as a method of school instruction. In scientific teaching it has become widely used through the introduction of laboratories, in which the pupils observe facts and perform experiments. As applied to language work, it reverses the process of giving a rule and illustrating it by example, and gives first a number of examples, from which the pupil sees the general truth. The *object method*, which has been referred to Pestalozzi, has often been interpreted to mean simply the exhibition of objects for the pupil to look at, and has frequently degenerated into a mere waste of time. Rightly conceived, it is a most valuable means of instruction, in that it enables the mind to avail itself of the senses of touch and sight as well as of hearing, and thus produces a more vivid and lasting impression. The *natural method* is generally applied to the teaching of modern languages, and is opposed to the so-called grammar method. It rests on two principles: First, that the necessary interest for the successful prosecution of language work can most easily be aroused by the actual spoken use of the foreign tongue; second, that a boy or a man can best learn a new language in the same manner in which an infant acquires its native speech. The first principle is sound, but the second fallacious. In practice the method consists in a very large use of conversation. In the hands of skillful native teachers good results are often obtained. Other particular methods are the *deductive method*; the *method of disputation*, so generally used in the universities of the Middle Ages, when books were lacking and disputes furnished the only exercises for the students; and the *historical method*, which is applicable to a considerable number of subjects. This by no means exhausts the list. In most and perhaps in all of these methods there are valuable features, but the safest standpoint is that which, while knowing them all, does not adhere strictly to any one. It is unquestionably true that there should be as many methods as there are teachers. The best teacher will be the one who, knowing all the methods, is an eclectic, using some of all and all of none, and varying the method to suit varying conditions and different classes of students.

The history of method has not yet been fully written. Comenius was the first of the modern writers on the subject; his *Magna Didactica*, written early in the seventeenth century, one of the world's great educational classics, is the first great work on method from a philosophical basis, though previous to this Ascham and Ratich had given attention to new methods of teaching. Pestalozzi contributed largely to its development. Among the German schoolmen and philosophers, Froebel, Herbart, and Ziller have made important contributions. The invention of printing entirely revolutionized methods of teaching. Previous to that books had been very scarce and practically inaccessible for school use. Printing made it possible to place a copy of the text studied in the hands of every pupil and so entirely do away with the old methods of dictation. In Europe, however, much less use is made of text-books, even to-day, than in America. Indeed, perhaps the greatest American contribution to method is the development of scientific text-books. The lecture method, so called, still prevails almost exclusively in European universities, and to a considerable extent in the universities of the U. S., though by no means so prominent in the U. S. as abroad; but the lecture method is not considered widely available in instruction below university grade. Innumerable books on the subject of method, under various titles, have been written, among which may be mentioned Laurie's *Institutes of Education*; Tompkins's *Philosophy of Teaching*; McMurry's *General Method* (and also *Special Methods* in several subjects); Landon's *Art of Teaching and Class Management*; White's *Elements of Pedagogy*; Page's *Theory and Practice of Teaching*; Rein's *Outlines of Pedagogics*; and the works of Comenius, Pestalozzi, Herbart, and Froebel, a considerable part of which may be found in English translations. Cajori's *History of Physics* and *History of Mathematics* are also of interest. Kehr, *Geschichte der Methodik*, in five volumes (Gotha, 1891), is the most valuable single work on the history of method, but it is confined to Germany. C. H. THURBER.

Mettam, CHARLES: architect; b. in Dublin, Ireland, in May, 1819; educated as an architect and civil engineer in his native city, practiced there and in England until 1848, and afterward in New York city. In 1854 he proposed an elevated railroad structure in New York. In 1861 he was employed under Gen. Delafield on the construction of fortifications in New York harbor. He patented many articles used in buildings, including the rolling iron shutter. He designed the funeral car that bore the remains of President Lincoln in New York. D. in Bayonne, N. J., Dec. 5, 1897.

Mexico: The census of 1895 showed a population of 12,619,959, a density of 16·4 to the square mile. About 19 per cent. is of European descent, 43 native Indian, and 38 mixed European and Indian. The state is spending large sums to improve the harbors on the Gulf coast. Vera Cruz, an open roadstead, is gradually being made a good port. The depth of water on the bar at Tampico was only 8 or 9 feet in 1893, but in 1899 steamships drawing 24 feet enter the port. The drainage works by which the waters of the Valley of Mexico are carried outside the wall of mountains that hemmed them in were completed in 1897. The works cost $20,000,000, were twelve years in building, and include a tunnel 6 miles long through the range, while the canal in the valley is 43 miles long. The surplus waters which sometimes flooded the city of Mexico and the sewage of the city are thus carried outside the valley. The works are expected greatly to improve the sanitary condition of the city and reduce its heavy death-rate. Mexico is supplying about one-third of the silver production of the world; but ever since 1886, when the price of silver began to fall, the Government has encouraged gold-mining by facilitating the exploration and working of the placers, and granting special franchises and concessions. Under this stimulus, production increased from $1,269,907 in 1892–93 to $7,584,182 in 1897–98. Cattle-raising is increasing, and in two years Mexico has sent about 400,000 small cattle to the U. S. at about $16 a head (silver) to take the place of better stock sent to Europe. The total imports were $61,304,914 (gold), of which the U. S. supplied $31,020,136, Great Britain $10,479,512, France $6,754,015, Germany $6,678,393, and Spain $2,918,323. The total exports were $73,527,616 (gold), of which $57,888,243 went to the U. S., or 79 per cent. of the total exports, as against 77 per cent. in 1896–97. C. C. ADAMS.

Military Insignia: badges and other devices used as distinguishing marks of military rank and service. These are necessarily so numerous in the various armies and navies of the world that it is not feasible to describe all in this article. Distinctions of military rank are universally marked by the use of badges, such as shoulder-straps and epaulettes, with different devices, usually highly ornamental for officers of the highest rank. Details can be given here for the U. S. services only.

As early as 1775 general officers and their aides were distinguished by "ribbands" of various colors worn between the coat and the waistcoat, field and company officers by cockades, sergeants by a stripe or epaulette of red cloth on the right shoulder, corporals by a stripe of green. A general order dated June 18, 1780, under authority of an act of Congress, made the first announcement of insignia of rank, as follows: Major-generals were to wear two epaulettes with two stars on each, and a black-and-white feather in the hat; brigadiers, epaulettes with one star, and a white feather; field officers, two epaulettes; captains, one epaulette on the right shoulder; lieutenants, one epaulette on the left shoulder. The aides of the general commanding in chief were distinguished by a green-and-white feather in the hat, other aides by a green feather, inspectors by a blue feather. All officers, both commissioned and non-commissioned, were required to wear a cockade. Service stripes first appeared in 1782, when it was ordered that each non-commissioned

CAP
NAVAL CADET

COLLAR
CONSTRUCTION CORPS, NAVY

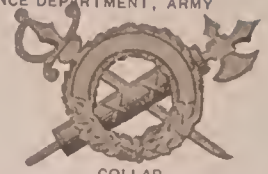
COLLAR
SUBSISTENCE DEPARTMENT, ARMY

COLLAR
ORDNANCE DEPARTMENT, ARMY

CAP
MILITARY CADET

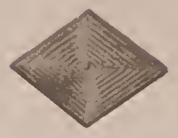
COLLAR
ENGINEER'S, ARMY

COLLAR
JUDGE ADVOCATE, ARMY



COLLAR
INSPECTOR-GENERAL'S DEPARTMENT, ARMY

COLLAR
MEDICAL DEPARTMENT, ARMY



COLLAR
PAY DEPARTMENT, ARMY

COLLAR
MEDICAL CORPS, NAVY

COLLAR
ARTILLERY, ARMY

COLLAR
PAY CORPS, NAVY

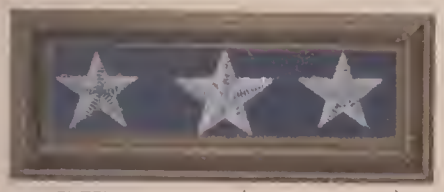
COLLAR
SIGNAL CORPS, ARMY

COLLAR
INFANTRY, ARMY

COLLAR
QUARTERMASTER'S DEPARTMENT, ARMY

COLLAR
CAVALRY, ARMY

COLLAR
ADJUTANT-GENERAL'S DEPARTMENT, ARMY



LIEUTENANT-GENERAL (OCCASIONAL RANK.)

MAJOR-GENERAL

BRIGADIER-GENERAL

COLONEL, INFANTRY

LIEUTENANT-COLONEL, SILVER LEAVES
MAJOR, GOLD LEAVES

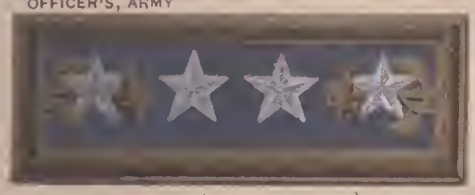
CAPTAIN, INFANTRY

CAP
OFFICER'S, ARMY

FIRST LIEUTENANT, ARTILLERY

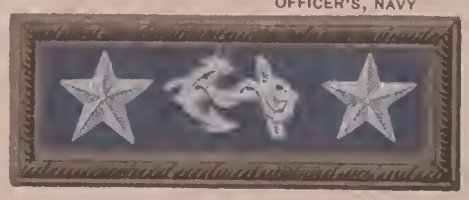
SECOND LIEUTENANT, CAVALRY

CAP
OFFICER'S, NAVY

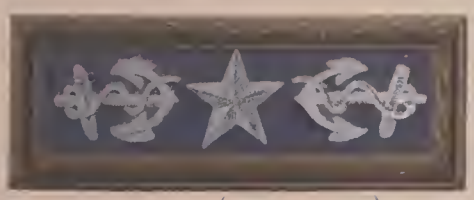


ADMIRAL (OCCASIONAL RANK.)

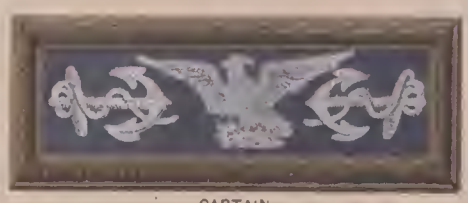
VICE-ADMIRAL (OCCASIONAL RANK.)



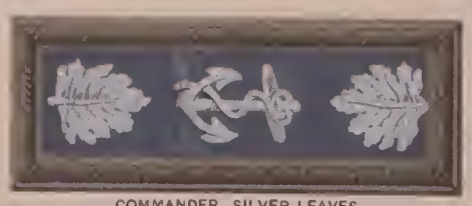
REAR-ADMIRAL



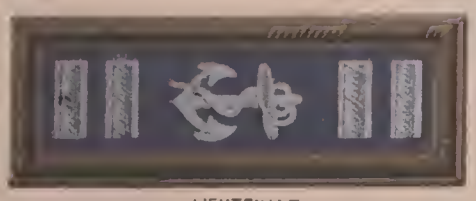
COMMODORE (OCCASIONAL RANK.)



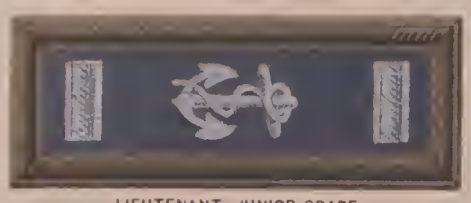
CAPTAIN



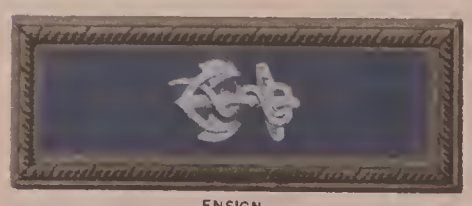
COMMANDER, SILVER LEAVES
LIEUTENANT-COMMANDER, GOLD LEAVES



LIEUTENANT



LIEUTENANT, JUNIOR GRADE



ENSIGN

PREPARED BY MESSRS. SHANNON, MILLER & CRANE.

ARMY, GENERAL OFFICERS AND STAFF, BLUE GROUND INFANTRY, WHITE GROUND CAVALRY, YELLOW GROUND ARTILLERY, RED GROUND NAVY, BLUE GROUND

ARMY AND NAVY INSIGNIA.

CORPS SYMBOLS.
U.S.A.

1ST DIVISION.....RED.
2ND DIVISION.....WHITE.
3RD DIVISION.....BLUE.


1st Corps.


Artillery.


Cavalry.


2nd Corps


3rd Corps.


4th Corps.


5th Corps.


6th Corps.

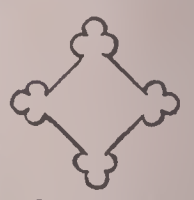

7th Corps


8th Corps.

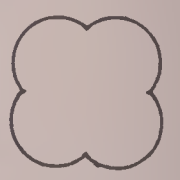

9th Corps


10th Corps.


11th Corps.

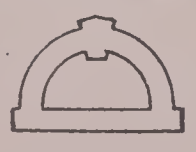

12th Corps.


13th Corps


14th Corps.

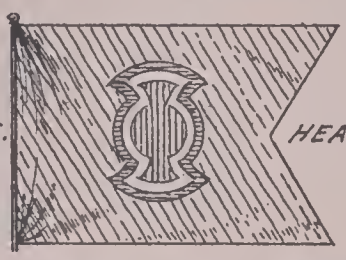

15th Corps

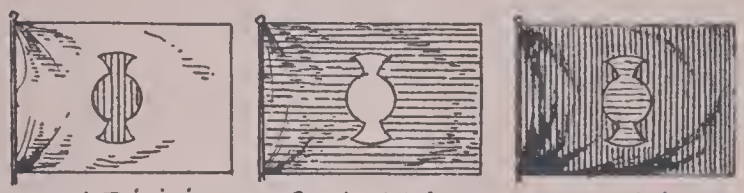

17th Corps.


18th Corps


16th Corps

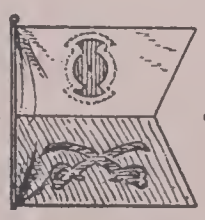
CORPS AND DIVISION FLAGS.

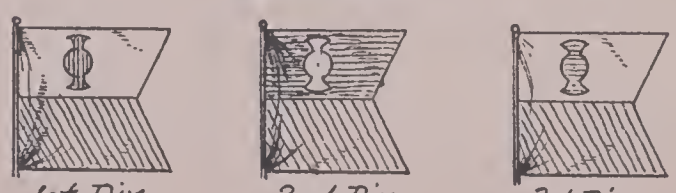

FIRST CORPS. HEADQUARTERS.


1st Division. 2nd Division. 3d Division.


FIRST CORPS. ARTILLERY.


1st Div. 2nd Div. 3d Div.


FIRST CORPS. CAVALRY.


1st Div. 2nd Div. 3d Div.

COLORS
INDICATED BY LINES.

BLUE .....
RED .....
YELLOW..

officer and private who had served four years in any Continental regiment might wear one stripe of white tape on the left sleeve of his regimental coat, and for eight years' service two stripes. Changes were often made up to the time of the civil war, since which time the distinctions have remained substantially what they now are.

THE ARMY.—The arms and corps of the army are distinguished first by badges (insignia proper), and by facings. The insignia for officers' undress coats are as follows: The letters "U. S.," in Gothic design, of suitable height (one inch), each followed by a period, embroidered in gold or made of gold or gilt metal (except for the corps of engineers, which are embroidered in silver or made of silver), are worn on each side of the collar, an inch from its edge and midway of its height, with distinctive insignia of suitable height, embroidered or made of metal, worn on each side of the collar about five-eighths of an inch from the letters "U. S.," as follows: Adjutant-general's department, a shield of gold or gilt metal, or embroidered in gold; inspector-general's department, a gold or gilt sword and fasces crossed and wreathed; judge-advocate-general's department, sword and pen crossed and wreathed, embroidered in gold, or of gold or gilt metal; quartermaster's department, sword and key crossed on a wheel surmounted by a spread eagle, of gold or gilt metal, platinum and enamel; subsistence department, a silver crescent half an inch between cusps, placed near the golden letters "U. S.," cusps to the rear; pay department, a diamond three-quarters by one inch, embroidered in gold, or of gold or gilt metal, placed with shorter diagonal vertical; medical department, a modification of the cross of the Knights of St. John, three-quarters of an inch over all, embroidered in gold or made of gold or gilt metal in exact imitation of gold embroidery, the center plain, and the cross without border; corps of engineers, a silver-turreted castle; ordnance department, shell and flame, of gold or gilt metal, or embroidered in gold; signal corps, two crossed signal-flags and a burning torch, of gold or gilt metal, or embroidered in gold; record and pension office, a silver trefoil, within and partly upon a gold wreath, embroidered or in metal; cavalry, two crossed sabers, an inch high, with the number of the regiment above the intersection, of gold or gilt metal, or embroidered in gold; artillery, two crossed cannon, an inch high, with the number of the regiment at the intersection, of gold or gilt metal, or embroidered in gold; infantry, two crossed rifles, an inch high, with the number of the regiment above the intersection, of gold or gilt metal, or embroidered in gold.

The cap badge for all officers is the coat of arms of the U. S., embroidered in gold, and is placed in front so that the top of the badge is slightly below the top of the cap.

Epaulettes.—The epaulettes of the general of the army are of gold with solid crescent; device, two silver embroidered stars, with five rays each, 1½ inches in diameter, and the arms of the U. S. embroidered in gold placed between them. Those of a lieutenant-general are of gold, with solid crescent; device, three silver embroidered stars of five rays each, respectively 1½, 1¼, and 1⅛ inches in diameter; the largest placed in the center of the crescent; the others placed longitudinally on the strap and equidistant, ranging in order of size from the crescent. Those of a major-general are the same as for the lieutenant-general, omitting the smallest star, and the smaller of the two remaining stars placed in the center of the strap. Those of a brigadier-general are the same as for a lieutenant-general, omitting all stars but the largest. The adjutant-general, inspector-general, and chief of the record and pension office wear an aiguillette, with the right epaulette.

Arrangement of Buttons.—The general wears two rows of twelve buttons each, placed by fours; lieutenant-general, two rows of ten each, the upper and lower groups by threes, the middle by fours; major-general, two rows of nine each, placed by threes; brigadier-general, two rows of eight, placed by twos; field officers, two rows of nine, equidistant; company officers, two rows of seven, equidistant.

Sword-belts.—General officers wear sword-belts of red Russia leather, with three stripes of gold embroidery; all field officers, of black enameled leather, with one broad stripe of gold lace; staff officers below the grade of major, of black enameled leather, with four stripes of gold lace interwoven with black silk; company officers of the line, of black enameled leather, with four stripes of gold lace, interwoven with silk of the color of the facings of the arm of the service.

Insignia of Corps on Epaulettes.—The chiefs of the various staff corps and staff departments have upon their epaulettes the insignia of their respective corps or departments, substantially as already described for the undress coat.

Shoulder-knots.—Officers of the adjutant-general's department wear shoulder-knots of gold cord, a quarter of an inch in diameter, Russian pattern, on dark-blue cloth ground; insignia of rank embroidered on the cloth ground of the pad; a solid shield of silver on the center of the pad (except for a colonel and assistant adjutant-general, who wears it on the bullion of the knot midway between the upper fastening and the pad); an aiguillette of gold wire cord; the cord for the breast-plaits is a quarter of an inch in diameter, and that for the arm-plaits three-sixteenths of an inch, and they are worn on the right shoulder-knot, the loop crossed on top of the right arm above the elbow, and the cords fastened, before buttoning, to the top and second buttons on the right side of the coat. The aiguillette, instead of being permanently attached to the shoulder-knot, may be made separate, so as to be attached to the coat under the knot, by means of a strap or tongue passing through the lower fastenings of the knot.

Officers of the inspector-general's department wear knots like those of the adjutant-general's department, but with solid gold or gilt sword and fasces crossed and wreathed in place of the silver shield.

Officers of the judge-advocate-general's department wear the same knot as that of the adjutant-general's department, without the aiguillette and shield, but with sword and pen crossed and wreathed, embroidered in silver on the cloth ground of the pad (except for a colonel and assistant judge-advocate-general, who wears the device made of solid silver on the knot midway between the upper fastening and the pad).

In the quartermaster's department colonels wear the same knot as the officers of the adjutant-general's department, without the aiguillette and shield, but with a sword and key, crossed on a wheel, surmounted by a spread eagle looking to the front, made of gold or gilt metal, platinum, and enamel, and placed midway between the fastening and the pad. Officers below the rank of colonel wear a similar device placed on the center of the pad.

In the subsistence department colonels wear the same knot as the officers of the adjutant-general's department, without the aiguillette and shield, but with a silver crescent, an inch between cusps, placed on the strap over the first crossing of the embroidery above the pad, cusps to the rear. Officers below the rank of colonel wear a silver crescent similar to that of the colonel, to be placed centrally on the pad, cusps to the rear, the extremities of the cusps to be equidistant from a median line drawn through the center of the fastening and the center of the pad.

In the medical department colonels wear the same knot as officers of the adjutant-general's department, without the aiguillette and shield, but with a modification of the cross of the Knights of St. John, made of solid silver in imitation of embroidery, three-quarters of an inch over all, the center plain and the cross without border, placed on the crossing of the cords below the upper fastening, one axis of the cross to coincide with the axis of the strap. Officers below the rank of colonel wear a cross an inch over all, embroidered in dead-gold bullion, or made of gold or gilt metal in exact imitation of gold embroidery, the center plain and the cross without border, placed on the center of the pad; the axes of the cross coincide with the axes of the pad.

In the pay department colonels wear the same knot as officers of the adjutant-general's department, without the aiguillette and shield, but with a diamond embroidered in silver or made of silver metal in exact imitation of silver embroidery, diagonal, in size three-quarters of an inch by an inch, placed on the strap over the first crossing of the embroidery above the pad, the shorter line parallel to the line of the shoulders. Officers below the rank of colonel wear a diamond of the pattern above described, placed on the center of the pad, the shorter diagonal parallel to the line of the shoulder.

The knot of officers of the engineer corps is the same as that of the adjutant-general's department, without the aiguillette and shield, but with a silver-turreted castle. That of the ordnance department is the same as in the adjutant-general's department, without the aiguillette and shield, but with a shell and flame in silver embroidery. That of the signal corps is the same as in the adjutant-

general's department, without the aiguillette and shield, but with two crossed signal-flags and a burning torch, in gold and silver embroidery. That of the record and pension office is a silver trefoil within and partly upon a gold wreath embroidered or in metal. Aides-de-camp to major-generals and brigadier-generals, and regimental adjutants, wear the shoulder-knots of their corps or regiment, with aiguillette attached. Officers of cavalry, artillery, and infantry wear knots of the same pattern as for the staff corps, but on cloth of the same color as the facings of their arm, with the number of the regiment embroidered in silver and insignia of rank on the cloth ground of the pad.

Insignia of Rank on Shoulder-knots.—Colonel, a silver-embroidered eagle at the center of the pad; lieutenant-colonel, two silver-embroidered leaves, one at each end of the pad; major, two gold-embroidered leaves, one at each end of the pad; captain, two silver-embroidered bars at each end of the pad; first lieutenant, one silver-embroidered bar at each end of the pad; second lieutenant, plain; additional second lieutenant, same as the second lieutenant. The foregoing insignia are the same as prescribed for the shoulder-strap.

Shoulder-straps.—The general of the army wears shoulder-straps of dark-blue cloth, 1⅝ inches wide by 4 inches long, bordered with an embroidery of gold a quarter of an inch wide, two silver-embroidered stars of five rays each and gold-embroidered arms of the U. S. between them. Lieutenant-general, of dark-blue cloth, 1⅝ inches wide by 4 inches long, bordered with an embroidery of gold a quarter of an inch wide; three silver-embroidered stars of five rays each, one star on the center of the strap and one at each end, equidistant between the center and the outer edge of the strap, the center star the largest. Major-general, the same as for a lieutenant-general, except that there are two stars instead of three; the center of each star is an inch from the outer edge of the gold embroidery on the ends of the strap, both stars of the same size. Brigadier-general, the same as for a major-general, except that there is one star instead of two at the center of the strap. The cloth of the straps for the general staff and staff corps is dark blue; infantry, white; artillery, scarlet; cavalry, yellow. Colonel, the same as for a brigadier-general, omitting the star, with a silver-embroidered spread eagle on the center of the strap, 2 inches between the tips of the wings, having in the right talon an olive branch and in the left a bundle of arrows; an escutcheon on the breast, as represented in the arms of the U. S. Lieutenant-colonel, the same as for a colonel, omitting the eagle, with a silver-embroidered leaf at each end, each leaf extending seven-eighths of an inch from the end of the strap. Major, the same as for a lieutenant-colonel, with a gold-embroidered leaf at each end, each leaf extending seven-eighths of an inch from the end of the strap. Captain, the same as for a major, omitting the leaves; at each end two silver-embroidered bars of the same width as the border, placed parallel to the ends of the strap; the distance between them and the border equal to the width of the border. First lieutenant, the same as for a captain; at each end one silver-embroidered bar of the same width as the border, placed parallel to the ends of the strap, at a distance from the border equal to its width. Second lieutenant, the same as for a first lieutenant, omitting the bars. Additional second lieutenant, the same as for a second lieutenant. Chaplain, of dark-blue cloth of the usual size and pattern, with a plain Latin cross in the center.

Insignia of Rank on Overcoat Sleeves.—General officers wear a knot of flat black mohair soutache braid, not exceeding an eighth of an inch in width, and composed of five braids, double knot: colonels, five braids, single knot; lieutenant-colonels, four braids, single knot; majors, three braids, single knot; captains, two braids, single knot; first lieutenants, one braid, single knot; second lieutenants, without braid; chaplains, without braid.

Facings.—The facings of the various arms are as follows: General officers, officers of the staff corps and departments, dark sky-blue (Khaki uniform only); infantry, white (except of the Khaki uniform, sky-blue); cavalry, yellow; artillery, scarlet; engineer troops, scarlet piped with white; ordnance troops, crimson piped with white; post quartermaster-sergeants, buff piped with white; commissary sergeants, gray piped with white; sergeants of the signal corps, black piped with white; hospital corps, emerald green.

Cadets of the U. S. Military Academy.—The facings of the cadet uniform are black. Rank is indicated by gold-lace chevrons on the full dress, and by black cloth chevrons on the undress coat, as follows: Captain, a chevron of four bars; lieutenant, a chevron of three bars, the adjutant having in addition an arc, and the quartermaster a tie; sergeant-major, a chevron of two bars with an arc; quartermaster-sergeant, a chevron of two bars with a tie; first sergeant, a chevron of two bars with a diamond; color-sergeant, a chevron of two bars with a star; sergeant, a chevron of two bars; corporal, a chevron of two bars, worn below the elbow. The forage-cap and dress-hat badges are the coat of arms of the U. S., with the letters "U. S. M. A." in a scroll connecting the tips of the eagle's wings.

Chevrons, Stripes, etc., of Non-commissioned Officers and Privates.—The rank of non-commissioned officers is marked on the blouse and overcoat by chevrons of cloth, and on the uniform dress coat, except for the hospital corps, by chevrons of gold lace. Chevrons are worn points down; those on the uniform dress coat and blouse are above the elbow; those on the overcoat, below the elbow, with the point half an inch above the cuff. The cloth chevrons are of the same color as the facings of the uniform dress coat, except those worn by the hospital corps, which are of emerald green. Those for the overcoat of infantry are of dark-blue cloth. The engineers' and signal corps' chevrons are piped with white cloth. The bars of the chevrons are half an inch wide, separated by silk stitching; white for hospital stewards, acting hospital stewards, engineers, signal corps, and for overcoats for infantry; black for all others; the upper and lower edges are finished or bound with a similar stitching. The arms of the chevron-bars are 6 to 7 inches long, being the arcs of a circle of about 25 inches radius, and meeting at an angle of about 96 degrees; distance between extreme outer ends about 9 inches.

Rank is indicated as follows: Sergeant-major, three bars and an arc of three bars. Quartermaster-sergeant, three bars and a tie of three bars. Saddler sergeant, three bars and a saddler's round knife, handle upward. The knife is of the following dimensions: Handle 1¾ inches long, three-quarters of an inch wide near top, five-eighths of an inch near the blade; blade 1⅛ inches deep in center; from point to point of the blade, 3¼ inches; center of edge, 1¼ inches above the inner angle of the chevron. Chief trumpeter, three bars and an arc of one bar, with a bugle, of pattern worn on caps, in the center. Principal musician, three bars and a bugle. Ordnance sergeant, three bars and a star. Post quartermaster-sergeant, three bars and a crossed key and pen. Commissary sergeant, three bars and a crescent (points to the front) 1¼ inches above the inner angle of the chevron. Hospital steward, three bars and an arc of one bar, of emerald-green cloth, inclosing a red cross. Acting hospital steward, the same as for a hospital steward, omitting the arc. Private of the hospital corps, and all persons neutralized by the terms of the Geneva Convention, a brassard of white cloth, 16 inches long and 3 inches wide, with a cross of red cloth, 2 inches long and 2 inches wide, in the center, worn on the left arm, above the elbow. Sergeant of the first class of the signal corps, three bars and an arc of one bar, inclosing a device, consisting of crossed signal-flags, red and white, and a burning torch in yellow. Sergeant of the signal corps, the same as for a sergeant of the first class, omitting the arc. First sergeant, three bars and a lozenge. Sergeant, three bars. Regimental and battalion color-sergeant, three bars and a sphere, 1¼ inches in diameter. Corporal, two bars. Lance-corporal, one bar. Farrier, a horse-shoe of cloth, 4½ inches long and 3¾ inches wide, worn toe uppermost. Pioneer, two crossed hatchets, of cloth, same color and material as the facings of the uniform dress coat, sewed on each sleeve above the elbow, in the place indicated for a chevron (those of a corporal to be just above and resting on the chevron), the head of the hatchet upward, its edge outward, of the following dimensions: handle, 4½ inches long, a quarter to a third of an inch wide; hatchet, 2 inches long, 1 inch wide at the edge. First-class gunner, an elongated cannon-projectile 1½ inches long and three-fourths of an inch wide, point up, of scarlet cloth neatly piped and stitched on the outside of the right sleeve of the dress coat, blouse, and overcoat half-way between the point of the shoulder and the elbow, below the chevron in the case of a non-commissioned officer. Company litter-bearer, a brassard of red cloth worn on the left arm above the elbow.

Gold-lace Chevrons.—Gold-lace chevrons are of the same dimensions as cloth chevrons, stitched on cloth of the same color as the facings of the uniform dress coat. Those for engineers have a stitching of white silk on each edge of the gold lace. Those for the signal corps have the crossed signal-

flags and torches of the same color and dimensions as those for the cloth chevrons, and embroidered in silk and bullion in high relief.

Service Chevrons.—All enlisted men who have served faithfully for one term of enlistment, for either three or five years, wear as a mark of distinction, on both sleeves of the uniform dress coat, below the elbow, a diagonal half-chevron of gold lace, half an inch wide, stitched on a piece of dark-blue cloth of the color of the uniform dress coat, and extending from seam to seam, the front end nearest the cuff, and half an inch above the point of the cuff. Those of the enlisted men of the hospital corps, however, consist of a single stripe of emerald-green facing-cloth, half an inch wide and 12 inches long, stitched on the outer edges with white chevron silk, and worn on both sleeves of the blouse below the elbow.

To indicate service in war, a diagonal half-chevron of gold lace, half an inch wide, with piping on each side an eighth of an inch wide, is worn on each sleeve of the uniform dress coat, of cloth of the same color as the facings of the arm of service in which the soldier earned the right to wear it; those for engineers have in addition a stitching of white silk on each side of the gold lace. Those for the enlisted men of the hospital corps are worn on both sleeves of the blouse, and consist of a single stripe of emerald-green facing-cloth, half an inch wide and 12 inches long, piped on the outer edges with orange facing-cloth an eighth of an inch wide, indicating war service in the hospital corps only. War service in other arms is indicated by pipings of the color worn by the arm in which such service was rendered, except in the engineer corps, in which case the outer edges of the scarlet pipings have a row of white silk stitching.

All soldiers who have served during the war of the rebellion, who were honorably discharged; all who served in the Indian campaigns enumerated in general orders from the headquarters of the army; and all who have served or may serve in the army of the U. S. in war, or in such Indian campaigns approaching the magnitude of war as may from time to time be so designated by the Secretary of War, are entitled to wear the "service-in-war" chevron. The chevrons to indicate service and service in war, if more than one, will be worn one above the other in the order in which they were earned, with a quarter of an inch between them. But one chevron will be used for each enlistment, the "service-in-war" chevron being worn in place of the "service" chevron for each enlistment in which the right to wear it was earned. A lance-corporal wears, in addition to the uniform of a private, a chevron having one bar of lace or braid; holding a renewed appointment, he is entitled to wear the uniform of a corporal, except that the chevron shall have but one bar of lace or braid.

Corps Badges.—By direction of the Secretary of War, Nov. 19, 1898, it was decided that the corps badges prescribed in General Orders No. 99, July 15, 1898, adjutant-general's office, are a part of the uniform of the army and serve as marks of identification the same as the symbols of the various arms of the service and the different staff corps. These badges are as follows: Cavalry corps, a winged horse-foot; artillery corps, crossed conical projectiles, with round shot above the center; First Corps, a circle over the letter "I," of special design; Second Corps, a four-leaf clover; Third Corps, a three-tooth clutch; Fourth Corps, a caltrop; Fifth Corps, a five-bastion fort; Sixth Corps, a six-spoke hub; Seventh Corps, a seven-pointed star; Eighth Corps, two circles overlapping each other, one-third radius, resembling the figure 8; Ninth Corps, a buzz-saw with nine teeth; Tenth Corps, two triangles, point to point, resembling the letter X; Eleventh Corps, badge of Tenth Corps, with horizontal bar through the center, representing "XI"; Twelfth Corps, a square with clover-leaf at each corner, thereby showing twelve small circles; Thirteenth Corps, a palm-leaf with thirteen spikes; Fourteenth Corps, a square, with half-circles on each side; Fifteenth Corps, a bugle; Sixteenth Corps, a spear-head; Seventeenth Corps, a battle-axe; Eighteenth Corps, an arch.

The divisions of the corps are represented by the color of the symbol, as follows: First Division, red; Second Division, white; Third Division, blue.

These corps symbols are habitually worn in the form of a small badge on the front of the hat or in the center of the crown of the forage-cap by enlisted men, and on the left breast by officers, and are of felt of the color designating the division to which the wearer belongs; the badge being 1½ inches high, or occupying a space 1½ inches square. Officers and enlisted men belonging to a corps and not attached to a division wear the corps symbol of the size above described in red, bordered in white one-sixteenth of an inch and edged in blue one-thirty-second of an inch. If preferred, officers and enlisted men are authorized to wear the proper badge made of gold or yellow metal enameled in the proper colors. The members of the provost guard when on duty may wear on the left breast, as a badge of authority, the corps symbol, 3 inches high, or occupying a space 3 inches square, made of tin or white metal. A modification of the general order establishing corps badges provides that these as worn by officers and men shall be from 1¼ to 1½ inches in size, and that officers may wear them on the hat or cap.

The Navy.—The various branches of the navy are distinguished from one another by suitable devices, while grades are indicated generally by the disposition of gold lace on the collar, cocked hats and forage-caps, and especially by grade devices proper and sleeve ornaments.

Corps Devices.—The line of the navy is distinguished by the foul anchor. The other devices used are: For the medical corps, a spread oak-leaf embroidered in dead gold, with an acorn embroidered on it in silver; for the pay corps, a silver oak-sprig; for the construction corps, a gold sprig of two live-oak leaves and an acorn; for professors, one silver oak-leaf and an acorn; for civil engineers, the letters C. E. in silver.

Insignia of Grade.—The grade is indicated in a general way on the collar of the special full-dress coat by a strip of navy-gold wire or thread lace, of two vellums, around the top and down the front, 1¾ inches wide for flag-officers, 1½ inches for captains and commanders, 1 inch for lieutenant-commanders, lieutenants, and lieutenants junior grade, and one-half inch for ensigns. The same general distinction is brought out on the cocked hat, as follows: For the admiral, a strip of 2-inch gold lace, laid on flat, around the outer rims of the fans, passing under the peaks; for rear-admirals, a strip of 1½ inches of gold lace, laid on flat, around the outer rims of the fans, passing under the peaks; for all other officers, a strip of black silk lace 2½ inches wide, binding the rims of the fans, and showing 1¼ inches on each side and under the peaks.

The visor of the forage-cap is embroidered as follows: Admiral and rear-admiral, embroidered all around with oak-leaves; staff officers of corresponding relative rank, a gold band, half an inch wide, embroidered all around the edge; captain and commander, embroidered along the front edge with oak-leaves; staff officer of corresponding relative rank, a gold band, half an inch wide, embroidered along the front edge. The cap device for all officers, except chaplains, chief boatswains, chief gunners, chief carpenters, chief sailmakers, mates, and clerks, is a silver shield, emblazoned paleways, of thirteen pieces, with a chief strewn with stars surmounted by a silver spread eagle, the whole being placed on two crossed foul anchors embroidered in gold; for chief boatswains, chief gunners, chief carpenters, chief sailmakers, warrant officers, mates, and pay clerks, two gold foul anchors crossed.

Distinctions of grade also appear in the belt ordered to be worn on special occasions, as follows: For rear-admirals, the belt is of dark navy-blue cloth, with gold-embroidered stripe a quarter of an inch wide on each edge, and one of the same width in the center. The slings are of dark navy-blue cloth, with three gold-embroidered stripes an eighth of an inch wide, arranged as on the belt. For captains and commanders, the belt is of dark navy-blue silk webbing, with 7 sixteenth-inch gold-lace stripes. For lieutenant-commanders and lieutenants, the belt is of dark navy-blue silk webbing, with 5 sixteenth-inch gold-lace stripes. For lieutenants junior grade and ensigns, the belt is of dark navy-blue silk webbing, with 3 sixteenth-inch gold lace stripes.

Sleeve Ornaments (special full-dress, frock, blue service, and evening dress coat).—The admiral wears two strips of 2-inch gold lace, with one 1-inch strip between, set a quarter of an inch apart; rear-admirals, one strip of 2-inch gold lace, 1½ inches from the edge of the sleeve, with one strip of half-inch gold lace a quarter of an inch above it; captains, four strips of half-inch gold lace, set a quarter of an inch apart; commanders, three strips of half-inch gold lace, set a quarter of an inch apart; lieutenant-commanders, two strips of half-inch gold lace, with one strip of quarter-inch gold lace between, a quarter of an inch apart; lieutenants, two strips of half-inch gold lace, a quarter of an inch apart; lieutenants junior grade, one strip of half-inch gold lace, with one strip of quarter-inch gold lace a quarter of an inch

above it; ensigns, one strip of half-inch gold lace; chief boatswains, chief gunners, chief carpenters, chief sailmakers, one strip of half-inch gold lace, woven with dark-blue silk thread at intervals of 2 inches—the width of the blue silk weaving is half an inch; naval cadets who have completed the four years' course at the Naval Academy, one strip of quarter-inch gold lace. In the case of officers below the grade of rear-admiral, the lower edge of the sleeve lace is 2 inches from the edge of the sleeve.

All staff officers, except chaplains, wear the same lace on the cuff as is prescribed for line officers with whom they have rank, with bands of colored cloth around the sleeve, between strips of gold lace, as follows: Medical officers, dark-maroon velvet; pay officers, white cloth; naval constructors, dark-violet cloth; professors of mathematics, olive-green cloth; civil engineers, light-blue velvet. Staff officers entitled to but one strip of lace on the sleeve wear the colored cloth so as to show one-fourth of an inch above and below the strip. The sleeve ornaments for chaplains are of lustrous black braid, and correspond in width and disposition with those of line officers of the same relative rank. Line officers (including chief boatswains, chief gunners, mates, boatswains, gunners, and warrant machinists) wear a star of five rays, embroidered in gold, an inch in diameter, on the outer side of each sleeve and midway between the seams, with one of the rays pointing directly downward, and the point one-fourth of an inch from the upper edge of the upper strip of lace. Mates, boatswains, gunners, and warrant machinists wear the star 4 inches from the edge of the sleeve. On the overcoat the grade-mark on the sleeve is of lustrous black braid of double thickness, showing the same width and disposition as that of gold lace worn on the other coats. Cadet officers at the Naval Academy have their rank indicated by sleeve-marks, commissioned grades wearing stripes around the cuff, petty officers badges on the upper arm.

Epaulettes and Shoulder-knots.—All officers, except chaplains, chief boatswains, chief gunners, chief carpenters, chief sailmakers, naval cadets, warrant officers, mates, and clerks, wear two gold bullion epaulettes of the following dimensions: The admiral and rear-admirals, a strap $2\frac{3}{4}$ inches wide and 6 inches long; frog, $4\frac{3}{8}$ inches wide; crescent, eleven-sixteenths of an inch in the broadest part; bullion, $3\frac{1}{2}$ inches long and five-eighths of an inch in diameter. Captains and commanders, a strap $2\frac{3}{4}$ inches wide and 6 inches long; frog, $4\frac{3}{8}$ inches wide; crescent, eleven-sixteenths of an inch in the broadest part; bullion, 3 inches long and half an inch in diameter. Lieutenant-commanders, lieutenants, and ensigns, a strap $2\frac{1}{2}$ inches wide and 6 inches long; frog, $4\frac{3}{8}$ inches wide; crescent, nine-sixteenths of an inch in broadest part; bullion, 3 inches long and three-eighths of an inch in diameter. Naval cadets who have completed the four years' course at the Naval Academy, gold-embroidered shoulder-knots in lieu of epaulettes. All staff officers wear the same epaulettes as are prescribed for line officers with whom they have relative rank, with the substitution of the proper corps devices.

Shoulder-straps.—The admiral's shoulder-straps are $4\frac{7}{8}$ inches long and $1\frac{5}{8}$ inches wide, including the border, which is a quarter of an inch wide, embroidered in dead gold. The center is of dark navy-blue cloth, upon which are embroidered the corps and rank devices as below. For all other officers, except chaplains, chief boatswains, chief gunners, chief carpenters, chief sailmakers, warrant officers, mates, clerks, and naval cadets, the shoulder-straps are $4\frac{1}{2}$ inches long and $1\frac{1}{2}$ inches wide, including the border, which is a quarter of an inch wide, embroidered in dead gold. The center is of dark navy-blue cloth, upon which are embroidered the corps and rank devices as below.

Embroidered Devices for Frogs of Epaulettes and for Shoulder-straps and Knots.—For the admiral, four silver stars of five rays each, placed equidistant from each other in the middle of the strap or frog of the epaulette, with a gold foul anchor, $1\frac{1}{8}$ inches long, under each of the two outer stars. For rear-admirals, two similar stars, one near each end of the frog, with a silver foul anchor seven-eighths of an inch long in the center. For captains, a silver spread eagle in the center, with a silver foul anchor at each end. For commanders, a silver oak-leaf at each end, with a silver foul anchor in the center. For lieutenant-commanders, a gold oak-leaf at each end, with a silver foul anchor in the center. For lieutenants, two silver bars at each end, with a silver foul anchor in the center. For lieutenants junior grade, one silver bar at each end, with a silver foul anchor in the center. For ensigns, a silver foul anchor in the center. For naval cadets who have completed the four years' course at the Naval Academy, a gold foul anchor in the center of the pad of the shoulder-knot.

Staff officers wear on the frog of the epaulette and on the shoulder-strap the same rank devices as are prescribed for line officers with whom they have relative rank, substituting the proper corps device for the foul anchor. The devices for frogs of epaulettes are the same in dimensions as those on the collar of the service coat.

Shoulder-marks.—For all officers except chaplains, chief boatswains, chief gunners, chief carpenters, chief sailmakers, warrant officers, mates, and clerks, the shoulder-marks are of blue cloth, worked over one thickness of haircloth or other similar stiffening material, $5\frac{1}{4}$ inches long on the side, $2\frac{1}{4}$ inches wide, with a symmetrical triangular peak at the top, extending an inch beyond the parallel sides; at the center of this peak is a small navy button. For the admiral and rear-admirals the top is covered with 2-inch gold lace, showing a margin of one-eighth of an inch of cloth, and has worked over the gold lace the same device as on the shoulder-straps. For captains, commanders, lieutenant-commanders, lieutenants, lieutenants junior grade, ensigns, and naval cadets, strips of gold lace running across the shoulder-mark the same as on the cuff of the special full-dress coat are worn, including the star for line officers of the above grades, and the colored cloth for staff officers of corresponding rank.

Embroidered Collar Devices (for frock-coats of chief boatswains, chief gunners, chief carpenters, chief sailmakers, and warrant officers).—Chief boatswains, two foul anchors, crossed, embroidered in silver; boatswains, two foul anchors, crossed, embroidered in gold; chief gunners, a flaming spherical shell, embroidered in silver; gunners, a flaming spherical shell, embroidered in gold; chief carpenters, a chevron point down, embroidered in silver; carpenters, a chevron point down, embroidered in gold; chief sailmakers, a diamond, embroidered in silver; machinists, four gold oak-leaves; sailmakers, a diamond embroidered in gold; pharmacists, a Geneva cross, embroidered in gold; mates, after twenty years' service as such, a binocular glass, with the axes at right angles to the edge of the collar, eyepieces up, embroidered in silver; under twenty years' service as such, a binocular glass, placed as above, embroidered in gold; pay clerks, the corps device of the pay corps, embroidered in gold.

Embroidered Collar Devices for Service Coats.—Collar devices for the service coat are embroidered in high relief on dark navy-blue cloth. They are an inch in height, with other dimensions proportionate, and are placed vertically or horizontally with reference to the upper edge of the collar. The rank device commences three-quarters of an inch from the front edge of the collar. The corps device is placed three-quarters of an inch in rear of the rear edge of the rank device. For flag officers the stars are placed $1\frac{1}{4}$ inches between centers, with one point up, the center line of the upper point being at right angles to the upper edge of the collar. Where two bars are worn the distance between them is the width of a bar. The bar is always placed at right angles to the upper edge of the collar. The anchor is placed with the shank parallel to the upper edge of the collar, and the crown to the front. Devices representing a leaf or a sprig of leaves are placed with the axes parallel to the upper edge of the collar, stem to the front, and acorn, if any, on the upper side.

Devices are as follows: For the admiral, four silver stars with a gold foul anchor under each of the outer stars; for the rear-admirals, two silver stars and a silver foul anchor; for captains, a silver spread eagle and a silver foul anchor; for commanders, a silver oak-leaf and a silver foul anchor; for lieutenant-commanders, a gold oak-leaf and a silver foul anchor; for lieutenants, two silver bars and a silver foul anchor; for lieutenants junior grade, one silver bar and a silver foul anchor; for ensigns, a silver foul anchor; for naval cadets who have completed the four years' course at the Naval Academy, a gold foul anchor.

Staff officers wear the same rank devices as are prescribed for line officers with whom they have rank, substituting the proper corps devices for the anchor. Chief boatswains, chief gunners, chief carpenters, chief sailmakers, warrant officers, mates, and pay clerks wear the same devices on the collar of their service coat as are prescribed for the frock coat.

Rating Badges.—All petty officers wear on the outer garment a rating badge, consisting of a spread eagle above a class chevron. Petty officers of the starboard watch wear the badge on the right arm, and those of the port watch on

the left arm, half-way between the shoulder and the elbow. The chevrons are made of stripes of scarlet cloth, three-eighths of an inch wide, separated one-quarter of an inch, and sewed flat without padding. The badge covers a field 3¼ inches broad. Chief petty officers wear three stripes with an arch of one stripe forming the arc of a circle between the ends of the upper stripe of chevron, the outside radius of the circle being 1⅞ inches; the specialty mark is in the center of the field under the arch, and entirely included in a circle an inch in diameter; the eagle rests on the center of the top of the arch. Petty officers, first class, wear three stripes in the chevron; second class, two stripes; and third class, one stripe; the specialty mark is in the center of the field in the angle of the upper stripe, and the eagle 1½ inches above the angle and just above the specialty mark. For permanent petty officers holding three consecutive good-conduct badges, the chevrons are made of gold lace instead of scarlet cloth. On blue clothing the eagle and specialty marks are worked in white, and on white clothing in blue.

The specialty marks are as follows: Gun-captain, a foul anchor placed perpendicularly; master-at-arms, a five-point star; boatswain, mate, coxswain, a pair of crossed anchors; quartermaster, a steering-wheel; gunner's mate, a pair of crossed guns; seaman gunner, a shell and flame; chief yeoman, a pair of crossed keys; hospital steward and hospital apprentice (first class), Geneva cross; yeoman (first, second, or third class), a pair of crossed pens (quill); printer and schoolmaster, an open book; bandsman, a lyre; electrician, a globe; machinist and boiler-maker, a three-bladed propeller; water-tender, coppersmith, oiler, carpenter, mate, plumber, and painter, a pair of crossed hatchets; blacksmith, a pair of crossed hammers; sailmaker's mate, a cringle.

Marks.—Every enlisted man who has qualified as a seaman gunner wears the specialty mark so placed that the top comes an inch below the point of the chevron, or, if not a petty officer, in place of the rating badge. Hospital apprentices wear a Geneva cross of red cloth, the cross-bars 2 inches long and two-thirds of an inch wide, in place of the rating badge. An apprentice mark 2 inches long, worked in white on blue clothes and in blue on white clothes, is worn by all enlisted persons who belong to or have passed through the ratings of apprentice in the navy. On the overshirt and jumper it is worn on the breast, 2 inches below the neck-opening. On all coats, except overcoats, it is worn on the outside of the same sleeve as the rating badge, half-way between the elbow and wrist.

The watch mark is worn by all enlisted men, except petty officers, officers' messmen, and bandsmen. It consists of a strip of braid three-eighths of an inch wide, white on blue shirts and blue on white shirts, placed on the shoulder-seam of the sleeve and extending entirely around the arm. For first and second class firemen and coal-passers, the braid is red on both blue and white shirts, and of the same width and disposition as above. The men of the starboard watch wear the mark on the right, those of the port watch on the left sleeve.

Continuous-service marks, of scarlet cloth, 8 inches long, the side edges being turned under until they meet on the under side, to show a width of three-eighths of an inch, are worn on the left sleeve diagonally across the outside of the forearm at an angle of 45 degrees, one for each complete re-enlistment for three years under continuous service, a quarter of an inch apart.

Marine Corps.—The insignia of rank of the Marine Corps of the U. S. navy are essentially the same as those worn in the army. CORNELIS DE W. WILLCOX.

Millard, HARRISON: singer and composer; b. in Boston, Mass., Nov. 27, 1829. When twenty years old he went to Italy and studied there for three years under famous masters. Made a successful appearance in opera in Europe and returned to Boston in 1858. The next year he went to New York, and in that year composed his famous song *Viva l'America*. In 1861 he enlisted in the Seventy-first Regiment, and later received a commission as first lieutenant in the Nineteenth U. S. regulars. He served in the army until 1864, when he resigned, having been severely wounded in battle. He was appointed to a position in the New York custom-house, which he retained for twenty-one years. He composed many songs which attained a very wide popularity, also much church music, and two operas, *Uncle Tom's Cabin* and *Deborah*. D. in New York, Sept. 10, 1895. His daughter Marie is a soprano singer of merit. D. E. H.

Miller, CHARLES HENRY: artist; b. in New York city, Mar. 20, 1842; was educated at Mount Washington Collegiate Institute; graduated in medicine at the New York Homœopathic Institute in 1864; studied art, and became an exhibitor at the National Academy in 1860; traveled in Europe, stopping for study in Munich; became a member of the National Academy in 1875; was president of the New York Art Club in 1879, and of the American committee at the Munich International Exposition in 1883. His pictures include *The Challenge Accepted*; *A Long Island Homestead*; *High Bridge from Harlem Lane*; *A Bouquet of Oaks*; *A Suburban Wayside*; *Cornfield at Queen Lawn*; and *Oaks at Creedmore*. Under the pseudonym of Carl de Muldor, he is the author of *The Philosophy of Art in America* (1885).

Miller, JOSEPH NELSON: naval officer; b. in Ohio, Nov. 22, 1836. He entered the Naval Academy in 1851, became passed midshipman in 1856, master in 1858, lieutenant in 1860, lieutenant-commander in 1862, commander in 1870, and captain in 1881. As commander of the ironclad Passaic he took part in the bombardment of Forts Sumter and McAllister in 1863. As executive officer of the Monadnock he participated in the attacks on Fort Fisher, and was specially reported for bravery in these fights. He was advanced to commodore in 1894, made rear-admiral in 1897, and retired in 1898.

Miller, LEWIS: b. in Greentown, O., in 1829; after learning the trade of the machinist, he established a manufactory in Canton, where he improved, after his own ideas, the mower and reaper; afterward established plants in Akron and Mansfield, manufacturing agricultural implements of all kinds. He did much philanthropic work, and was deeply interested in the perfection of the Sunday-school. In 1874 he evolved the idea of the Chautauqua Assembly, and his plans, after having been examined by Bishop Vincent, of the Methodist Church, and other clergymen, were placed in operation. He was made president of the organization, and remained in that office until his death, at which time he was also president of the board of trustees of Mount Union College, at Alliance, O. D. Feb. 17, 1899.

Mills, ALBERT LEOPOLD: soldier; b. in New York city, May 7, 1854; graduated at the Military Academy in 1879, and was commissioned second lieutenant in the First Cavalry; after service on the frontier, was promoted first lieutenant; took part in the campaign against the Sioux in 1891 and in other Indian wars, for four years being adjutant of his regiment; did duty at the cavalry and infantry school at Fort Leavenworth, in the department of tactics and strategy, and at the outbreak of the Spanish-American war was commissioned captain and assistant adjutant-general, afterward becoming chief of staff in General Young's brigade, taking part with the Rough Riders in the battle of La Guasima, and winning distinction for gallantry and ability; was severely wounded at the battle of San Juan. He was appointed superintendent of the U. S. Military Academy with the rank and pay of colonel.

Mind and Body: The question of the relation of mind to body has been discussed as long as any other question in philosophy. The history of the problem is the history of philosophy. We may confine ourselves, therefore, to a statement of the alternative theories which are held to-day, each claiming to represent more adequately than the others the data and conclusions of modern thought. At the same time we should be careful to distinguish the scientific or dualistic point of view from the more philosophical or monistic point of view; for it is finally to this distinction that the current discussions of the subject reduce themselves.

Taking up the scientific point of view, we find the following theories in the field: (1) *The so-called "epi-phenomenon" theory.* Those who hold this view are for the most part workers in positive science, who are convinced that the universe is subject with no exception to the law of the conservation and correlation of energy. They maintain that the brain, being a part of the material universe, must be subject to this law; that the energies which it may manifest are derived from the material processes of nutrition, anabolism, etc., and that therefore no process can take place in the brain which does not have its exact antecedents—its causes—in material changes. If this be the case, we are told, mind can have no influence in brain-processes—can in no way direct or release energy, and, in fact, can have no place whatever in the causal series which brain and nerve action exhibit. The mind is in no sense a cause. It is an

"epi-phenomenon"—an index, merely, of the material processes—a spark thrown off by the machinery; and in the mental processes and functions we are to recognize only a singular and what is usually called "subjective" way of discovering that the brain-processes are taking place in this center or that, in this form or that, etc.

This theory—or class of theories—was earlier called the "automaton," or "conscious automaton," theory. It took its name from the position and arguments of Descartes—who, however, did not apply them strictly to man—that the brain is a machine, an automatic-working thing which can not be interfered with by the mind.

It is evident, of course, that if one go on to ask for a philosophy built up on this theory he is driven to some form of materialism; for the recognition of the material causes as efficient, at the same time that the mind is denied all efficiency, makes it necessary to hold that there is only one form of ultimate reality—matter or motion, or both, in whatever form this hypothesis be made. There are many, however, who do not wish to draw this conclusion, although still holding to the universal application of the law of conservation of energies in the brain. Some also refuse to go into metaphysics, claiming that it is better to take an agnostic position, and so adopt the theory to be mentioned next.

(2) *The "double-aspect" theory.* According to this way of stating the question the problem itself vanishes. We are told that the initial distinction between body and mind, considered as being two distinct substances capable of acting and reacting upon each other, is mistaken. On the contrary, body and mind are always together; we never know them apart; they are equally entitled to recognition, and the only reasonable procedure is that which takes them as constituting a single group of changes which must be considered as a whole. Looked at from the point of view of the body; the emphasis falls on the brain-changes, and the law of conservation is a statement which is necessary to bring these changes into relation to the others going on in nature. But looked at from the point of view of the mind—that is, within consciousness—we have the processes called mental with certain laws of their own, matched and accompanied by those of the brain. These are two *aspects*, therefore, of a single reality. We can not take both points of view at once, and in consequence we reach the artificial abstraction of mind as a separate thing set over against body, which is considered as another and different thing.

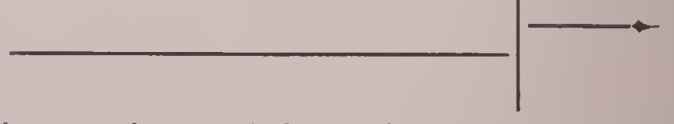
(3) *The "cause and effect" theory*—the theory according to which mind and body are two separate efficient causes which in some way work mutual effects, each in the phenomenal series represented by the other. This is the so-called "common-sense view" which holds that in willing to move the arm, for instance, the mind works changes in the brain and so brings about the modifications necessary to the actual performance of the movements designed.

(4) *The theory of "psycho-physical parallelism."* This theory declares that science is not capable of dealing with the question; that science should simply state the facts which are clearly established and hand the question of the ultimate relation of mind and body to the same department which deals with the constitution of mind and body—i. e. to philosophy. Yet, recognizing the facts established by science, it holds to certain things which may be stated in brief order, leaving their clearer exposition to the following section. *A.* The law of conservation of energy holds for all physiological processes, including those of the brain. *B.* The processes of mind are subject to great laws which require independent statement in the science of psychology, and which can not be stated adequately under the categories of physical cause and effect. *C.* These two forms of phenomena, with their laws, are associated in what is called a parallel way; that is, they are uniformly associated, and one is never found in experience dissociated from the other.

With this exposition of the principal hypotheses now current some lines may be devoted to stating the point of view of the present writer. It is often held that the "automaton theory"—the view which considers the brain-processes as the sufficient statement of the grounds of all voluntary movement—is the outcome of the denial of causal energy to consciousness; in other words, that there is no alternative to what is called the epi-phenomenon theory of consciousness except a theory holding that the law of conservation of physical energy is violated in voluntary movement.

Now this reduction of the possible views to two is unnecessary, and, indeed, impossible. In speaking of the antecedents of a voluntary movement we have to consider the entire group of phenomenal events which are always there when voluntary movement takes place; and among the phenomena really there the conscious state called volition is really there. To say that the same movement could take place without this state of consciousness is to say that a lesser group of phenomenal antecedents occurs in some cases and a larger group in other cases of the same event. Why not go to the other extreme, and say that the brain is not necessary to voluntary movement, since volition could bring about the movement without using the nervous processes to do it with? In his posthumous book on *Matter and Monism*, the late Mr. Romanes brings out this inadequacy of the automaton view, using the figure of an electro-magnet, which attracts iron-filings only when it is magnetized by the current of electricity. Whatever the electricity be, the magnet is a magnet only when it attracts iron-filings; to say that it might do as much without the electricity would be to deny that it is a magnet; and the proof is found in the fact simply that it does not attract iron-filings when the current is not there. So the brain is not a brain when consciousness is not there; it could not produce voluntary movement—simply because, as a matter of fact, it does not. So consciousness does not, on the other hand, produce movement without a brain. The whole difficulty seems to lie in an illegitimate use of the word "causation." Such a conception as physical causation can not be applied beyond the sphere of things in which it has become the explaining principle—i. e. in the objective, external world of things. The moment we ask questions concerning a group of phenomena which include more than these things, that moment we are liable to some new statement of the law of change in the group as a whole. Such a statement is the *third alternative* in this case; and it is the problem of the metaphysics of experience to find the category, or the most general principles of experience as a whole, both objective and subjective. The writer is far from thinking that the automaton or epi-phenomenon man can argue his case with much force in this higher court of appeal.

The other extreme is represented by those writers who think that the revision of the law of causation can be made in the sphere of objective phenomenal action represented by the brain; and so claim that there is a violation of the principle of conservation of energy in a voluntary movement, an actual efficiency of some kind in consciousness itself for producing physical effects. This is as illegitimate as the other view. It seems to deny the results of all objective empirical science and so to sweep away the statements of law on one side, on which the higher interpretation of the group of phenomena as a whole must be based. And it does it in favor of an equally empirical statement of law on the other side. It is not easy to see how any result for the more complex system of events can be reached if we deny the only principles which we have in the partial groups. To do so is to attempt to interpret the objective in terms of the subjective factor in the entire group; and we reach by so doing a result which is just as partial as that which the epi-phenomenon man reaches by his mechanical explanation. Lotze made the same mistake long ago, but his hesitations on the subject showed that he appreciated the difficulty. The claim of these writers that the mechanical view of causation can not be used as an adequate explaining principle of the whole personality of man seems good; but for reasons of much the same kind it seems equally true that as long as we are talking of events of the external kind, i. e. of brain processes, we can not deny what we know of these events as such.



The general state of the problem may be shown by the accompanying diagram, which will at any rate serve the modest purpose of indicating the alternatives. The line above, of the two parallels, may represent the statements on the psychological side which, on the theory of parallelism, mental science has a right to make; the lower of the parallels, the corresponding series of statements made by physics and natural science, includes the chemistry and physiology of the brain. Where they stop an upright line may be drawn to indicate the setting of the problem of interpretation in which both the other series of statements claim to be true;

and the further line to the right then gives the phenomena and statements of them which we have to deal with when we come to consider man as a whole. Now the point is that we can neither deny either of the parallel lines in dealing with the phenomena of the single line to the right, nor can we take either of them as a sufficient statement of the further problem which the line to the right proposes. To take the line representing the mechanical principles of nature and extend it alone beyond the upright is to throw out of nature the whole series of phenomena which belong in the upper parallel line and are not capable of statement in mechanical terms. And to extend the upper line alone beyond the upright is to allow that mechanical principles break down in their own sphere.

As to the interpretation of the single line to the right, it may always remain the problem that it now is. The best we can do is to get points of view regarding it; and the main progress of philosophy seems to be in getting an adequate sense of the conditions of the problem itself. From the more humble side of psychology, the growth of consciousness itself may teach us how the problem comes to be set in the form of seemingly irreconcilable antinomies. The person grows both in body and mind, and this growth has to have two sides, the side facing toward the direction from which, the "retrospective reference," and the side facing the direction toward which, the "prospective reference" of growth and the consciousness of growth. The positive sciences have by their very nature to face backward, to look retrospectively, to be "descriptive," as the term is used by Prof. Royce—these give the lower of our parallel lines. The moral sciences, so called, on the other hand, deal with judgments, appreciations, organizations, expectations, and so represent the other, the "prospective" mental attitude and its corresponding aspects of reality. This gives character largely to the upper one of our parallel lines. But to get a construction of the further line, the one to the right, is to ask for both these view-points at once—to stand at both ends of the line—at a point where description takes the place of prophecy and where reality has nothing further to add to thought. The writer believes that the best evidence looking to the attainment of this double point of view is found just in the fact that we are able to compass both of these functions in a measure at once; and that in our own *self-consciousness* we have an inkling of what that ultimate point of view is like. It is the very essence of such a contention in philosophy that it is a comprehension of both aspects of phenomenal reality, and not the violation or denial of either of them. J. Mark Baldwin.

Minor, Robert Crannell: artist; b. in New York city, Apr. 30, 1840; studied art in Belgium, France, and Italy; was president of the Société artistique et littéraire of Antwerp in 1874; returned to the U. S. and opened a studio in New York city, where he has since resided. His paintings include *Evening Dawn*; *The Studio of Corot*; *Under the Oaks*; *The World of Kent*; *The Cradle of the Hudson*; *The Close of Day*; and *A Mountain Path*.

Minor, Virginia Louisa: reformer; b. in Goochland co., Va., Mar. 27, 1824; received academic education in Charlottesville, Va.; removed to St. Louis, Mo., in 1846; originated the woman-suffrage movement in Missouri in 1866; organized the Woman Suffrage Association in 1867; was the first woman in the U. S. to claim suffrage as a right, taking the question before the courts, finally to the U. S. Supreme Court.

Minto, Gilbert John, Earl of: b. in London, England, in 1845; graduated at Trinity College, Cambridge, and entered the Scotch Guards in 1867. He was assistant military secretary with the Turkish army on the Danube in 1877, served in the Afghan campaign in 1879, and was appointed captain of mounted infantry in the Egyptian campaign in 1882. He was military secretary to Lord Lansdowne in Canada from 1883 to 1886, and was appointed Governor-General of Canada in 1898.

Mizon, mēē′zōṅ′, Lieut. L.: African explorer and officer in the French army; b. in 1853. He explored a wholly unknown region of the Northwest Congo basin in 1890–92, and the treaties he made with numerous native chiefs were eventually a part of the bases for the extension of the French Congo to the N. E. as far as Lake Chad. He followed to its mouth the Sanga river, which he showed to be about 1,000 miles long and the fourth largest tributary of the Congo. France, later, planted a line of stations along the Sanga. The work of Mizon, with that of other explorers farther E., proved that the water-parting between the Congo and the Niger basins was farther N. than it was supposed to be situated. He died on Mayotte island, near Madagascar, Mar. 22, 1899, as he was on his way to take the governorship of the Obock and Somali coast protectorate. C. C. A.

Modesty and Bashfulness: Under the general heading of *modesty reactions* several phases of development have been distinguished in the individual. Bashfulness in childhood grows into coyness and social timidity, the former indicating the oncoming of sexual maturity. Modesty proper is a matter of later origin, involving the sense of self and more or less reflection on personal relationships. The form of modesty known as *shame* indicates both physical situations, as seen in matters of physical indelicacy, and moral situations, seen in so-called moral shame. The manifestations of this class of phenomena in the child may be set out in some detail (following the writer's works on *Mental Development in the Child and the Race* and *Social and Ethical Interpretations*).

The general character of a child's bashfulness need not be enlarged upon. Its form of expression is also familiar. It begins to appear generally in the first year, showing itself as an inhibiting influence upon the child's normal activities. Its most evident signs are nervous fingerings of dress, objects, hands, etc., turning away of head and body, bowing of head and hiding of face, awkward movements of trunk and legs, and in extreme cases reddening of the face, puckering of lips and eye-muscles, and finally weeping and crying. An important difference, however, is observable in these exhibitions according as the child is accompanied by a familiar person or not. When the mother or nurse is present, the signs all seem to be useful in securing concealment from the eye of strangers—behind dress or apron or figure of the familiar person. In the absence, however, of such a refuge the child sinks often into a state of general passivity or inhibition of movement, akin to the sort of paralysis usually associated with great fear. This analogy seems to give a real indication of the race origin of bashfulness, which is probably a differentiation of fear—i. e. of persons, in view of personal qualities possessed by the one who fears; the concealing tendency also showing the parallel development of intimate personal relationships of protection, support, etc.

Observations of bashfulness serve to throw the illustrations of it into certain periods or epochs. The child is earliest seized with what may be called "primary" or "organic" bashfulness akin to the organic stages in the well-recognized instinctive emotions, such as fear, anger, sympathy, etc. This exhibition occurs in the first year and marks the attitudes of the infant toward strangers. It is not so much inhibitory of action in this first stage; it rather takes on the positive signs of fear: protestation, shrinking, crying, and so forth. It falls easily under the type of reaction known as "sensori-motor suggestion," being very largely provided for in the nervous equipment of the child at this age.

The duration of this stage depends largely upon the child's social environment. The passage from the attitude of instinctive antipathy toward outsiders, and that of affection equally instinctive toward the members of the household, over into a more reasonable sense of the difference between proved friends and unproved strangers—this passage depends directly upon the growth of the sense of general social relationships established by experience, which are largely got through imitation, and its clarifying influence upon the sense of self in the child. One of the most important elements in the child's progress in this way from its "organic" social life is the degree and variety of its intercourse with other children, and indeed also with other adults than those of its own home. Children carried to summer hotels every year, or brought into the drawing-room to see the mother's callers, soon lose all "fear of strangers" and become quite frankly approachable, even showing great liking for society at the tender age of a year and a half or so. On the other hand, children kept in extreme isolation from strangers, young or old, may show extraordinary paralysis of all motor functions, of a markedly organic kind, steadily for two or three years later on in their development.

The rapidity with which a child gets over its organic bashfulness varies also remarkably with the attitudes of older children whom he sees. Nothing else cures a child of this physical shyness so quickly as the example of an older

child. This is one of the marked offices of imitation also, to shorten the stages of social growth.

There is next a period of strong social tendency in the child, of toleration of strangers and liking for persons, in great contrast to the attitudes of organic distrust just mentioned. There seems to be a reaction against the instinct of social self-preservation characteristic of the earlier stage. It is due in all likelihood to the actual experience of the child in receiving kind treatment from strangers—kinder in the way of indiscriminate indulgence than the more orderly treatment which it gets from its own parents. Everybody comes, through experience, to be trusted on first acquaintance, just as in the earlier years everybody is considered, by mistrust, an agent of possible harm.

That this new phase of social attitude is learned from experience is seen in the absence of this confidence, on the part of the child, toward animals. The fear, purely, of the organic stage persists in the child's thoughts of animals which are new to him, and only becomes more confirmed as he fails to get the same reasons for "modifying his opinion" that teach him to tolerate persons more and more comfortably.

Finally, we may note the return of bashfulness in the child's second and third years. This time it is bashfulness in the proper sense of the term—rid largely of fear, and rid also of its compelling organic force and methods of expression. The bashful three-year-old smiles in the midst of his hesitation, draws near to the object of his curiosity, is evidently overwhelmed with the sense of his own presence rather than that of his new acquaintance, and indulges in actions calculated to keep notice drawn to himself. All this makes so marked a contrast to the exhibition of the organic period that it constitutes a most important resource for the study of the evolution of the social sense.

In this last case we have before us, in short, a phenomenon of rather complex self-consciousness—a thing of *ideal* value—and its suggestion-complexes, as they body themselves forth in the child's reactions, reveal his extraordinary progress in the understanding of himself and the world. He now begins to show the germ of *modesty* and of all the emotions akin to and contrary to it.

The several aspects of the child's personal environment appeal to him in a progressive way. It seems fair to think that persons are at first to him only a peculiar part of his projected, presented, objective world of things. He has "personal projects" before he has any sense of himself as a spiritual being or as the subject of his own mental processes. The getting of objects seems to be part of the business for which his nervous equipment more or less adequately provides, and among these objects the persons who move around him are characterized by very important marks.

The observation of "organic" bashfulness tends, when viewed in connection with this earlier point, to confirm this view of the way the child begins to apprehend persons; and at the same time enables us to see a little further. For, strange as it may appear, we are here confronted with an element of organic equipment especially fitted to receive and respond to these peculiar objects—persons, "personal projects." The child strikes instinctively an extraordinary series of attitudes when persons appear among his objects: attitudes which other objects, *qua* objects, do not excite. These attitudes extend somewhat to animals, and that makes it all the more striking. For animals are persons to a child of that age: they act upon him through his animal parts, through physical pains, pleasures, fears, etc., and that is all that persons can do to an infant a year old. We have to say, therefore, that the child is born to be a member of society in the same sense that he is born with eyes and ears to see and hear the movements and sounds of the world, and with touch to feel the things in space; and all views of the man as a total creature, a creation, must recognize him not as a single soul shut up in a single body, but as a soul partly in his own body, partly in the bodies of others—a service for which he pays in kind, since we see in his body preparation for the reception of the soul-life, the suggestions of mind and spirit, of those others.

Again, the second phase of the child's actions in the presence of persons—the freer, more ready reception of strangers and intercourse with them seen usually during the second year—also has its meaning. The child begins to find out more about persons, and so to gain associations which give him the beginning of certain expectations regarding them; self-formed expectations, that is, no longer dependent merely upon the stirrings of instinct and inherited impulse. He learns that pleasure comes almost always from persons, as does the alleviation of pain. This is a mortal blow at organic bashfulness, as every father and mother knows. A lump of sugar will very soon release the inhibitions of the shy year-old. Then he learns something of the characteristics of persons, the irregularity of personal action, the presence of the "personal equation" of mood and feeling in those nearest to him. This leads him to seek out somewhat individual methods of pleasing these near persons and of securing their smile and approbation, or of escaping the reproofs which his shyness brings; and these he substitutes for the blinder attempt to hide himself, which nature taught him.

And he also learns our habits, the regularities of character in adults, and so finds that nobody will hurt him, after all. It is amusing how soon a two or three year old child "sizes up" a stranger, and meets him half-way with conduct more or less appropriately attuned to the indications of character shown in the face and acts of the newcomer.

So, with all this, the instinctive or "organic" bashfulness gets rapidly rubbed away. But it is now clear that the means of this freedom from it are all social. A child's growth away from the instinct of social fear to the apprehension of social truth, and all his actions midway in this progress, come only from varied and persistent experience of people and appeals to living examples. How can character be apprehended if characters are absent? And how can character-schemes be grown into if the regularity of the child's life is of so narrow a scope that all the threads of his social relationship run the same way, and no tangles and confusions arise to bring out his own strenuous action and his rebellions against his native reflex ways of behavior?

The oncoming of true modesty, finally—the bashfulness which shows the simpler form of reflection upon self and the actions of self—represents the child's direct application of what he knows of persons to his own inner life. It is what has been called the "subjective" stage in his sense of personality.

But, as we soon find, this grows only apace with the contrary movement by which he assigns his own enriched mental experience back to his teacher, and seeks his further judgment upon it. The child when he knows himself able to draw a figure, for example, does not know this alone or completely. He has also the sense of the social "copy" or example from which the lesson was learned, and further and with it, he knows that his performance is again subject to revision in light of the approval or disapproval of teacher or friend. The performances of the self can not in any case be freed from the sense of possible inspection by others, and the child shrinks from this inspection. This is a constant feature of his progress. Suffice it to say that in this higher *rapport*, which involves the sense of self-agency in relation to the agency of other people like self—here in the real reflective relation of self to others—comes the third and crowning stage of the class of phenomena known by the word bashfulness. My children do their imperfect tasks for me because they know me to understand and be indulgent: the elder, H., even assumes the patron, and says of the younger, E., "She is so little, you know." But in the presence of the stranger whose opinion is not known beforehand, they are bashful with the sense of new standards perhaps firmly insisted upon. This is the inhibiting suggestion of bashfulness, of modesty, and clearly also of certain ethical emotion.

The whole situation becomes an extraordinary point of vantage for the development view of the origin of the social and personal sense. We have in it direct evidence of the growth of the social instinct by accretions from experiences of social conditions—or from the adding up of variations all fitted to survive socially—and direct evidence, further, of the lines of progress which these experiences and variations have marked out. For the infant is an embryo person, a social unit in the process of forming; and he is, in these early stages, plainly recapitulating the items in the social history of the race.

This social evolution presents a phase of general development in which the theory that the individual goes through stages which repeat the race-stages of his species ought to find illustrations of more than common value. For the social life is a late attainment, whether considered anthropologically or racially, and the child waits to begin the series of "laps in the social race" until he meets us, his observers, face to face. The embryology of society is open to study in the nursery.

Several important hints at the history of societies, both animal and human, are afforded by the phenomena of bash-

fulness as now described. Organic bashfulness would seem to represent the instinctive fear shown by the higher animals, coupled with the natural family and gregarious instincts which they have. This shades up into the more fearless and more confiding attitudes of certain passably peaceable creatures, which take kindly to domestication, and depend more upon animal organizations and natural defenses, such as those afforded by geographical distribution, coloration, habits of life, etc., for their protection. For the social protections are, after all, more effective for the defense of racial life and propagation than the special instinctive armament of individuals. Then, only in man, of course, do we find the stage of reflective thought on self and the social relations of self, which is seen germinating in the child in the third year or later.

The parallel seems also to be worth something to the anthropologist when he comes to inquire into the history of the human species. Admitting with Westermarck that man as a species is monogamous and tends to family life, we should find in his earliest history the period of organic bashfulness; and its instinctive presence in the very young child lends further support, perhaps, to Westermarck's view. The later tribal and nomadic conditions possibly tended to release the cords of an instinct so purely defensive, and to bring in the freer range of peaceful pursuits represented by the second stage of the child's history; while again the stage of development of the distinctly industrial, artistic, and commercial life of man, with its social ways of solving all problems of public welfare, corresponds to the more reflective attainments of the three-year-old. For there can be no doubt that recent writers are correct in finding that the most refined egoism is a reflex from the most generalized socialism; a thesis which social psychology takes now from the analyses of Bourget and the insights of Tarde and the historians of society, but one which it seems itself quite able to make good by its own methods of inquiry.

J. Mark Baldwin.

Mohammedan Schools: The learning of the Arabs before Mohammed was limited to a single subject, poetry, in which they had attained high rank. Their astronomy was nothing but astrology; their knowledge of medicine could not be called scientific; their history was simply genealogy and a few historical dates handed down by oral tradition. The new religion opened an entirely new field and gave the first incentive to scholarly effort. The knowledge of the Koran and of the traditions handed down from the personal followers of the Prophet became for all later time the foundation of learned investigation among the Arabs. The first efforts of scholarship were directed at fixing and securing the correct text and the proper reading of the Koran. The system of schools and of teaching among the Mohammedan people has an important place in their history. The whole system falls into two parts—elementary and higher education. Order, as represented by courses of study and curriculum, is completely lacking in both parts. The schools grew up quite voluntarily; the motive was purely a religious one. Elementary schools were provided for in the earliest times of Islam, not only in Arabia, but also in the provinces. The benefits of instruction were not limited to the rich, and even girls attended some of the schools. The discipline was marked by severity. There was some consciousness of pedagogical principles, since there was strife between scholars over the question whether anything can be educated into a man which is not in him by nature, or whether education is merely a development of the gifts bestowed at birth—one of the controversial questions of all educational history. The famous Sadi puts this phrase into the mouth of the king, at the very beginning of his *Rose Garden*. "One who is not a man does not become a man through education." Elementary instruction was imparted in the schools that were connected with the mosques. This instruction embraced reading, the elements of grammar, memorizing poems, and religion, taught by means of committing the Koran to memory. As pictorial art was discountenanced by Islam, the artistic impulse was gratified by many forms of calligraphy, so that writing became a form of art instruction. While the growing interest in grammatical study checked the despotism of religious influence in the elementary schools, this despotism had free play in the field of higher education, which at first concerned itself solely with the study of the Koran, which kept souls healthy, and of medicine, which kept bodies healthy. Philology gradually found its way into the higher schools, while the speculative and mathematical disciplines followed in its train, but religion jealously guarded its supremacy. Yet religion contributed much to the development of higher instruction. In the first place, it opened the mosques for teaching, thus supplying ready-made an outfit of university buildings. A natural consequence of using the mosques for places of instruction was that the instruction should be free to all comers, and this it virtually was. For the Mohammedan the mosque does not possess that high quality of sanctity that the church has for the Christian. He honors it, indeed, but is not anxious as to its use, provided some pious purpose can be joined with that use. So it came to pass that under the same roof the pious said his prayers and the philologian expounded some poet or other.

There was almost no barrier whatever between the great public and the teacher. If the lecture took place, as was often the case, in the mosque itself, the listeners simply formed a narrow circle about the teacher, and every respectable person could join the circle, provided only that the teacher was willing, as he always was, except occasionally when polemic discussion waxed too hot. An important element in the higher education of Islam was the custom of making pilgrimages. These pilgrimages were stimulated both by religious and philological zeal. From a religious motive many men went to Mecca from the most distant lands, and, passing through cities that had famous schools, naturally tarried to hear the great teachers. Men who were enthusiastic for Islam and also scientifically inclined undertook wonderful journeys to all parts of the world where there could be any possible fund of tradition in regard to the sayings and doings of Mohammed. But the language of Middle Arabia, in which the Koran was written, became the classical tongue of Islam, so that believers of other countries undertook pilgrimages to master the peculiarities of the Bedouin tongue. The desire of many to go among the children of the Arabian desert was so strong that the attacks of the Bedouins, who killed the travelers or took them prisoners, seemed to be a stroke of good fortune. This movement certainly contributed much to the wandering impulses of Mohammedan students and teachers, which is one of the most notable facts in the educational system of Islam. No literary newspaper was needed to spread new views, for the travelers carried with them both evil and good reports into far-distant lands.

The meeting of strange scholars, often from distant countries, produced a lust for disputation which sometimes led even to the shedding of blood, and is exactly parallel with the same development in the earliest universities of the Middle Ages. Great stress was laid upon the memory, not because of the lack of books, but on account of the free and open nature of the instruction. The fame of the scholar consisted in what he knew by heart; one *savant* boasted that he had seventy thousand extracts as though in a sack. There was practically complete freedom of teaching. Every Mussalman of respectable reputation could set up as a teacher without special difficulty. A certain limitation to this freedom was found in the fact that no one could use the book of an author in public instruction unless he had the author's written permission; after the author's death this permission must be had from the heirs. Such a testimonial from an author naturally became a testimony of capacity, and therefore a sort of license to teach. After the establishment of the formal high school, or *madrasas*, the teacher still enjoyed great freedom in the choice of the subject and in method. There were no definite terms; the teacher could prolong the course as long as the book held out. There was much dictation, and the lectures were often tedious. The professors were in the habit of testing the knowledge of the students by questions. The same teacher might, and frequently did, lecture on a great variety of subjects. So far as salary was concerned, teachers were generally left to provide for their own support as best they could or would. They had recourse not only to state employment of various kinds, but also and particularly to poetry. The ruler whose praise was sung might even pay his poet's debts. The scholar with a princely patron whom he served as permanent poet laureate was very lucky. Those masters who took boarders were most certain of a permanent income. From the fifteenth century the activity of the Mohammedan schools gradually declined and the numerous attendance fell off. The modern school system varies with the different countries in which the Mohammedan religion prevails. Statistics are difficult to obtain and not reliable. In 1887 there were in Turkey

nearly 7,000 schools and more than 7,000 teachers. There is no compulsory system, and the teachers depend upon fees for support. The well-to-do in the chief villages engage private tutors for their own children and those of their dependents. The chief subject of education is still the reading of the Koran. Of higher schools, there are some 15 Government colleges, with about 2,500 pupils, and 21 national schools in the chief towns, with about the same number of pupils. A considerable number of pupils are educated in foreign countries at the expense of the Government. See articles on TURKEY, ARABIA, and other Mohammedan countries. C. H. THURBER.

Monium: an elementary substance obtained by Sir William Crookes, of London, England, in the separation of the constituents of the rare earth yttria by skillful methods of fractionation. Using an especially designed form of spectroscope to test the relative amounts of the substances present in the fraction, Sir William Crookes isolated this substance, which gave a characteristic series of lines at the extreme end of the ultra-violet spectrum. Unlike the gases discovered by Prof. William Ramsay, it readily forms compounds with other elements, and the discoverer says that the atomic weight will be very close to 118. He named it *monium* from the Greek word for "alone."

MARCUS BENJAMIN.

Monmouth, Battle of: Sir Henry Clinton, the later British commander at Philadelphia in the Revolutionary war, evacuated that city in the night of June 17–18. He marched across New Jersey intending to gain New York, and was pursued by Washington, who moved on a parallel line. Serving under Washington were Wayne, Stirling, Greene, Hamilton, and Charles Lee. To the latter, an overrated officer, known afterward to have been a traitor, the attack was intrusted. It was a time of great heat and heavy rains. On the morning of June 28 the British left Freehold or Monmouth, and they were soon threatened by the Americans. Though favorably situated, the latter by Lee's order began an inexplicable retreat. Clinton and Cornwallis pursued the fugitives, who were soon met and rallied by Washington himself. The commanding general severely upbraided Lee, reformed the lines, and repelled the British. The Americans expected to renew the battle in the morning. Many on both sides died from sunstroke. In casualties the British loss was over 400; the American loss is variously stated (229 or 362). The British retreated during the night, and secured an unhindered line of march to New York. Gen. Lee was suspended for twelve months on the grounds of disobedience, disrespect, and misbehavior. Later he wrote an impertinent letter to Congress and was dismissed from the service. EDMUND K. ALDEN.

Monmouth, JAMES SCOTT, Duke of: illegitimate son of Charles II. of England and Lucy Walters; b. in Rotterdam, Apr. 9, 1649. He was brought to England after his father's restoration to the throne, was created Duke of Monmouth, and in 1663 was married to the Countess of Buccleugh. He assumed the name of Scott as the family designation of the Buccleugh family, and was made Duke of Buccleugh. He received notice and honors at court and saw service in the army. Gradually he acquired prestige as a Protestant leader, and was closely associated with Shaftesbury. In 1679 Monmouth was intrusted with the command in Scotland against the insurgents, whom he routed at Bothwell Bridge. It was now the exciting era of the exclusion question. Monmouth was for a while disgraced, deprived of command, and was obliged to leave the country. He soon returned, and became a center for exclusion endeavors. An attempt was made to prove that he was the legitimate heir to the throne, and his cause was improved by his "progress" in the west of England, and by his personal popularity. He was partially compromised in the plots against the Duke of York, was pardoned, and again retired to the Continent.

On the accession of James II. in 1685, concerted risings were planned in Monmouth's favor. The "Protestant Duke" himself sailed from Holland with a few vessels and followers, and landed at Lyme Regis June 11. He issued a declaration claiming the crown, which the Government answered by a bill of attainder. Some thousands of militia and countrymen from the south and west joined his side; at Taunton he assumed the royal style, and he entered Bridgewater. James's forces were collecting under Churchill and Feversham. A night surprise on the royalists failed, and the insurgents were totally defeated at Sedgemoor July 6. Monmouth fled from the field and was taken two days later in the New Forest. He displayed an abject want of moral courage, and in spite of entreaties he was condemned and executed in London July 15. The suppression of the rebellion was further signalized by bloody reprisals under Justice Jeffreys. The episode of the rebellion enters into the novels *Lorna Doone* and *Micah Clarke*.

EDMUND K. ALDEN.

Monroe, WILL S.: educator; b. in Union township, Luzerne co., Pa., Mar. 22, 1863; educated in the public schools of Luzerne County; A. B., Leland Stanford Junior University, 1894; studied in the Universities of Jena, Paris, and Leipzig; teacher and principal in public schools, Luzerne co., Pa., 1887–89; superintendent of schools, Nanticoke, Pa., 1889–92; superintendent of schools, Pasadena, Cal.; Professor of Psychology and Pedagogy, State Normal School, Westfield, Mass., since 1896. He is author of *Educational Labors of Henry Barnard* (1893); *Comenius's School of Infancy* (translated and edited, 1896); *Bibliography of Education* (1897); *Entwickelung der sozialen Vorstellungen des Kindes* (Berlin, 1899); and of numerous contributions to American and foreign educational journals.

C. H. THURBER.

Monte Nuovo: an extinct volcano in the Phlegræan Fields, on the northwest shore of the Gulf of Naples, directly W. of Naples. Its history is unusual in that its active life lasted only a few days, and its beginnings and growth, and in fact the whole story of its building, were duly recorded by eye-witnesses. The site of the volcano prior to 1538 formed a part of Lucrine Lake, which itself occupied the crater of an ancient volcano. One side of it had been worn away, admitting the sea, and the galleys of the Roman fleet formerly used the crater as a harbor. On Sept. 29, 1538, the bottom of the crater harbor and of the surrounding sea was slightly elevated, exposing a strip of sea-floor 600 feet wide. This strip was suddenly rent with cracks from which steam escaped, and then, says one of the records, "smoke, fire, stones, and mud composed of ashes poured forth with a noise like the loudest thunder. The stones were shot up into the air about as high as a crossbow can carry, and they fell sometimes on the edge and sometimes into the mouth of the vent." The eruption ceased on the third day, was renewed on the fourth and the seventh, and the ejection of "smoke" or steam was observed for several weeks, since which time no signs of activity have appeared. On the seventh day several persons were killed by falling stones or mephitic vapors. Monte Nuovo is 440 feet above the sea, formed of scoria and volcanic mud without lava, with rather steep slopes covered with coarse herbage. Its outlines have been very little changed in the three and a half centuries of its existence. C. C. ADAMS.

Moore, CLARA (*Jessup*): author; b. in Philadelphia, Pa., Feb. 16, 1824; was educated in New Haven, Conn.; during the civil war, established the woman's Pennsylvania branch of the U. S. sanitary commission, the special relief committee for hospital work, and was instrumental in founding the Union temporary home for children in Philadelphia; removed to London, England, about 1879, after the death of her husband, and legally changed her surname to Bloomfield-Moore. Her publications include *The Diamond Cross* (1857); *Mabel's Mission*, poems and stories (1875); *On Dangerous Ground*, translated into French and Swedish (1876); *Sensible Etiquette* (1878); *Slander and Gossip* (1882); and *The Warden's Tale and other Poems, New and Old* (1883). Under the pen-name of *Mrs. Clara Moreton*, some of her early stories won prizes.

Moore, HARRY HUMPHREY: artist; b. in New York city, July 2, 1844; after studying art at home and in California, went to Dresden in 1865, subsequently working under Gérôme in Paris; visited Spain, where he became the pupil of Fortuny; spent several years in the study of Moorish life in Morocco; worked in Rome under Fortuny 1873–75; returned to the U. S.; lived in Japan 1880–81, and then settled in Paris; was made chevalier of the Order of Charles III. by the Queen Regent of Spain. His paintings, which chiefly represent Spanish, Moorish, and Japanese scenes, include *Almeh*, a Moorish dancer; *The Blind Guitar-player*; *A Moorish Bazaar*; *A Bulgarian*; *A Moorish Merchant*; *A Morning Call in Japan*; *The Daimio*; and *A Garden-Party at the Alhambra*.

Moore, JOHN BASSETT: lawyer; b. in Smyrna, Del., Dec. 3, 1860; received private education, and graduated at the University of Virginia in 1880, after which he studied law;

was admitted to the bar in 1883; served in the U. S. Department of State as clerk 1885–86; was third Assistant Secretary of State 1886–91; secretary on the part of the U. S. in the Samoan conference in 1887, and in the fisheries conference 1887–88; was first Assistant Secretary of State in 1898; acted as secretary and counsel to the U. S. peace commission at Paris in 1898; Professor of International Law and Diplomacy in Columbia University since 1891. He is the author of *Report on Extraterritorial Crime* (1887); *Report on Extradition* (1890); *A Treatise on Extradition and Interstate Rendition* (1891); *Asylum in Legations and Consulates and in Vessels* (1892); *Kossuth: a Sketch of a Revolutionist* (1895); *History and Digest of International Arbitrations* (1898); and is one of the editors of the *Journal du Droit International Privé.*

Moore, Willis Luther, LL. D.: meteorologist; b. near Binghamton, N. Y., Jan. 18, 1856; educated at public schools and at the Government military school at Fort Myer, near Washington, D. C., and subsequently studied scientific branches for five years under private tutors. In 1876 he entered the U. S. Signal Corps, and ten years later was promoted to the grade of observer-sergeant for his invention of new mechanical appliances. During the five years that followed he was engaged as a meteorological clerk in preparing daily synoptic charts for use of the official forecasters, and in that way became thoroughly familiar with the study of weather forecasting. On the organization of the weather service on a civil basis in 1891, he became local forecast official in charge of the meteorological office in Milwaukee, Wis., and in 1894 became professor in the U. S. Weather Bureau. He was assigned to duty in Chicago in 1894 as forecast official for the upper lakes and fifteen of the Western States, and in July, 1895, was appointed chief of the U. S. Weather Bureau. He received the degree of LL. D. from the University of Nebraska in 1897. He is a fellow of the American Association for the Advancement of Science, as well as a member of various other scientific associations. He has delivered many public addresses and lectures and has contributed articles to various reviews and magazines.

Marcus Benjamin.

Morgan, Sir George Osborne; lawyer and member of Parliament; b. in Conway, Carnarvonshire, Wales, May 8, 1826; educated at Baliol College, Oxford; called to the bar in 1853; made queen's counsel and bencher of Lincoln's Inn in 1869, and treasurer of that Inn in 1890; represented the County of Denbigh in Parliament 1868–85; returned from East Denbighshire in 1886 and 1892. He was appointed judge advocate-general and privy councilor in 1880, and Under-Secretary of State for the Colonies in 1886, and was made a baronet in 1892. He carried through Parliament the act abolishing corporal punishment in the army, besides many other beneficial measures, especially that securing married women's property ownership. He acted as chairman of various committees of Parliament, including that on land titles and transfer in 1887–88, and that on law and trade bills in 1888–93. He wrote political pamphlets on *Land Reform in England*, *Disestablishment in Wales*, etc., and a standard work on chancery practice. D. in London, Aug. 25, 1897.

Morgan, James Appleton: author; b. in Portland, Me., Oct. 2, 1850; graduated at Racine College, Wisconsin, and at the law school of Columbia College, New York, in 1869; began the practice of law in New York in 1871, but devoted most of his time to literature. In 1877 he formulated a theory as to the authorship of Shakespeare's plays, which was published in *Appleton's Journal.* His suggestion was that the plays as printed in 1623 presented a growth founded on plays originally produced by Shakespeare, with additions and alterations by actors and stage censors. In 1885 he founded the Shakespeare Society of New York. His Shakespearean work includes an edition of the plays and poems; *The Shakespearean Myth, or William Shakespeare and Circumstantial Evidence* (Cincinnati, 1881); *Some Shakespearean Commentators* (1882); *Venus and Adonis, a Study in the Warwickshire Dialect* (New York, 1885); *Shakespeare in Fact and in Criticism* (1887); and *Digesta Shakespeareana*, a topical classification of publications about Shakespeare's writings (1887). He has published also *Macaronic Poetry* (1872); *Note to De Colyar on Guaranty and Suretyship* (1874); *The Law of Literature* (2 vols., 1875); *Notes to Best's Principles of Evidence* (2 vols., 1876); and *Notes to Addison on the Law of Contract* (3 vols., 1876).

Morgan, John Pierpont: banker and financier; b. in Hartford, Conn., Apr. 17, 1837; son of Junius Spencer Morgan, a banker and partner of George Peabody, the philanthropist; educated at Boston high school and University of Göttingen; returned to the U. S. and entered the banking business in 1857; in 1864 founded the copartnership of Dabney, Morgan & Co.; in 1871 became a member of the firm of Drexel, Morgan & Co., which was changed in 1895 to J. P. Morgan & Co. He has been connected with most of the large financial railroad operations in the U. S. for nearly thirty years, and has reorganized or has been influential in promoting the financial credit of the New York City and Northern Railroad 1895; Chesapeake and Ohio Railroad 1888; Southern Railway 1891; and of the Erie system, the Reading system, and others. He is a director in the New York Central, New York, New Haven and Hartford, Baltimore and Ohio, Southern Railway, and others; and is largely interested in the General Electrical Company. He is prominent among dog, horse, and flower fanciers, and in yachting circles, and has been the donor of many rich gifts to scientific and charitable institutions.

F. Sturges Allen.

Morgan, Lewis Henry, LL. D.: anthropologist; b. in Aurora, N. Y., Nov. 21, 1818; graduated at Union College in 1840; studied law, and practiced in Rochester, N. Y., 1844–64; member of Assembly in 1861; State Senator 1868–69. In 1844, because of his connection with a secret society called the Grand Order of the Iroquois, he visited the Indians of New York State, was adopted by a tribe of Senecas, and began a study of their social organization and government. In 1847 he began to publish in the *American Review* a series of *Letters on the Iroquois*, and in 1851 his first book, *The League of the Iroquois*, appeared, giving a thorough and scientific account of the home life and organization of the Six Nations. In 1858, being then in Marquette, Mich., he learned that the Ojibwas' government and customs were similar to those of the Iroquois, and this led to further investigation. Information obtained through personal research and correspondence, covering the systems of kinship of more than four-fifths of the world, was published by the Smithsonian Institution in 1869, entitled *Systems of Consanguinity and Affinity of the Human Family*, and from the same material a treatise on *Ancient Society* was made (New York, 1877). He wrote also *The American Beaver and his Works* (Philadelphia, 1868) and *Houses and House Life of the American Aborigines* (Washington, 1881). He received the degree of LL. D. from Union College in 1873, was elected a member of the National Academy of Sciences in 1875, and was a member of other scientific societies. In 1879 he was president of the American Association for the Advancement of Science. D. in Rochester, N. Y., Dec. 17, 1881.

Morine, Alfred Bishop: lawyer and journalist; b. in Port Medway, Nova Scotia, Mar. 31, 1857; educated at the local schools and at Dalhousie University, Halifax, and was called to the bar in 1894; became correspondent at Ottawa for the *Halifax Herald* and *St. Johns Sun*; subsequently editor of the *New Era*, Halifax, and *The Spectator* of Annapolis; removed to Newfoundland, and became editor of the *St. Johns Mercury* (1883–85) and of the *Herald* (1889–91); was elected to the Legislature in Buenavista in 1886 and retained his seat until 1889; in 1890 was chosen one of the people's delegates to England in connection with the French treaties question, and in 1891 also. He is a supporter of a union of the Canadian provinces, and incidentally of protection and union with Great Britain.

F. Sturges Allen.

Morley, Edward Williams, M. D., Ph. D., LL. D.: chemist; b. in Newark, N. J., Jan. 29, 1838; graduated at Williams College in 1860, and then turned his attention to teaching, devoting himself chiefly to chemistry, which soon became a specialty with him. In 1869 he was called to the chair of Chemistry in the Western Reserve University, which institution, then in Hudson, O., has since removed to Cleveland, and under the name of Adelbert College now forms part of the Western Reserve University. This chair, together with a similar one in the Cleveland Medical College, he has since continued to fill. Prof. Morley has devoted his attention very largely to a consideration of the redetermination of the atomic weight of oxygen. This investigation, extending over a decade, was brought to a successful completion in 1885, when he definitely showed that the atomic weight of that element by three methods was 15·879,

with a possible error in the fourth decimal place. The results of this magnificent investigation were published in the *Smithsonian Contributions to Knowledge* in 1896, under the title *On the Densities of Oxygen and Hydrogen and on the Ratio of their Atomic Weights*. He has also been associated with Prof. Albert A. Michelson, of the University of Chicago, and with Prof. William A. Rogers, of Colby University, in investigations of a chemical-physical nature that have gained for him a high reputation. For the prosecution of his work on the determination of the atomic weight of oxygen he gathered a library of chemical periodicals which is unique in the U. S. He was president of the American Association for the Advancement of Science in 1895, was elected president of the American Chemical Society for 1899, and since 1897 has been a member of the National Academy of Sciences. His publications have appeared in chemical journals both in the U. S. and abroad, and in the *Proceedings* of the various societies of which he is a member. MARCUS BENJAMIN.

Morphy, PAUL CHARLES: chess-player; b. in New Orleans, La., June 22, 1837; exhibited from childhood surprising skill in chess, and at the age of twelve had defeated the best players of his native city; graduated at St. Joseph's College; studied law, and was admitted to the bar in 1857; at the chess congress in New York in 1857 was the victor, thereby becoming the champion player of the U. S.; in 1858 visited Europe; gained a victory over Löwenthal and others in London; defeated the best French and German players, and gave exhibitions of his ability to play eight games simultaneously without seeing the chess-boards. Later he suddenly abandoned chess-playing, and conceived such an abhorrence therefor that it almost drove him into a frenzy to hear the subject mentioned. D. July 10, 1884.

Morton, OLIVER PERRY: statesman; b. in Saulsbury, Wayne co., Ind., Aug. 4, 1823; studied for two years at Miami University; afterward studied law and was admitted to the bar in 1847, and began practice in Centreville, Ind. He was elected circuit judge in 1852, but was deprived of the office under the new State constitution of the next year, when he studied for a year in Cincinnati before resuming practice. He had been a Democrat, but in 1854 was active in forming the Republican party, and was its candidate for Governor, but was defeated. In 1860 he was elected Lieutenant-Governor, and in Jan., 1861, became Governor through the election of Gov. Henry S. Lane to the U. S. Senate. When President Lincoln called for volunteers Indiana's quota was raised at once, and Gov. Morton became famous through his energetic measures toward placing troops in the field and providing for their care and sustenance, as one of the "war Governors." He was opposed by a Democratic Legislature in 1863, and would have been deprived by it of his military control had not the withdrawal of Republican members left the Legislature without a quorum. Gov. Morton borrowed money for government expenses, and appointed a bureau of finance to control its disbursement, and this course was at first condemned, but afterward so thoroughly approved that he was again elected Governor in 1864. He was elected to the U. S. Senate in 1867, and again in 1873. He served on the committees on foreign relations, agriculture, military affairs, elections, and land claims, and was active in the impeachment proceedings against President Johnson. In the Republican convention of 1876 he received 124 votes on the first ballot for a Presidential candidate. He was a member of the electoral commission in 1877. After having a paralytic stroke in 1865 he was obliged always to use crutches. D. in Indianapolis, Ind., Nov. 1, 1877. See *Life and Public Services of Oliver Perry Morton* (Indianapolis, 1876).

Morton, WILLIAM THOMAS GREEN: dentist; b. in Charlton, Mass., Aug. 19, 1819; d. in New York city, July 15, 1868. He studied dentistry in Baltimore in 1840, and in 1841 he returned to Boston. While practicing his profession he attended medical lectures, and studied chemistry in the laboratory of Dr. CHARLES T. JACKSON (*q. v.*), and there became acquainted with the anæsthetic properties of sulphuric ether. After experimenting on himself, he successfully administered it to a dental patient Sept. 30, 1846. The new anæsthetic was first used publicly by Dr. John C. Warren in an operation at the Massachusetts General Hospital, Oct. 16, 1846. Morton's claim to the discovery was hotly contested, notably by Dr. Jackson and Horace Wells. The French Academy, after an investigation, of the Montyon prize awarded 2,500 francs to Dr. Jackson for the discovery, and 2,500 to Dr. Morton for its application to surgical operations. A monument commemorating the discovery was presented to the city of Boston by Thomas Lee in 1868.

Mosby, JOHN SINGLETON: soldier; b. in Powhatan co., Va., Dec. 6, 1833; entered the University of Virginia; before completing his course was fined and sentenced to imprisonment for wounding another student by shooting, but was afterward pardoned and his fine remitted; studied law during his imprisonment; was admitted to the bar soon after his release, and practiced in Bristol, Washington co., Va. At the opening of the war in 1861 he enlisted as a private in the Confederate cavalry, and served under Gen. Joseph E. Johnston in Shenandoah valley, and at Manassas. In Feb., 1862, he was made adjutant of his regiment, but was reduced to the ranks after two months. Serving as a scout on June 14, 1862, he guided Gen. James E. B. Stuart's brigade in a raid against Gen. McClellan on the Chickahominy. In Jan., 1863, he recruited a force of irregular cavalry in Northern Virginia, which he employed in cutting off communication and destroying supply-trains. When not engaged in a raid his men were dispersed and concealed, with orders for assemblage at a set time and place. At Chantilly, Mar. 16, 1863, he defeated a cavalry force much larger than his own. At Dranesville, Apr. 1, 1863, he defeated a force sent especially to capture him. His force was scattered at Warrenton Junction, but was reorganized, and cut its way through Gen. Hooker's lines. In May, 1864, Mosby's operations compelled Gen. Grant to detail a special force of cavalry to protect his communications. Mosby was commissioned captain in March, 1863, major two weeks later, and colonel some time afterward. On Apr. 21, 1865, his regiment was disbanded, and he returned to the practice of law in Warrenton. In 1872 he supported Gen. Grant as a candidate for the presidency, and gave as a reason therefor his opinion that Southern support of the Republican party was the best means for attaining tranquillity and home rule. It is said that a letter written by him to the New York *Herald* in 1876 contained the first use of the phrase "the solid South." He was consul at Hongkong for six years just preceding President Cleveland's first administration, and afterward practiced law in San Francisco, Cal. In Dec., 1886, in Boston, he delivered a lecture on Stuart's cavalry, which was repeated in other places, and published in a book entitled *War Reminiscences* (Boston, 1887). See *Partisan Life with Mosby*, by John Scott (New York, 1867), and *Mosby and his Men*, by J. Marshall Crawford (1867).

Mosler, HENRY: artist; b. in New York city, June 6, 1841; went with his family to Cincinnati in 1851, and to Nashville in 1854; having evinced a talent by engraving on blocks with crude tools, was instructed in drawing by his father, and afterward in painting in oil by George Kerr, an amateur; returned to Cincinnati in 1855, and worked there a year as draughtsman for the *Omnibus*, a comic weekly; was a pupil of James H. Beard 1859–61; followed the Western army as art correspondent for *Harper's Weekly* 1862–63; was appointed on Gen. William Nelson's staff; painted portraits of various generals; studied in Düsseldorf and Paris 1863–65, spent the next eight years in the U. S., obtaining national reputation through his painting *The Lost Cause*, and studied under Piloty in Munich 1874–76, during this time winning a medal at the Royal Academy; since 1877 has resided in Paris. His picture *Le retour*, exhibited at the Paris Salon of 1879, was bought by the French Government for the Musée du Luxembourg. In 1885 he received for his *Last Sacrament* one of the four cash prizes at the exhibition of the American Art Association. Among his best-known works are *Early Cares* and *Quadroon Girl* (1878); *The Return* and *Les femmes et les sécrets* (1879); *Purchase of the Wedding Gown* and *Spinning Girl* (1880); *Night After the Battle* and *Return of the Fisherwomen* (1881); *Discussing the Marriage Contract* (1882); *Wedding Morning* and *Rainy Day* (1883); *Last Sacrament* and *Village Clockmaker* (1884); *Approaching Storm* (1885); and *Visit of the Marquise* (1886–87).

Most Favored Nation Clause: in the law of commercial treaties, a treaty clause which binds each of the treaty-making powers to give to all the contracting parties all the privileges which it then gives, or afterward may give, to that nation which receives from it the most favorable terms in respect to those matters. An example of such stipulation is the treaty or agreement on the subject of trade-marks made between the U. S. and Great Britain in 1878, which

provides that "The citizens of each of the contracting powers shall have, in the dominions and possessions of the other, the same rights as belong to native subjects and citizens, or as are now granted or may hereafter be granted to the subjects and citizens of the most favored nation, in everything relating to trade-marks and trade labels." If strictly observed such a clause would often result in compelling a power to grant to another power concessions actually or supposedly inimical to its own interests, without an equivalent concession or recompense from the other; but this difficulty has been avoided by construing the doctrine to mean that such a clause applies only to gratuitous concessions, and does not entitle the nation claiming under it to the privileges given to some other nation in return for corresponding privileges unless the party claiming under it offers a fair consideration for them. See Wharton's *International Law Digest.*

F. STURGES ALLEN.

Moszkowski, MORITZ: pianist and composer; b. in Breslau, Germany, Aug. 23, 1854, and studied in Dresden and in Berlin, where he settled permanently. He has composed a large number of pieces for the piano, many of them very brilliant, also *Johanna d'Arc*, a symphony; several works for violin and violoncello with orchestra; a violin concerto, suite for orchestra, and other orchestral works, and an opera, *Boabdil.*

D. E. HERVEY.

Motor Carriages: Motor carriages are not a new creation. The first work in this line of which we have any well-authenticated record was by a Frenchman, Cugnot, in 1770. He constructed an operative though crude steam-carriage for heavy-draught service, and this machine is still preserved in the Conservatoire des Arts Métiers, Paris. These experiments, which were carried on under the auspices of the Government, do not appear to have been prosecuted with much energy, and a few years later the French Revolution effectually checked all progress in the new art. In England the subject was attacked with great ingenuity, skill, and energy, and for a long time the steam road-carriage was regarded as offering a better solution of the question of rapid transit than the steam-railway. An operative steam-carriage was constructed in Halifax, England, by Robert Fourness in 1788, and Nathan Reed, of Massachusetts, constructed and operated a steam-carriage in the same year. In 1803 Jean Richard Trevithick built a steam-carriage and ran it on the highway in and about London.

From 1820 to 1840 was a very busy period with inventors of motor carriages. The most successful of these were Walter Hancock and Goldsworth Gurney. Hancock constructed ten steam-carriages during this period. They were mostly of the double-body coach type, and were the most efficient and practical self-propelled vehicles of his time. Several of these were run regularly from London over certain routes, and remained in service some time.

Gurney built a series of carriages propelled by steam, and operated them regularly, carrying passengers between Gloucester and Cheltenham for four months. In 1834 the Steam-Carriage Company of Scotland was formed, and it operated a line of steam-coaches for the conveyance of passengers between Glasgow and Paisley, which plied hourly for several months with regularity. The distance is 7 miles, and the trip was made in thirty-four minutes, a speed of 17 miles an hour being obtained in the open country.

About 1834 a very strong prejudice was aroused in England against the new form of road locomotion. This was largely instigated by the railroad companies, rapidly growing in power, who foresaw serious competition in the steam-carriage, and it found a ready welcome with the ignorant rustic class, always opposed to new inventions, and with the general public, which had been recently alarmed by several serious motor-carriage accidents. The result was the passage of a parliamentary act imposing such onerous conditions upon the operation of road carriages as practically to prohibit their utilization. This was a serious setback to progress in England, and it remained without repeal or modification until 1896.

Experiments up to the present time have been conducted with steam as a motive power, and have resulted in the development of practical types of heavy steam vans, trucks, omnibuses, and other vehicles for heavy work and low speed, and these have been commonly used in France, and to a limited extent in England, since 1850.

Although the principle of the gas-engine was understood as early as 1794, when a patent on this form of motor was granted to Robert Street in England, and from this time engaged the attention of such men as Wright, Barnett, and Lenoir, not until the subsequent improvements by Dr. Otto, of Germany, in 1867, did steam have any competitor as a motive power; but the ability to construct a practical and reliable explosion engine, and the feasibility of substituting hydrocarbon oils for gas and carrying a very condensed fuel, such as naphtha, seemed at once to solve the question of an automatic vehicle motor.

Among the first to appreciate this fact and to set about constructing a practical vehicle was Gottlieb Daimler, of the Otto Gas-Engine Works in Cologne, Germany. Contemporaneous with Daimler large numbers of experimenters appeared in France, England, and the U. S., and at present (1899), while it can not be said that the gasoline carriage has reached the state of perfection necessary to warrant its general use, its future seems to promise a wide field.

The first public demonstration of what was being done was a contest of "automobile vehicles" held in Paris in the summer of 1894. This event marks an epoch in the history of trackless transportation. It was instituted by *Le Petit Journal* of Paris, and consisted of a trial of speed from Paris to Rouen and back. The vehicles registered for participation numbered 102. Of these, 15 appeared at the start on the day of the race, 2 being steam-vehicles and 13 propelled in various ways, by the exploding of gasoline or naphtha. The winner was a vehicle propelled by a Daimler gasoline motor, which covered the 75 miles of the course in 5 hours and 40 minutes.

In June, 1895, a race from Paris to Bordeaux and return, a distance of 705 miles, was arranged, for which 28 vehicles appeared at the start. Twelve vehicles reached Bordeaux, and nine made the complete trip. The time of the winner was 48 hours and 48 minutes, and again a vehicle propelled by a Daimler gasoline explosion motor finished ahead. Of the nine vehicles completing the course but one was run by steam, and that was a very heavy and cumbersome affair. In these contests vehicles propelled by electric storage batteries appeared, but in every case had failed to make any important showing in a field now recognized not to have been theirs.

In Nov., 1895, in Chicago, the *Times-Herald* of that city inaugurated a contest for motocycles, as they were called. This was to consist of a trial of speed and practicability between Chicago and Milwaukee, 100 miles. On Nov. 2, the day set for the contest, but 2 vehicles were prepared to start, and it was postponed until Nov. 28. On this date 15 vehicles appeared. Of these, 7 were propelled by gasoline, 1 by steam, and 7 by electricity. On the day of the start Chicago was covered with a deep fall of snow, and the route had been changed to Evanston and return, 54 miles. At the final start only 6 vehicles were prepared to compete, 4 gasoline and 2 electric, and of these but 2 finished, both gasoline. The winner was an American motor vehicle, constructed by Charles Duryea, of Springfield, Mass. The other finisher was A. Mueller, in a German vehicle built by Benz, of Mannheim, Germany. Duryea's time for the 54 miles was 10 hours and 23 minutes.

This contest, though of little intrinsic worth, was the beginning of the horseless-vehicle epoch in the U. S., and was largely instrumental in attracting the attention of inventors and capitalists to this new art, which has since grown to large proportions, and is fairly started on a career of economic usefulness. From this time, contests and races of all descriptions have followed one another with great frequency, the principal of which have been the London *Engineer* contest of 1896, to celebrate the modification of the odious English road laws; a race from Paris to Marseilles and return; a trial of heavy vehicles in Liverpool in the summer of 1898; and a contest of passenger-carrying cabs in Paris in 1898, on the results of which was based the decision to transform the entire Paris cab service from horse-drawn vehicles to electric automobiles. London and New York have large and well-equipped electric-cab stations, and the utility of the electric carriage for this branch of service has passed all expectations and greatly stimulated the interest of producers of electricity.

General Construction.—The construction of motor vehicles has been very much aided and simplified by the results of the development of the bicycle with its improved tires, and especially is this the case with the lighter forms of road-carriages where it has been possible to combine speed, strength, and comfort through the use of ball-bearings, bicycle construction, and pneumatic tires. Motor-carriage construction of course exhibits great differences of

detail, besides variations necessary through the difference in the conditions of service imposed.

For vehicles of light construction, intended for high speeds, steel rims and tangential steel-wire spokes are employed in the better class, and the wheels are usually fitted with large pneumatic tires made with a very thick outer shell. For the heavier class of vehicles wooden wheels are found preferable, and for hard roads the solid-rubber tire is used by the majority of makers. Nearly all builders concur in the advisability of using ball-bearings on the lighter vehicles. For the heavier variety ball, plain, and roller bearings are all used.

One feature employed by nearly all carriage-builders is a balance or compensating gear. The driving-gears then are not keyed to the same axle, but are connected through this compensating gear, which is so constructed as to admit of the wheels revolving at different rates of speed when turning corners, thereby avoiding the injurious slipping of the outer wheel which would occur were the wheels rigidly connected. The same result is sometimes attained in electric carriages without mechanical means, but through the use of two independent driving motors, one attached to each wheel, electrically connected in such a way as to give the proper increment to the outer wheel in turning; or, again, through the use of a peculiarly constructed motor, the field of which, capable of rotation, is geared to one driving-wheel through an internal gear, while the armature is geared through an external gear to the other driving-wheel. This object is accomplished in a great variety of ways, but the purpose is the same in each case as that of the device used on the tricycles of fifteen years ago.

Steering is sometimes done through the ordinary king-bolt method, but oftener and with better results by individually pivoting each front wheel at the end of the axle and causing them to turn through the proper angles by a system of links connected to the hand-steering lever. As can be readily seen, the latter leaves various opportunities for improving the faults of steering at high speeds, which do not exist in the former.

Speed-control is closely associated with the character of the motive power. In the case of the steam-carriage variations of speed are obtained by some form of link motion, as is done with the ordinary locomotive. In the case of the gasoline-engine the speed can not be varied beyond certain comparatively narrow limits which have proved acceptable to the users, and it becomes necessary to use two or more separate trains of gears, and different speeds are obtained through the medium of a gear-shifting device which transmits the power of the engine through any of the gearing-trains desired. The electric carriage lends itself most readily to the matter of speed-control, and mere changes in the battery connections, sufficient to alter the voltage applied at the motor, is all that is needed to get gradations of speed.

Brakes of all descriptions are employed on motor carriages, and this is, as may be seen, a question of vital importance. Some form of band brake operated by a foot-lever is usual and most satisfactory; but tire-brakes, consisting of a broad shoe pressed against the periphery of the tire, are in common use, especially on European carriages. The builders of electric vehicles often fit them with some form of electric brake, the usual principle of operation being the retardation or magnetic drag effected by running a motor as a dynamo through the momentum of the carriage. The employment of current generated in this way for recuperating the batteries is limited to hills of more than ordinary inclination, such as grades of 10 per cent. or more.

Speed.—The speed of an automobile can be made almost anything that the condition of the road and the intrepidity of the driver will permit. In France the maximum speed of automobiles is not limited by the character of the road surface, and for special purposes great speeds are obtained; but in current literature the speed of the French carriages has been greatly overstated, and this fact has been carried into the reports of French societies interested in the art. Few French carriages have speeds exceeding 20 miles an hour, and in the autumn of 1898 the best obtainable evidence indicated that but three automobiles in France had a maximum speed on the level of more than 25 miles an hour. Of these three but one had a speed of more than 30 miles an hour, and this one was reported to have gone from Paris to Amsterdam at an average speed of 25 miles an hour, and was driven by Baron De Knyff, who, with Charron and Bollée, holds the front rank among the automobile drivers. Such speeds as these are out of the question over any but the very best roads. In cities this fact, combined with police regulations, places at 12 miles an hour the maximum speed to be provided by the builder.

Steam-Carriages.—The application of steam to automobiles presents no novelty in principle, for exactly the same character of engine is required as on the ordinary locomotive, though of course lighter and less powerful. The real obstacle in the way of a successful steam-vehicle lies in the care and attention necessary to bestow upon the boiler and its accessories. Simple as is the steam-carriage in most particulars, its operation under the best conditions requires the full attention of a trained mechanic. Steam transportation has been reasonably successful only where conditions of operation and current wages of operators have not prohibited the employment of two operators, or where the speed has been reduced to such an extremely low mark as to require the supervision of but one man. The most successful system of steam carriage propulsion is probably that devised by M. Serpollet, a Frenchman. This has been applied with success to heavy omnibuses, vans, road-tractors, and tramways, but, by reason of the great weight of boiler required, is not applicable to the lighter class of road-vehicles. His invention, in brief, consists of a peculiar form of boiler which he calls an instantaneous steam-generator. It is a water-tube boiler, the tubes being made of steel pipes with very thick walls and flattened out so as to leave a small slit called the capillary space. These tubes are exposed to a very hot flame, and, containing as much highly heated metal as they do, are not cooled by the small amount of water passing through the interior slit, but instantly vaporize it, and the interior walls maintain their temperature by conduction of heat from the exterior. It is claimed that this boiler can be run for a long time without injury with no water whatever in the tubes, and in fact it is by regulating the amount of water fed to the boiler that Serpollet obtains his variations of speed. Since the boiler is without capacity—that is, all the steam generated immediately passes into the engine—the moment the water ceases flowing the engine stops. The greater number of steam-carriages use some form of tubular boiler, which is non-explosive, and apply the heat through a gasoline burner, this being the most convenient fuel obtainable. Among the steam-vehicles in commercial use may be mentioned a line of goods-vans, built by the Liquid Fuel Engineering Company of London, and operated between London and Birmingham.

Petroleum or Gasoline Carriages.—To this class belong all those vehicles employing engines or motors actuated by the explosion of hydrocarbon vapors. The Otto principle of explosion engine is used almost exclusively. It consists of a cylinder and piston which act alternately as pump and motor—that is, there is one effective or working stroke only in two revolutions of the crank-shaft. At the first forward stroke a mixture of air and gas is sucked in; on the return stroke this is compressed; on the second forward stroke this mixture is ignited in one of several possible ways, and an explosion results, driving the piston forward and storing up the resulting surplus energy in a fly-wheel large enough to do the work required of the engine between the separate working strokes. On the second return stroke the exhaust or burned gas is expelled. The application of explosive engines to carriages was never successful until the principle of the compressed charge was applied. Explosion engines used on motor carriages almost universally employ the vapor of common gasoline to form the explosive mixture. This is obtainable anywhere, and is a cheap and condensed form of fuel. With few exceptions, the gasoline is vaporized and intimately mixed with air before entering the explosion-chamber. The device for vaporizing the oil is known as the carburetter, and in its simplest form consists of a tank containing a certain amount of gasoline through which air is drawn by the suction of the piston, becoming saturated in its passage with the vapor of the volatile oil. This vapor, however, must be mingled with a certain amount of air before a truly explosive mixture is reached, and this is accomplished through some form of regulating valve which permits the control of the richness of the mixture. A form of aspirating carburetter, in which the gasoline is sucked up in a fine needle-like jet and sprayed in the midst of an inrushing current of air, is the one in most common use.

The extremely high temperature accompanying the explosions and the frequency with which these take place——several hundred a minute—results in greatly overheating the cylinder-walls, and necessitates the use of some cooling device, usually a water-jacket, and a small pump to maintain the circulation of the water around the cylinder and through a coil of pipe exposed to the air, where it dissipates the heat acquired from the cylinder. On the smaller engines this complication is often dispensed with, and the cooling effect of the air coming in contact with a large number of radiating vanes, which form a part of the cylinder and explosion-chamber, relied upon to keep the engine at a moderate temperature. This method of cooling will be observed on all the small motocycles, voiturettes, etc., where simplicity is essential. Currents of air forced by fans have also been employed.

The ignition of the explosive mixture may be effected by an electric spark or by the hot-tube method. In the spark method an induction coil is employed to force a spark at the proper instant between two conducting points or electrodes in the explosion-chamber, surrounded by the mixture of gas and air. This of course necessitates carrying a source of electrical energy, which is usually in the form of two small cells of dry battery. In the hot-tube method of ignition the chamber is fitted with a small platinum tube projecting outward therefrom and kept at a high temperature by a gasoline burner placed beneath. The vapor filling the chamber and the interior of the tube comes in contact with its heated sides, which, however, are not at a temperature high enough to ignite it under the conditions of pressure obtaining. As the piston returns, the gas is compressed, and at the point of greatest compression—that is, at the end of the stroke—the temperature of the tube is sufficient to explode the mixture. This apparently crude device has been used with great success on many carriages. The French racing carriages are almost all provided with hot tubes. As will be seen from a consideration of the events taking place in the cylinder of a gas-engine, this motor can not be self-starting like a steam-engine, but some mechanical means of previously compressing the gas before an explosion can take place must be used. This is ordinarily effected by turning the engine over once or twice through the medium of a hand-wheel placed conveniently near the driver, which is thrown out of gear when the engine starts.

The advantages of the gasoline-engine consist in the cheap, compact, common, and well-known character of the fuel. At a price of ten cents a gallon for gasoline a well-built carriage with two passengers should be run at an expense of less than half a cent a mile. The main disadvantages are the disagreeable odor, which has been greatly exaggerated in current literature, noise of the exhaust-gases, and vibrations and shocks of the engine which seem inseparable from this form of motor, and its rather uncertain action due to its sensitiveness to changes of temperature, mixture, and the exhaustive wear upon the operating parts which the high working temperature necessitates. Devices have been employed which almost entirely overcome the disagreeable odor and the noise of exhaust, while shocks and vibrations are to a large extent questions of workmanship. The prevailing and important defects of the gasoline-engine, which have resulted to the advantage and the spread of the electric carriage in its own peculiar though limited field, are the numerous functions which must be performed as a result of the sensitiveness to changes of atmospheric conditions just referred to, and to the fact that the motor requires in operation the same general attention which would be demanded by any engine.

Electricity as a Motive Power.—The electric carriage makes use of electricity stored in the form of chemical energy in accumulators or storage batteries. A storage battery consists of a positive plate containing lead peroxide and a negative plate of porous lead immersed in an electrolyte of dilute sulphuric acid. This combination forms a type of battery that can be discharged in the same way as the ordinary primary cell, and acts on exactly the same principle, and when discharged either fully or partly the battery can be connected to a source of electrical energy and the chemical compounds on the plates, resulting from the passage of the discharge-current, transformed into their original constituency by forcing an electric current between the plates in a reverse direction. If this reverse current is continued sufficiently long, all the active material of the battery becomes reconverted to its original chemical form, and the battery is said to be charged, for it is now again able to yield current to the extent of its full capacity, and this process of charge and discharge may be carried on indefinitely. It is evident that although electricity is put into the cell and later withdrawn, it is really a storage of chemical energy that is effected, which on discharge is manifested as electricity.

Although the principle of the lead storage battery has been well known since 1860, it is only since 1890 that its increasing fields of usefulness and extended application to the industrial arts have demanded due attention to improvements and refinements in its manufacture. Still more recently the peculiar conditions of road-vehicle service have demanded a form of lead storage battery which should possess with other essentials lightness and durability, but already storage batteries are available which conform sufficiently to the requirements to make the electric vehicle both serviceable and commercially practical. The immense superiority of control and the simplicity of the motive power in electric vehicles have, in fact, a strong tendency to extend this field beyond its most advantageous limits and to produce a willingness to accept relatively low standards of performance in storage batteries.

The relatively poor character of American roads has greatly retarded, and up to the present time almost prevented, the introduction of types of automobiles whose principal recommendation lies in unlimited radius of action, and it is not surprising that the world must still look to France as a leader in the production of vehicles propelled by gasoline, if not also in the degree of their development; while in England possibly the extreme conservatism may account for the fact that such development as has been made in that country in the new art has been along the lines of the steam-carriage.

A special form of motor on electric vehicles reduces all noise to a minimum. The controller-handle, placed conveniently at the left of the operator, gives three speeds through the medium of a very simple controller. The steering-handle, placed at the right of the driver, and a foot-lever operating a powerful and quick-acting band brake, complete the apparatus necessary for a thorough control of the carriage. For the average person but a few hours' trial is necessary to give skill and familiarity in all phases of the operation. A mileage of 30 is the normal amount for these vehicles, although much more than this has often been obtained. For a two-passenger carriage at the prices ordinarily prevailing in American cities, the cost per mile is one cent or slightly more. This type of carriage is rapidly coming into vogue.

The advantages of the electric carriage are cleanliness, flexibility, ease and completeness of control, simplicity, freedom from noise, odor, and vibration, and, compared with the horse, economy of operation (within the limits of reasonable deterioration). Its disadvantages are the weight of the battery and its limited mileage.

Mott, Lucretia (*Coffin*): reformer; b. in Nantucket, Mass., Jan. 3, 1793; daughter of Capt. Thomas Coffin, a descendant of one of the original purchasers of the island of Nantucket; went with her parents to Boston, Mass., in 1804; was educated in a school taught by James Mott (1788–1868), a member of the Society of Friends and a prominent anti-slavery worker, to whom she was married in 1811; became a teacher in Philadelphia in 1817, and entered the ministry of the Society of Friends in 1818; was a Hicksite after the division of the society in 1827. Mrs. Mott was one of the most prominent participators in the movement against slavery. She was one of the founders of the American Anti-slavery Society in Philadelphia in 1833, and thereafter participated in the organizing of various female anti-slavery societies. In 1840 she went to London as a delegate of the American Anti-slavery Society to the world's anti-slavery convention, but women were excluded as members. This action of the convention led to the woman's-rights movement, in which Mrs. Mott was a leader, she being one of the four women who called a convention in Seneca Falls, N. Y., in 1848, and afterward devoting much of her effort to the procurement of a better legal and political status for women. For some years she was president of the Pennsylvania Peace Society. As a preacher she made various journeys through New England, New York, Pennsylvania, Maryland, Virginia, Ohio, and Indiana. D. near Philadelphia, Pa., Nov. 11, 1880. See her

Life, with that of her husband, edited by her granddaughter, Anna Davis Hallowell (Boston, 1884).

Moulton, Richard Green, Ph. D.: educator; b. in Preston, England, May 5, 1849; studied at New Kingswood School, Bath, and Clevedon College, Northampton; B. A., University of London, 1869; B. A., University of Cambridge, 1874, and M. A. 1877; Ph. D., University of Pennsylvania, 1891; extension lecturer to the University of Cambridge 1874–90; extension lecturer to American Association for Extension of University Teaching 1890–91; extension lecturer to London (England) Society for Extension of University Teaching 1891–92; Professor of Literature in English, University of Chicago, since 1892. He is author of *Shakespeare as a Dramatic Artist*; *The Ancient Classical Drama*; *The Literary Study of the Bible*; *The Modern Reader's Bible* (21 vols.). C. H. Thurber.

Mountain, George Jehoshaphat, D. D., D. C. L.: Anglican bishop; b. in Norwich, England, July 27, 1789; son of Bishop Jacob Mountain; educated at Trinity College, Cambridge; took orders 1812 and 1813; held rectorships in Fredericton and Quebec, of which in 1821 he became archdeacon: was Bishop of Montreal 1836–50; Bishop of Quebec 1850–62; author of *Songs of the Wilderness* (1846); *Journal of a Northwest Mission* (1853); founded in 1844 the Bishop's College, Lennoxville. D. near Quebec, Jan. 6, 1863.

Mountain, Jacob, D. D.: Anglican bishop; b. at Thwaite Hall, Norfolk, England, 1750; was educated at Cambridge, and received valuable church preferments. In 1793 he was appointed Bishop of Quebec, and was the first Anglican prelate in Canada. He was distinguished for the faithfulness with which he performed the severe duties of his ecclesiastical position, as well as the important *ex-officio* civil functions which then attached to his office. D. June 16, 1825.

Mount Vernon Ladies' Association of the Union: the oldest patriotic association of women now in existence in the U. S., founded in 1854 by Miss Ann Pamela Cunningham, of South Carolina. Its object was to teach the people of the U. S. to remember Washington and his great achievement, and its immediate purpose was the raising of funds to purchase the Mount Vernon estate, including the mansion and Washington's tomb. In 1674 a tract of 5,000 acres on the west bank of the Potomac river, 15 miles S. of the present city of Washington, was granted to John Washington and Nicholas Spencer by Lord Culpepper. Of this estate one-half was inherited by Lawrence Washington, who in 1743 built his residence there and named the property Mount Vernon in honor of the British admiral under whom he had served. On his death, in 1752, the estate passed to his half-brother, George Washington, who then made it his home, and who bequeathed it to his nephew, Bushrod Washington, who became its owner on the death of Martha Washington in 1802. From Bushrod it passed to his nephew, John Augustine Washington, and then to John Augustine Washington, Jr., who, unable to keep his inheritance in a proper state of repair, endeavored, in accordance with the wishes of the family, to effect its permanent preservation by selling it to the national Government. This plan failed, as did also an attempt to dispose of it to the Commonwealth of Virginia. It was in consequence of these failures that Miss Cunningham organized the Ladies' Association and appointed vice-regents representative of the States of the Union to aid in the work. An appeal was then made to the country for the desired amount of money. The first contribution came from the Laurens district in South Carolina, and it was soon followed by donations from every section of the country. The greatest interest, however, was created by the celebrated oration on Washington by Edward Everett, who prepared it and delivered it seventy times for the benefit of the Mount Vernon fund, thus giving to its treasury more than $40,000. Masonic lodges and other organizations came forward with liberal contributions, until in Mar., 1858, the association was able to purchase from Mr. John A. Washington, Jr., and his heirs 200 acres of the Mount Vernon estate, including the tomb, the mansion, attendant buildings, the wharf, etc., paying therefor $200,000 and interest. The Legislature of Virginia granted the association a proper charter, giving it permission to charge a suitable fee, "not exceeding twenty-five cents," to all visitors, for the care and maintenance of the property. On coming into possession of the estate ruin and decay were found on every side, but repairs were immediately instituted and a steamboat service established for the conveyance of visitors from Washington to Mount Vernon. Notwithstanding these necessary expenses, the association announced in Nov., 1859, that the last obligation had been canceled and the home of Washington was the property of the nation. In order to maintain Mount Vernon in a satisfactory condition, an endowment fund of $140,000 was started, but the civil war prevented its completion, and after the war it was found that the money collected had been absorbed in the care of the estate and necessary repairs. Beginning with 1866, the annual meetings in May of the regents at Mount Vernon were resumed, and strong efforts were made to furnish the mansion with household furniture and belongings of Washington. For this purpose the several rooms were assigned to the special care of certain States, whose regents undertook their restoration; thus the main hall is cared for by Alabama, the music-room by Ohio, the banquet-hall by New York, the west parlor by Illinois, and the remaining rooms were suitably allotted. By this method the furnishing of the interior of the mansion has been accomplished, and as typical of the articles procured may be mentioned the sword worn by Washington at Braddock's defeat, the harpsichord and music-stool given by Washington to Nellie Custis on her marriage, and the rug woven by order of Louis XVI. and sent by him as a present to Washington. In 1887 a tract of 35 acres adjoining Mount Vernon was presented to the association by Jay Gould, so that at present the entire property includes 237 acres. The endowment fund is being restored, and when its interest becomes equal to the expenses the entrance-fee to the grounds will be discontinued.

Muir, John: naturalist; b. in Dunbar, Scotland, Apr. 21, 1838. He came with his parents to the U. S. in 1850 and settled near the Fox river in Wisconsin. He was graduated from the scientific department of the University of Wisconsin in 1864. He set out on a botanizing tour, wandering through the Southern States, Cuba, and California, settling in the latter place in 1868. In 1876 he joined a party connected with the geodetic survey of the great Basin; and in 1879 he made a tour of exploration in Alaska, where he discovered the great glacier now named after him. He was one of the first to make known the beauties of the Yosemite. He has published *The Mountains of California* (1894) and many magazine articles.

Muir, Mackenzie Montague: English lawyer and law writer; b. Sept. 29, 1847, and received his education at Charterhouse and Brasenose College and at Hertford College, Oxford University, and was a fellow of Hertford College 1874–88; was called to the bar in 1873, in which year he was appointed secretary to Lord Chief Justice Coleridge, which position he retained till 1877; was made recorder of Deal in 1892, and recorder of Sandwich and bencher of the Middle Temple in 1894. He is the author of several standard legal works, including editions of Mackenzie on *Bills of Lading*; of Chalmers and Mackenzie on the *Judicature Acts*; of Mackenzie and Lushington on the *Laws of Registration*; and of Mackenzie and Hough on the *Bankruptcy Acts*. F. Sturges Allen.

Müller, Georg Friedrich (commonly called George Müller): philanthropist; b. in Kroppenstädt, Prussia, not far from Magdeburg, Sept. 27, 1805. His youth was anything but exemplary. He did not hesitate to lie and to steal. He deliberately deceived his father and other beneficiaries, forged documents to effect a temporary purpose, and was at times drunken and unchaste. In 1825, while leading this evil life, he entered the University of Halle as a divinity student, for he expected to be a pastor. Later in that year he was converted, and determined to be a missionary. But his father's opposition prevented his going to the foreign field, and on Mar. 19, 1829, he became a six months' probationary missionary student of the London Society for Promoting Christianity among the Jews. But, chafing under the necessary restrictions the society put upon its probationers, he resigned in Jan., 1830, allied himself to the Plymouth Brethren, and a little later became minister of Ebenezer chapel, belonging to that denomination, in Teignmouth, a few miles south of Exeter. Convinced that believers were the only proper subjects for baptism, and that immersion was the only true scriptural mode of baptism, he was immersed early in that year, but he never was anything else than a Plymouth Brother. On Oct. 7, 1830, he married Miss Mary Groves, sister of Anthony Norris Groves, one of the founders of the Plymouth Brethren and

the benefactor of John Kitto. His wife was six years his senior. Her first child and her fourth were stillborn, date of birth Aug. 9, 1831, and June 13, 1838, respectively; her second child was Lydia, born Sept. 17, 1832, married Nov. 16, 1871, to a widower, James Wright, the present director of the institution which Mr. Müller founded, and died Dec., 1889; her third child was Elijah, born Mar. 19, 1834, died June 26, 1835. At the time of his sister's marriage, Mr. Groves was living as a volunteer missionary in Bagdad. His renunciation of home and country and devotion of his own and his wife's money to the Christianization of the world made a profound impression on George Müller, and led him to give up the salary of £55 which his church had agreed to pay him, abolish pew-rents, and depend solely upon the voluntary gifts of his congregation and others. He believed that God would on request supply all his wants if he had faith. Upon this principle he lived all the rest of his life, and though often in great straits, and face to face with absolute pennilessness, he calmly waited upon God to supply his wants, and they always were supplied. In the first full year of thus living on faith (1831) his income from the money placed in the chapel-box, and from presents in money, provisions, and clothing given by members and others, was £150, or nearly thrice what he would have received in the way of salary. At Teignmouth he made the acquaintance of the eminent Plymouth Brother Henry Craik, and they began, in 1832, joint ministerial labor in Bristol, and so continued until the death of Mr. Craik, in 1866.

On Feb. 20, 1834, Mr. Müller records in his diary his plan to establish "on scriptural principles an institution for the spread of the Gospel at home and abroad." On Mar. 5, 1834, a public meeting was called to inaugurate the Scriptural Knowledge Institution for Home and Abroad. Its objects were (1) to assist day, Sunday, and adult schools, provided they gave instruction by "godly persons" and upon "scriptural principles," to establish such schools and to put poor children in them; (2) to circulate the Holy Scriptures; (3) to aid missionary efforts. Its principles were never to solicit money from unconverted persons and never to go into debt.

In April, 1835, Mr. Müller revisited the famous A. H. Franeke's orphan house in Halle, where in his student days he had himself lodged. He was so much impressed with what he saw there that on his return to Bristol he determined to do something himself for orphans, and at the same time give public demonstration of the practical results of faith, for he intended to make no direct appeals. On Dec. 9, 1835, he called a public meeting and broached his plan. The money at once began to come in, and he rented a house to accommodate thirty girls. He had, however, forgotten to ask God for orphans to shelter, and the first day none were offered. This omission was at once supplied, and by 1837 he had three houses full. In 1843 he opened another. In June, 1849, he moved the orphanage to a house especially constructed at Ashley Down, just outside of the city, and on Nov. 12, 1857, he opened another there; on Mar. 12, 1862, another; the fourth on Nov. 5, 1868; the fifth and latest on Jan. 6, 1870. The money requisite for these large and costly buildings, as well as that for the maintenance of the work, has been raised without direct appeals, though the circulation of Mr. Müller's autobiography and of the reports of the work gives the orphanage wide publicity. Oftentimes there has not been money in hand to provide the next meal, but never has it failed to come in sufficient amount. These orphanages are branches of the Scriptural Knowledge Institution.

On Feb. 6, 1870, his first wife died. He preached her funeral sermon. On Nov. 30, 1870, he married Miss Susannah Grace Sangar, then in the fifty-seventh year of her age. With this wife he was able to carry out a long-cherished scheme —to preach the Gospel outside of Bristol and in foreign lands. He made his first missionary tour in 1875, but only through England; but in subsequent years, down to May, 1892, he and his wife were well-nigh continuously traveling, and they visited parts of the world as widely separated as India and Australia and the contiguous lands, Canada, and the U. S. In all he made seventeen tours, covered 200,000 miles by land and sea, and addressed more than 3,000,000 persons. The expenses of these tours were paid by voluntary gifts, coming, as he believed, in answer to prayer. While his orphanage was perpetually on his heart, he never spoke about it unless specially requested.

On Jan. 13, 1895, Mr. Müller's second wife died, and he conducted the whole funeral service for her. He did not marry again. In the last report (1896–97) he made on the work of the institution he showed that it was flourishing. From the beginning, 121,683 pupils had been in its schools; 281,652 Bibles, 1,448,662 Testaments, 21,343 psalters, and 222,196 other portions of the Holy Scriptures had been distributed; missionary operations had been carried on in many lands; 111,489,067 scriptural books, pamphlets, and tracts had been circulated; and 9,844 orphans had been cared for. "The total amount of money received, by prayer and faith, for the various objects of the institution," including the orphanage, had been £1,424,646 6*s.* 9½*d.*

Mr. Müller had frequent attacks of illness all his life, but retained to the end great recuperative powers. His death was caused by syncope, on Mar. 10, 1898, at Ashley Down, he being an inmate of one of the orphanage houses, Bristol.

His autobiography, *A Narrative of Some of the Lord's Dealings with George Müller, written by himself* (London, 1837–85, 4 parts, numerous reprints and several translations), tells the marvelous story of his success in raising money by prayer and faith and in carrying on expensive undertakings; his *Preaching Tours and Missionary Labors* (1883) recounts some of his journeys. See his biography by Arthur T. Pierson (New York, 1899). S. M. J.

Mulock, William, Q. C.: statesman; b. in Bond Head, Ontario, Jan. 19, 1843; graduated at the University of Toronto in 1863, and was admitted to the bar in 1868. He took his degree of M. A. in 1871, and received an honorary degree of LL. D. in 1894. He has held a seat in the House of Commons since 1882, and in 1890 was made a Q. C. He became Postmaster-General July 13, 1896, and while holding the office established a uniform rate of postage from Canada to all parts of the empire.

Mundy, Johnson Marchant: sculptor; b. near New Brunswick, N. J., May 13, 1832. In his boyhood, which was mainly spent at Geneva, N. Y., he manifested artistic tendency, and early received his first instruction in the art of drawing. Having been in the employment of an ornamental marble-cutter in New York city, in 1854 he entered the studio of Henry K. Brown, in Brooklyn, his first successful work in marble being a bust of Benjamin Hale. During his twenty years' residence in Rochester—where he settled in 1863 and opened the first school in that city for drawing and modeling—he produced many busts, statuettes, and medallions, among his more notable statuettes being *The Reaper*, *The Pilgrim*, and *Columbia*. His sight having always been defective, in his fifty-second year his left eye became entirely blind, and the right eye was seriously and progressively affected. Removing to the home of his sister, in Tarrytown, N. Y., he there, depending solely upon the sense of touch, modeled the statue for the soldiers' monument in that village, and produced his famous statue of Washington Irving. D. in Tarrytown, Aug. 16, 1897.

Municipal Assessments: By this term is commonly understood those impositions or burdens placed upon lands or property for benefit coming immediately and especially from local improvements, such as the establishment of a park, the grading of a street or thoroughfare, etc. In the U. S. such assessments are nearly always made by the local municipalities, which are authorized to make them by the laws of the State, and hence the subject is here treated; but there is nothing in the nature of them that prevents their being made by the central Government, when it is vested with power to do so. As here used, the term assessment is a special and specific application of its general use to signify the determination of the value of a man's property for purposes of taxation, or the value, or share of taxes, so determined. Although such assessments are in the nature of taxes, as here treated they are distinguished from taxes, as that term is generally understood; and this distinction has been constantly recognized in Great Britain in the acts of Parliament, which have distinguished between *taxes* for the benefit of the entire kingdom and *assessments* imposed for the improvement of local districts. In the U. S. the distinction is also recognized so that generally constitutional provisions requiring that "taxation shall be equal and uniform throughout the State," even when made applicable to municipal taxation, are held not to preclude by their intrinsic force such local assessments, and statutes exempting property from taxation are uniformly held not to exempt the property from such assessments; thus, a statute exempting a homestead, or the real estate of churches or charitable institutions, from taxation, does not make the property free from assessments

for local-improvement benefits, such as widening, paving, or grading of streets, etc.

In the U. S. the legality of assessments has been frequently contested as being in violation of the Fourteenth Amendment to the Constitution, but it has been decided by the U. S. Supreme Court that the States have the right to pass laws imposing upon persons determined by the Legislature to be benefited, the payment of the cost in whole or in part, and providing for a mode of judicially contesting the assessment or charge, and for proper notice, without contravening this amendment.

The State governments, then, when not restricted by their constitutions, have a legislative discretion as broad as their legislative power of fixing by law the method in which assessments shall be levied upon property that is specially benefited, and how far these benefits shall be made a measure of the assessments. As to what are these limits of legislative power, however, and how far the State may go in making arbitrary exactions, is not entirely settled; but the later decisions generally hold that assessments must be apportioned in accordance with some law or rule under the provisions of which a reasonable apportionment is possible.

Methods of Assessment.—In the case of city property, laid out in lots of uniform depth abutting upon the local improvement for defraying the cost of which the assessment is made, it is generally held that it is competent for the Legislature to make each assessment in proportion to the *frontage* of the lots. Such a method of fixing assessments is especially suitable in case of the making or repairing of sidewalks and in grading and paving, and the construction of sewers.

The Legislature may, however, in its discretion provide for the assessment upon the lots in proportion to their *superficial area*; but, if this method of apportionment would result in assessing equal amounts upon lots indirectly or only incidentally benefited and lots directly and largely benefited by the local improvements, the law may be set aside as unjust and illegal.

The truest and justest method of apportionment is that which is based upon the special benefits accruing to the property assessed—that is, those benefits received in addition to benefits coming to the public at large.

Amount Assessable and Nature of the Charge.—In the U. S. it is not yet settled whether the State Legislature or the municipality acting under delegated authority may impose the entire burden of local improvements upon the abutting and neighborhood owners. Such a method of assessment involved not only a determination by the legislative branch that the neighboring property was specially benefited, but also an arbitrary fixing of the amount of this benefit at the entire cost of improvement. Nearly all of the earlier cases held that the power of the Legislature extended thus far, and this view is still generally sustained; but there is a tendency apparent in the later cases to limit the legislative power to the making of the assessments in such a manner as to make the amounts assessed correspond reasonably to the benefits received. Assessments are uniformly made a lien upon the property assessed, and may be made a personal debt of the owner of the property, but special assessments for local improvements can not be enforced by fines or penalties imposed by ordinances.

F. STURGES ALLEN.

Municipality: a municipal town or city; that is, in its broadest sense, a town treated for purposes of administration as a distinct unit; also, the authority having the administration of such a town. In this sense *municipality* is a broader term than *municipal corporation*, as municipalities were not regularly incorporated until comparatively recent times. The term municipality has its origin in the Roman term *municipia*, by which name were designated those cities which voluntarily joined the Roman republic, so far as their sovereignty was concerned, but retained their local laws and liberties and their magistrates, who were called municipal magistrates. The powers of government in these cities were exercised by those who possessed the franchise of the city, and residence was not a necessary condition to the possession of this franchise. At first this system served to keep alive local patriotism and public spirit, but the extravagance and mismanagement which later became so common led to the interference of the authorities in Rome, until municipalities lost practically all their power. As a result of this the Roman municipality system practically ceased, and it was not until the revival of civilization toward the beginning of the eleventh century that self-governing municipalities arose. These mediæval municipalities here and there attained something like independence, since they had to resist only feudal monarchs whose power was more often nominal than real; and many of these politically independent towns, such as Milan and Ghent, retained their practical independence until a comparatively late date. The organization of these mediæval municipalities was largely industrial, and in many cases the power of government was absorbed by a quasi-aristocracy of great industrial and commercial leaders, and the towns became the centers of industry, art, and learning, in sharp distinction from the rural districts, where the people were little better than slaves or beasts of burden. The growth of the towns was marked by the erection of splendid churches and palatial public and private buildings.

This centralization of power in commercial and industrial municipalities was not carried so far in England, where the rural districts retained their self-government as well as the more thickly populated urban districts, and where the dense massing of the population in towns and cities was less marked than on the Continent.

This phase of municipal organization gradually disappeared before the growth of civilization, and the demand of the people for self-government gave rise to the modern form of municipalities, usually called *municipal corporations*, in which the local government is vested with corporate powers limited to those expressly granted in its charter. See MUNICIPAL CORPORATIONS.

See Harper's *Dictionary of Classical Antiquities*; Hegel's *Geschichte der Italianischen Stadtverfassung*; Sismondi's *Republiques Italiennes*; Alice S. Green's *Town Life in the Fifteenth Century*; Ashley's *Economic History of England*.

F. STURGES ALLEN.

Munn, GEORGE F.: artist; b. in Utica, N. Y., in 1852; studied art under Charles Calverly, at the National Academy, and in the art-schools of South Kensington, England, where he received the first gold medal awarded to an American, for a clay model of the Farnese *Hercules*; received a medal for life-drawing in the schools of the Royal Academy. Among his paintings are *Wild Flowers*; *Roses*; *Meadow-Sweet*; and *A Sunny Day, Brittany*.

Munroe, CHARLES EDWARD, Ph. D.: chemist; b. in Cambridge, Mass., May 24, 1849; graduated from the Lawrence Scientific School of Harvard in 1871, and received at once an appointment as assistant in chemistry to conduct the instruction in quantitative analysis in that institution, and in addition initiated and taught for three years the summer school of chemistry in Harvard University. In 1874 he accepted the chair of Chemistry in the U. S. Naval Academy, where he remained until 1886, when he was transferred to the U. S. naval torpedo station and war college in Newport, R. I. This place he resigned in 1892 to accept the chair of Chemistry in Columbian University in Washington and the office of dean of the Corcoran Scientific School of that university. The degree of Ph. D. was conferred upon him by Columbian University in 1895. He is a member of numerous scientific societies, including the chemical societies of London, Berlin, and Paris, and that of America, of the latter of which he was president in 1898. He was vice-president of the American Association for the Advancement of Science in 1888. He is the author of more than a hundred papers on chemistry, which have been contributed to the scientific journals and *Proceedings* of the societies of which he is a member, and many of which relate especially to the subject of explosives, on which he is an accepted authority. He was the inventor of the most successful smokeless powder that has ever been used by the U. S. navy.

MARCUS BENJAMIN.

Munroe, CHARLES KIRK: author; b. in Racine, Wis., Feb. 8, 1850; has lived chiefly in Florida, where he has produced many books, especially for young readers. Among his works are *Wakulla* (1885); *The Flamingo Feather* (1887); *The Coral Ship* (1893); *The White Conquerors* (1893); *The Fur-Seal's Tooth* (1894); *Snow Shoes and Sledges* (1894); *A Young War-Chief* (1895); *At War with Pontiac* (1896); *Through Swamp and Glade* (1896); and *The Painted Desert* (1897).

Murray, GEORGE HENRY, Q. C.: statesman; b. in Grand Narrows, Nova Scotia, June 7, 1861; educated at Boston University. He was admitted to the bar in 1883, and began to practice his profession in North Sydney, Cape Breton. He was made a Q. C. in 1895, and in 1896 became Premier and Provincial Secretary of Nova Scotia.

Murray, Sir HERBERT HARLEY, K. C. B.: statesman; b. in England, Nov. 4, 1829; educated in England, and entered the civil service of Great Britain. He was deputy chairman of the board of customs from 1887 to 1890, and chairman from 1890 to 1894, when he retired. He was made C. B. in 1885 and K. C. B. in 1894. During the same year he was sent as commissioner to Newfoundland, of which he became governor in 1895.

Murray, WILLIAM HENRY HARRISON: author; b. in Guilford, Conn., Apr. 26, 1840; graduated at Yale in 1862; was licensed to preach in 1863, and held pastorates in Greenwich and Meriden, Conn.; had charge of Park Street Congregational church, Boston, Mass., in 1868; delivered popular Sunday evening addresses in Boston Music-hall 1869–73; resigned his pastorate in 1874, occasionally preaching to independent congregations. He is the author of *Camp-Life in the Adirondacks* (1868); *Music-Hall Sermons* (1870–73); *Words Fitly Spoken* (1873); *The Perfect Horse* (1873); *Adirondack Tales* (1877); *How Deacon Tubman and Parson Whitney Kept New Year, and other Stories* (1887); and *Daylight Land* (1888).

Muscat: The Sultan of Oman, who leased a coaling station near Muscat to the French, revoked the grant in Feb., 1899, under a threat of a bombardment of the forts by three British war-ships then in the port. In 1897 the *Geographical Journal* of London declared that Muscat was under British influence. The city is a port of call for the Persian Gulf mail steamers, and some English as well as many Hindu merchants are established there. It has the best harbor for hundreds of miles. Its trade is chiefly with India. By the treaty of commerce between Great Britain and the sultan, concluded in 1891, import duties can not exceed 5 per cent. *ad valorem*. C. C. A.

Musin, OVIDE: violinist; b. in Liege, Belgium, in 1854. Having shown a talent for music, he was sent to the Royal Conservatory in Liege, where he received the first prize for violin-playing when eleven years old. In 1870 he came under Leonard's tuition, and since then has played with success in the principal European capitals. He went to New York in 1883, and made his first appearance at a concert of the Symphony Society on Oct. 17 of that year. He married the American soprano singer Annie Louise Tanner, and together they made several concert tours.

D. E. HERVEY.

Myer, ALBERT JAMES: chief signal-officer; b. in Newburg, N. Y., Sept. 20, 1827; graduated at Hobart College in 1847, and at Buffalo Medical College in 1851; entered the U. S. army as assistant surgeon in 1854, and was assigned to duty in Texas; originated a signaling system, with flags by day and torches by night, for long-distance messages, which was adopted by the armies of the world; was appointed major and signal-officer in 1860 as a reward for his services, that post being specially created by Congress for him; was on signal duty in New Mexico until the outbreak of the civil war, when he was assigned to duty with the Army of the Potomac; served as chief signal-officer to Gen. McClellan throughout the peninsular campaign, taking part in all the battles; took charge of the U. S. Signal Office in 1863, with the rank of colonel; introduced the study of signals at the Military Academy; served in the reconnoissance on the Mississippi river in 1863; became chief signal-officer of the division of West Mississippi, and was commissioned by Gen. Canby to arrange terms for the surrender of Fort Gaines; was relieved of his command, on the ground that his nomination had not been confirmed, and his appointment as chief signal-officer was revoked in 1864, but he was breveted brigadier-general in 1865; settled in Buffalo after his removal from the army, perfecting a manual of signals for the army and navy, which was published in 1868; was reappointed colonel and chief signal-officer in 1866; was engaged in taking meteorological observations at various military stations in the interior and at other places, and in devising means of giving notice on the Northern lakes and seaboard, by telegraph and signals, of the approach and force of storms, the first work under this system being done in 1870, the scheme proving to be perfectly practicable, and the Weather Bureau rapidly gained popularity, afterward publishing a daily international bulletin, which was supplemented by a daily international chart. He instituted a system of cautionary day and night signals for lake and ocean navigation, a system of reports for the benefit of interior commerce, and a series for farmers. He represented the U. S. at the international congress of meteorologists in Vienna in 1873; was a delegate to the meteorological congress in Rome in 1879, and was promoted to brigadier-general in 1880. D. in Buffalo, N. Y., Aug. 24, 1880.

Myer, ISAAC: author; b. in Philadelphia, Pa., Mar. 5, 1836; graduated at the University of Pennsylvania in 1857; studied law, was admitted to the bar, and removed to New York city. He has published *Presidential Power over Personal Liberty* (1862); *The Waterloo Medal* (1885); *Qabbalah: the Philosophical Writings of Solomon ben Yehudah Ibn Gebirol, or Avicebron* (1888); *On Dreams, by Synesios of Cyrene* (1888); and *Scarabs: the History, Manufacture, and Religious Symbolism of the Scarabæus in Ancient Egypt* (1894).

Nantel, GUILLAUME ALPHONSE: lawyer and journalist; b. in St. Jerome, Quebec, Canada, Nov. 4, 1852; was educated at the seminary of Ste. Thérèse de Blainville, where he was called to the bar and took up his practice in Montreal; in 1881 removed to St. Jerome, where he published the colonist journal *Le Nord*; returned to Montreal in 1887 and became editor-in-chief of *La Presse*, which position he held until 1892; published *Le Monde* 1896–97, since when he has published the paper *Le Monde Canadien*. Besides his work as a journalist, in which he has advocated a policy for the Canadians regardless of religious creed or national origin, Mr. Nantel is active in politics, and in 1882 was elected to the House of Commons for Terrebonne, and resigning, was returned to the Quebec Assembly; was re-elected 1886, 1890, and 1892, becoming Minister of Public Works in 1891 and again in 1892; retired from office on the defeat of his party in 1897. F. STURGES ALLEN.

Nash, STEPHEN PAYNE: lawyer; b. in Albany, N. Y., Aug. 26, 1821; son of David Nash and a descendant of Theodore Nash, one of the original settlers of New Haven, Conn.; was educated at Albany Academy and at the French college in Chambly, Lower Canada; studied law in Saratoga, N. Y., with Ezek Cowen; was admitted to the bar in 1843, having been appointed State reporter in 1842; in 1845 removed to New York city.

F. STURGES ALLEN.

National Educational Association: The object of this association is stated in the preamble of its constitution to be "to elevate the character and advance the interests of the profession of teaching, and to promote the cause of education in the U. S." From 1857, the date of its organization, to 1870, this body was known as the National Teachers' Association. It held annual meetings during that period, with the exception of the years 1861, 1862, and 1867. From 1871 to the present time it has been known as the National Educational Association, and has held meetings annually, with the exception of the year 1878. There are three classes of members—active, associate, and corresponding. Teachers and all who are actively associated with the management of educational institutions may become active members; all others who pay an annual membership fee of $2 may become associate members. Eminent educators not residing in America may be elected by the directory to be corresponding members, but the number of such corresponding members shall at no time exceed fifty. Active members shall pay an annual fee of $2, in return for which they receive the volume of *Proceedings* published annually. These reports have been issued annually since 1871, and constitute an increasingly valuable body of educational literature. Several of the numbers are now out of print. The later volumes average more than 1,000 pages of contents. The association is divided, for working purposes, into the National Council of Education and the following departments: Kindergarten, elementary, secondary, higher, normal schools, manual and industrial, art, music, business, child-study, physical training, natural science, school administration, library, and deaf, blind, and feeble-minded. It now possesses between $60,000 and $70,000 of invested funds. A permanent secretary is employed, who devotes his time exclusively to furthering the interests of the organization. The N. E. A. (the common abbreviation for the National Educational Association) is, so far as known, by far the largest organization of teachers in the world. Of late years it has adopted the policy of appointing sub-committees, whose expenses are paid by the N. E. A., to prepare careful and exhaustive reports on important questions of contemporary educational interest. These reports have been published by the N. E. A., and have exercised a wide and beneficent influence. The committees that have produced such reports

thus far are the Committee of Ten on secondary school studies, the committee on city school systems, the committee on rural schools, the committee on college entrance requirements, the committee on normal schools, and the committee on libraries. C. H. THURBER.

National Humane Alliance: an American association incorporated in 1897, founded on humanitarian principles. The purpose of the alliance is stated to be a desire to so educate people, especially the young, that altruistic kindness among themselves and the humane treatment of all dumb animals will be inculcated. It does not aim to achieve its purpose by the enforcement of laws, its work being confined wholly to humane education—to the making of better citizens by the elimination of cruel and brutal propensities, and by the cultivation of true kindness. Having been first incorporated in New York, the alliance is now established in other States.

Natural Law: the law which arises or exists not by agreement of men, but in the nature of things; that is, the law which is prescribed to all men and beings by the Creator of the universe, and by which all creatures are governed. This law is discovered or discerned by the dictates of right reason, and is opposed to those laws which are mere rules of conduct prescribed by the civil power of the state or by agreement between nations, the latter being called the *positive law*. The natural law, as here defined, corresponds in meaning to the *jus naturale* of the Roman jurists and philosophers, at least in its widely accepted sense. The later Roman jurists, however, distinguished between the *jus naturale*, or the law governing all creatures, and the *jus gentium*, or the law of nations, including under the former term not only the laws of natural right or justice common to all human institutions, however diversified, but also the "eternal law" or system of divine government under which all men as rational creatures live; but including under the term *jus gentium* many of the rules or laws arising out of express or implied agreement of men with each other, which were considered as a part of positive human law in general, *jus humanium*, this being distinguished from the *jus civile*, or the law of any particular state. As applied to man specifically, the law of nature is taken to mean those laws which are imposed by the dictates of reason, and comprehend the duties owing by one man to another, as well as those owing to the Creator or Supreme Being. It is independent of the artificial or positive law, and its principles are sometimes subdivided into the law of reason, the law of self-love, the law of sexual attraction, the law of parental love, the law of religious ideas, and the law of social tendencies. The obligation of the natural law is held by some, as Grotius, to exist independent of the Deity, but by others, as Pufendorf, this obligation is held to be derived from God. The doctrines and theories of the natural law, especially those concerning natural liberty, natural rights, etc., were an important part of the discussions of polities, economics, and jurisprudence of the eighteenth century, and belong to every discussion of the general theory of jurisprudence.

The exact definition of the term *natural law* depends, as already indicated, largely upon the school of philosophy to which the definer belongs, and the question as to whether a particular act shall be construed as being within or contrary to the law of nature is equally dependent upon the standpoint of the reasoner. Thus the obligation to respect property rights, when such rights have once been established or defined by positive law, are by some considered an obligation of the natural law apart from the positive law; but by others such obligations are not considered strictly as belonging to the natural law. So also it has been generally held that polygamy and polyandry are contrary to the law of nature, and that it is also contrary to the laws of nature that men should not be endowed with religious sentiment, which makes them desire to worship and to obey the Supreme Being; but others dispute these questions. For a full discussion of the subject, see Maine's *Ancient Law*; Pufendorf's *De Jure Naturæ et Gentium*; Austin's *Lectures on Jurisprudence*; Hogg's *The Elements of Law, Natural and Politic*; Ritchie's *Natural Rights*; Lorimer's *Institutes of Law*, etc. F. STURGES ALLEN.

Nature-study: In recent years this subject has been introduced as a part of the regular school work, and has been received with favor. Its introduction into the schools may be taken as indicating a protest against the tendency to exclusive study of symbols, rather than of objects, and a desire to interest the child in the world about him, thus laying up a treasure of impressions for the future. It has been advocated in the rural schools for the purpose of awakening the country child to the beauties and opportunities of his environment, so as to produce contentment with rural life and stop the excessive flow of population to the cities. The proper objects of nature-study are the things which one oftenest meets. Moving things, as birds, insects, and animals, interest children most, and are therefore most proper for nature-study, but they are also the most difficult to obtain. The most practical materials for the purpose are plants. If all teachers were ideal teachers there should be no formal methods of nature-study, no formal text-books, and no learning of lessons and regular recitations. The more informal the study and the teaching the better. But already the necessities of the case have led to the production of several text-books on nature-study. The difficulty with the informal method is that it may degenerate into so-called object-lessons, which consist simply in showing things to children, and often have almost no educative value. On the other hand, the difficulty with any formal method is that it may become too formal, and that method may obscure or kill off interest in the subject. It seems to be not yet quite certain what the exact place of nature-study in the programme of studies will be, but its potential importance is generally conceded. In New York, the College of Agriculture of Cornell University, under a special State law, has organized to promote nature-study in the schools, has printed a series of leaflets on the subject for free distribution, and has entered into correspondence with many thousands of teachers and pupils throughout the State. This is the most systematic and far-reaching work in this line that has thus far been undertaken. In many and probably most normal schools regular instruction in this subject is now offered. See *Report on Rural Schools*; Jackman, *Nature-Study for Grammar Grades*; and *Number Work* in *Nature-Study*. C. H. THURBER.

Necker de Saussure, ADRIENNE ALBERTINE: author: b. in Geneva in 1765, the daughter of a scholar under whose eyes she received a brilliant education. She married Jacques Necker, nephew of the famous minister of Louis XVI., and lived for many years among the most brilliant and distinguished society of the period. Increasing deafness gradually forced her to abandon society, and henceforth her life was devoted to the education of her children and to study. Her chief work as an author was *L'Education progressive, ou Étude du cours de la vie* (*Progressive Education, or Study of the Course of Life*), the first volume of which appeared in 1828 and the last ten years later. This book was crowned by the French Academy and is one of the best works in French pedagogical literature. The book is divided into two parts, which originally formed three volumes. The first two treat of education in general, taking the child from birth up to the fourteenth year. The third is devoted especially to the education of women. The work lacks unity, a fault belonging in general to books that take a long time in their composition. The book is dominated by a religious interest: "Our life has value only as it serves for the religious education of our heart." Character-training must be begun from the first; the most important object of education is the study and direction of the child in his first years; to reach the will of man is the supreme art of education. "Is it possible for the teacher to increase moral energy in the child? I do not know, but it seems to me certain that it is extremely easy to diminish it." The chief object of the educator should be to develop in the child religious sensibility, and this mission belongs especially to woman. Madame Necker has been generally classed with the school of Rousseau, but it is difficult to see on what grounds. In the main, her work is entirely opposed to Rousseau's. Certainly she lacks entirely his eloquence and skill as an author. Her book is a plain, straightforward statement of principles, but it exhibits healthy psychology, a profound moral sense, warm sympathy for the individual, and especially for the child, and a mind equally sensitive to the fragility and the infinite value of human life. Madame Necker died in 1841. C. H. THURBER.

Nelson, THOMAS LEVERETT, LL. D.: jurist; b. in Haverhill, N. H., Mar. 4, 1827; graduated at the University of Vermont in 1846; admitted to the bar in 1855. He practiced in Boston for many years in association with U. S. Senator George F. Hoar; was city solicitor of Worcester 1870–73; in 1879 became U. S. district judge for Massachu-

setts, afterward a justice of the U. S. circuit court of appeals. D. in Worcester, Mass., Nov. 21, 1897.

Neon: a gaseous element obtained from the atmosphere by Prof. William Ramsay and Dr. Morris W. Travers, of London, England. In the liquefaction of large volumes of argon it was found that when that element was allowed to enter a bulb cooled by liquid air it formed a liquid, and at the same time a white solid appeared on the sides and in the liquid. After standing some time this mixture was allowed to evaporate slowly, and fractions were taken off from time to time. The liquid was the first to evaporate, and nearly all of it was removed before there was any change of the solid. The latter evaporated more slowly, and the last portion became gaseous only when the bulb was removed from the protecting jacket. The lighter gas which first evaporated was found to have a density of 17·2, which decreased after further purification to 14·67, and after a preliminary fractionation to 13·7. In order to occupy a place in the periodic system which it would be expected to fill, its density should be 10 or 11; and as partial purification lowered the density from 17·2 to 13·7, it is believed further reduction is possible. An examination of the gas after it had been sparked with oxygen showed the presence of a number of bright-red lines, a bright-yellow one, and less conspicuous green and blue lines. The yellow line, although equal in intensity to the yellow lines of sodium, helium, and krypton, was found to have a different wave-length from any of these. This gas behaves in a vacuum tube differently from any other known gases. It is rapidly absorbed by the red-hot aluminium electrodes, and the color changes from a carmine red to a brilliant orange. According to Sir William Crookes, the atomic weight of this element would be about 22. It was called *neon*, signifying new, because of its novel properties. MARCUS BENJAMIN.

Netherlands, The: Like the peninsulas of Southern Europe, the Netherlands was formerly much more important as an industrial country than at present. It was pre-eminent in some industries, such as woolen and linen manufactures and ship-building, and long ruled the world's markets in many productions. But the decline of political power, the growing importance of cattle-raising, agriculture, and sea-carrying, and the dearth of useful minerals caused large industrial decline. Damask and linen weaving still flourishes in many small towns; cotton-manufactures employ about 250,000 spindles, chiefly in Overyssel and North Brabant; the production of cordials, brandy, gin, and cigars constitutes well-developed specialties, and potteries and sugar-refining are notable. But metal industries are insignificant, ship-building has greatly declined, and the fame of Amsterdam as the center of the diamond-cutting industry has been diminishing gradually on account of the competition of London and Paris and the increased tariff on diamonds in the U. S., which formerly bought about one-half of Amsterdam's product. The people accordingly depend largely upon foreign countries for many classes of goods, particularly for woolens, silks, cottons, iron and steel manufactures, and coal, and also import large quantities of food-products. The exports to the U. S. in the year ending June 30, 1900, were valued at $15,852,624, the chief items being sugar, tin-foil, herring, and earthenware, and from the colonies coffee, tin, and unmanufactured tobacco. The chief imports from the U. S. are wheat, Indian corn, raw metals, petroleum, and margarin. Holland is practically a free-trade country, the average import duty being only 5 per cent. *ad valorem*. U. S. metal-manufactures are highly esteemed, but have not been pushed by American traders, and Germany and Belgium supply most of the machinery and tools.

The Dutch colonial system in its results has been one of the most successful in the world. Java, for instance, pays to the Netherlands a profit of about $14,000,000 a year after paying all expenses, including an army of 20,000 men. The Government has steadily aimed to elevate the people without offending their racial instincts. It retains in power the native sultans and chiefs, and receives from them faithful subserviency to the policy of the mother country, which is thus all-powerful without being conspicuous in the control of local affairs. The seeds of education and development are constantly being sowed. The country succeeds in its colonies because it does more for those strange people than they can do for themselves. The large net income is the result of toil and enterprise, and not of burdensome taxation. The business part of the Dutch colonial system is conducted by the Netherlands Trading Company, which is only another name for the Dutch Government. The arrangements with the native rulers compel the people to be industrious, and with their manual labor the company plants and manufactures and the home Government acts as a merchant. The religions of the people are not interfered with, the native priests are in the pay of the Government, and a large force of native police is maintained. The policy is to keep the natives contented by maintaining conditions more favorable than they could themselves create and support. C. C. ADAMS.

Netherlands, The, History of: The malady of the king, William III., incapacitated him for ruling, and Queen Emma was appointed regent in 1890. The king died in the same year, and his daughter Wilhelmina succeeded to the throne under the regency of Queen Emma. This event separated Luxemburg from the Netherlands, through the operation of the Salic law. The two states had been united under one sovereign; Luxemburg now passed to Prince Adolphus, belonging to another line of the Nassau family.

The Dutch have had another protracted and troublesome war in Sumatra with the native sultan. At home the franchise has been widened and internal improvements effected. The Dutch political parties are Clericals, Liberals, Protestant Anti-Revolutionists, Radicals, and Socialists. In 1898 Queen Wilhelmina formally assumed the position of sovereign. The international peace conference at The Hague in 1899 was a notable event. On Feb. 7, 1901, she was married to Duke Henry of Mecklenburg-Schwerin.

Nevin, ALFRED, D. D., LL. D.: clergyman; b. in Shippensburg, Pa., Mar. 14, 1816; graduated at Jefferson College in 1834, was admitted to the bar in 1837, and graduated at Western Theological Seminary in 1840; after holding pastorates in various places in Pennsylvania, became editor of the *Standard*, which was merged with the *Northwestern Presbyterian* in 1866; was editor of the *Presbyterian Weekly* 1872–74, of the *Presbyterian Journal* 1875–80, and lecturer in the National School of Oratory, Philadelphia, 1878–80; received from Lafayette College the degree of D. D. in 1855, and from Western Theological Seminary LL. D. in 1873. His publications embrace *Spiritual Progression* (1848); *Guide to the Oracles* (1857); *Commentary on Luke* (1867); *The Age Question* (1868); *Notes on the Shorter Catechism* (1878); *Glimpses of the Coming World* (1880); *Letters to Col. Robert G. Ingersoll* (1882); and *Folded Lambs* (1885). He edited the *Presbyterian Encyclopædia* (1884) and a Presbyterian year-book (1887). D. in Lancaster, Pa., Sept. 2, 1890.

Nevin, EDWIN HENRY, D. D.: clergyman; brother of Alfred Nevin; b. in Shippensburg, Pa., May 9, 1814; graduated at Jefferson College in 1833, at Princeton Theological Seminary in 1836, and was licensed to preach; had charges in Portsmouth and Portland, Ohio, 1839–41, when he was chosen president of Franklin College, from which he received the degree of D. D. in 1870; also held pastorates in Mt. Vernon and Cleveland, O., of a Reformed church in Lancaster, Pa., and in Philadelphia. His works include *Warning against Popery* (1851); *Faith in God the Foundation of Individual and National Greatness* (1852); *History of All Religions* (1872); *Humanity and its Responsibilities* (1872); *Thoughts about Christ* (1882); *A Handbook of Church History* (1888); and *Carmina Cordis*, poems (1889).

Nevin, ETHELBERT: composer; b. in Edgeworth, near Pittsburg, Pa., Nov. 25, 1862; studied pianoforte under B. J. Lang, of Boston, and harmony under Stephen A. Emery; went to Berlin in 1884 for further study and returned to Boston in 1887; was again in Europe 1890–92; later he resided in Boston, occupying his time in composing, teaching, and occasionally playing in public. His first composition was published in 1888. He published many songs and piano pieces, which have become widely and favorably known. D. Feb. 7, 1901.

Nevin, WILLIAM CHANNING: author; son of Edwin Henry Nevin; b. in New Athens, O., Jan. 1, 1844; received education in Boston; was admitted to the bar in 1871; founded and edited the Philadelphia *Evening Express* in 1873; was on the staff of the Philadelphia *Press* 1877–78, and of the *Evening News* 1881–84. Among his works are *The Blue Ray of Sunlight, a Scientific Inquiry* (1877); *Ghouls and Gold* (1885); *A Wild-Goose Chase* (1885); *Joshua Whitcomb's Tribulation* (1886); *In the Nick of Time* (1886); *A Summer-School Adventure* (1887); and *A Layman's Theology* (1888).

Newboldt, John Henry, M. A : English lawyer and author; b. in Bilston, June 6, 1862; received his early education at Clifton College, and later graduated at Corpus Christi College, Oxford, where he took literary honors; studied law and was admitted to the bar at Lincoln's Inn in 1887. He is the author of a number of short sketches, including *Taken from the Enemy* (1892); *Mordred, a Tragedy* (1895); *Admirals All* (1897); *The Island Race* (1898); and magazine articles. F. Sturges Allen.

Newfoundland: The transinsular railroad was completed in Sept., 1897. It extends from St. John's, the capital, on the east coast, to Port-au-Basques, at the southwest extremity of the island. It is 547 miles long, and with the branch lines to Carbonear, Placentia, and Notre Dame Bay, all on the east coast, the total mileage is 615. The line is narrow-gauge, with steel bridges and granite piers, and trains are fitted with sleeping and dining cars. It is expected that the road will develop lumbering, pulp-manufacture, and cattle-raising in the interior, which hitherto has been entirely a wilderness. The road connects with Sydney, Cape Breton, by steamer; and as regular steamship communication is maintained between Liverpool and St. John's, a new transatlantic route is thus opened. In 1899 the British and French Governments are trying to reach a better understanding with regard to the rights retained by the French under the treaty of Utrecht, 1713, to land and dry fish on the north and west shores of the island. The extent of these rights has long been a subject of contention, and has interfered with the development of the west side of the island. The French maintain the right to carry on the industry, particularly at certain points on the large northwestern promontory, and this claim is disputed by the Newfoundlanders. The French cod-fisheries in 1898 employed 177 large vessels, and the amount of cod received at Bordeaux was 77,379,170 lb., 65 per cent. of the French cod imports. The growth of the French industry in Newfoundland waters has been 53 per cent. in twenty years. The imports into Newfoundland in 1897 amounted to $6,059,505, chiefly flour, $1,471,030; textiles (mostly wearing apparel), $1,277,545; salt pork, hardware, leather, molasses, butter, and tea. Exports, $5,026,315, chiefly dried cod, $2,901,630; lobsters (tinned), $544,470; coffee and ore, $422,210; seal-oil, cod-oil, iron ore and pyrites, and pickled herring. Imports (1900), $7,497,147; exports, $8,627,576. C. C. Adams.

New Guinea: The population of British New Guinea was estimated at 350,000 in 1899, of whom 250 were Europeans. The work of the British administration and of four missionary bodies has resulted in the establishment of order and government in large areas, and many tribes are amenable to control and have settled down peacefully. Thousands of the natives are instructed at the mission stations, native labor is available, cocoanut-planting is extending, and trade relations with Europe are developing. In 1897–98 397 vessels, of 20,702 tons, entered.

In 1899 the administration of Kaiser Wilhelm's Land (German New Guinea) was transferred from the German New Guinea Company to the imperial Government. Three different places have been the seat of government, which is now established at Stephansort. Cotton-raising has become the most active industry. The tobacco yield in 1897 was 79,000 lb., the cocoanut-palm plantations number more than 36,000 trees, and coffee-raising has attained considerable development. Gold has been found in the Bismarck Mountains. The cotton is sold at high prices in Liverpool, little of it going to Germany, because the mills of Germany do not work up the fine-grade yarn made from New Guinea cotton. Much of the tobacco is exported to Holland.

C. C. Adams.

Newhall, Charles Stedman: author; b. in Boston, Mass., Oct. 4, 1842; graduated at Amherst in 1869; studied at Union Theological Seminary; served in the civil war as corporal of the Forty-fifth Massachusetts Infantry, afterward as a clergyman and a professor, becoming U. S. assistant special forest agent in 1898. He has published *Joe and the Howards* (1869); *Harry's Trip to the Orient* (1885); *Trees of Northeastern America* (1890); *Shrubs of Northeastern America* (1893); and *Vines of Northeastern America* (1897).

Newman, Albert Henry, D. D., LL. D.: Baptist theologian; b. in Edgefield co., S. C., Aug. 25, 1852; graduated at Mercer University, Macon, Ga., 1871, and at Rochester, N. Y., Baptist Theological Seminary, 1875; taught church history in the latter institution from 1877 to 1881, when he became Professor of Church History and of Comparative Religion in the Baptist (Theological) College, now part of McMaster University, Toronto (Ontario, Canada). He is the author of *History of the Baptist Churches in the United States* (New York, 1894); *History of Anti-Pædobaptism* (Philadelphia, 1897). S. M. J.

New York, City of (commonly called **Greater New York**): under the charter that went into effect Jan. 1, 1898, includes New York, Kings, Queens, and Richmond Counties and is divided into five boroughs, named Manhattan, the Bronx, Brooklyn, Queens, and Richmond. The new city comprises 16 Congress districts, 20 State Senate districts, and 61 State Assembly districts. Area, 203,363 acres, or 317·77 sq. miles.

POPULATION BY BOROUGHS.	1900.	1890.	1880.
Manhattan borough	1,850,093	1,515,301	1,206,299
Bronx borough	200,507		
Brooklyn borough	1,166,582	838,547	599,495
Richmond borough	67,021	51,693	38,991
Queens borough	152,999	87,050	56,560
Total population	3,437,202	2,492,591	1,901,345

Apart from the important features of the borough system, the municipal assembly, the independent departments constituting the board of public improvements, and some minor changes, the scheme of the new charter mainly follows the lines of the New York City Consolidation Act of 1882.

Municipal Assembly.—The legislative power of the city is vested in two houses, known respectively as the council and the board of aldermen, together styled the municipal assembly. The council consists of 29 members, who are elected from the 10 council districts, and hold office for four years; the board of aldermen is composed of 61 members, each holding office for two years. Each alderman represents an Assembly district. The president of the council is elected by the voters of the whole city, at the same time and for the same term prescribed for the mayor. His salary is $5,000 a year; the other members receive $1,500 a year. Members of the board of aldermen receive $1,000 a year. Every ex-mayor of the city of New York as constituted by the charter is, so long as he remains a resident of the city, entitled to a seat in the council and to participate in its discussions, but he is not entitled to a vote. No member of the municipal assembly is eligible, during the term for which he is elected, to any other office under the city, nor can any member, while such, be a contractor with or an employee of the city, or of either branch of the assembly, in any capacity.

Large scope of power is given to the municipal assembly, but all its acts are subject to the approval or disapproval of the mayor. It has power to provide means of transit by ferry or railway throughout the city; to open and extend streets; to construct public buildings, schoolhouses, and parks; to supply water; to build docks and improve the harbor. Concurrent action of the board of estimate and apportionment is required in the granting of franchises, and no franchise for the use of the streets, avenues, highways, or parkways can be granted for more than twenty-five years, subject to renewal on new terms. Before the assembly acts in such cases, the approval of the board of estimate must be secured, and the granting of a franchise requires a three-fourths vote, a five-sixths vote being necessary to override a mayor's veto of such grant. Anterior approval of the board of estimate is also required for the issue of bonds and the creation of loans by the assembly, and in case of the issue of bonds for street-paving the approval of the board of estimate must be unanimous. The assembly has power to reduce taxes, but not to increase them. It is within the province of the assembly to pass all necessary ordinances and to see that the same are faithfully observed, and it is entitled to inquire at any time into the affairs of the various departments. All contracts made by the heads of departments involving more than $1,000 must, unless otherwise ordered by a three-fourths vote, be authorized by it.

Departments.—The administrative departments of the city are: The department of finance, law department, police department, department of parks, department of buildings, department of public charities, department of correction, fire department, department of docks and ferries, department of taxes and assessments, department of education,

department of health: represented in the board of public improvements: department of water-supply, department of highways, department of street-cleaning, department of sewers, department of bridges, and department of public buildings, lighting, and supplies.

The head of the department of finance is called the comptroller; he is elected by the people and holds office for four years, his salary being $10,000 a year; he may be removed from office by the Governor under certain conditions. In this department are five bureaus, at the heads of which are the collector of city revenue, the receiver of taxes, the collector of assessments and arrears, the auditor of accounts, and the chamberlain. The board of estimate and apportionment is composed of the mayor, the comptroller, the corporation counsel, the president of the council, and the president of the department of taxes and assessments, its powers being similar to those of like bodies in the former cities of New York and Brooklyn.

The corporation counsel is at the head of the law department; he is appointed by the mayor, his salary being $15,000 a year. He may appoint as many assistants as are necessary for the transaction of business.

The board of police, the head of the police department, is composed of a commissioner, appointed by the mayor, holding office for four years and receiving a salary of $5,000, and five deputy commissioners, one for each borough.

The park board is constituted of three commissioners of parks, appointed by the mayor, one for Manhattan and Richmond, one for the Bronx, and one for Brooklyn and Queens; they hold office for six years, at salaries of $5,000 a year each.

Three commissioners of buildings, appointed by the mayor and respectively holding office for six years, one for Manhattan and the Bronx, at a salary of $7,000 a year, one for Brooklyn, at a salary of $7,000, and one for Queens and Richmond, at a salary of $3,500, are at the head of the department of buildings.

The board of public charities consists of three commissioners, one for Manhattan and the Bronx, one for Brooklyn and Queens, and one for Richmond, the salaries of the first two being $7,500 a year each, and of the third $2,500. These commissioners have charge of the hospitals, asylums, and almshouses of the city.

The commissioner of correction, appointed by the mayor for six years, at a salary of $7,500 a year, is in charge of all the penal institutions of the city except jails and places for the detention of prisoners in charge of the sheriff and the police department.

At the head of the fire department is the fire commissioner, appointed for six years, at a salary of $7,500 a year. He appoints a fire marshal for Manhattan, the Bronx, and Richmond, and one for Brooklyn and Queens, each with a salary of $3,000. He is treasurer of the fire department, and gives a bond of $100,000; he is also trustee of the fire department relief fund.

The board of docks, at the head of the department of docks and ferries, consists of three commissioners appointed by the mayor, their terms of office being two, four, and six years; they choose a president, whose yearly salary is $6,000, the others receiving $5,000 a year each. Dockmasters appointed by this board succeed the abolished harbormasters. The board can set apart certain piers for recreation, and it has general charge of all the water-front and wharf property of the city, and of leasing ferry rights for a period of not more than ten years, with the privilege of renewal.

The board of taxes and assessments consists of a president, so designated in his appointment, and four other members. The president, who holds office for six years, receives a yearly salary of $8,000; the others receive respectively $7,000, and hold for four years.

Nineteen members constitute the board of education—the president of the school board of the boroughs of Manhattan and the Bronx, and ten other members elected by said school board; the president of the school board of the borough of Brooklyn, and five other members elected by that board; and the president of the school boards of Queens and Richmond, respectively. They hold office one year. The board must make an annual report to the mayor of the condition of the schools under its control.

The board of health consists of the police commissioner, the health officer of the port, and three commissioners, appointed by the mayor, two of whom must have been practicing physicians for at least ten years. The health commissioner, who need not be a physician, is president of the board, at a salary of $7,500; the other commissioners receive $6,000 each. Offices are to be maintained in all the boroughs.

The board of public improvements consists of the president of the board, the commissioners of street-cleaning, water-supply, highways, bridges, and public buildings, lighting, and supplies, each of whom is appointed by the mayor for a term of six years. The president of the board receives a salary of $8,000, and the other appointed members $7,500 each. The mayor, comptroller, and corporation counsel are *ex-officio* members of this board, together with the several borough presidents, but the latter have no vote on any matters excepting such as affect their own boroughs exclusively.

The Mayor.—The mayor is elected for four years, and is ineligible for the next succeeding term: his salary is $15,000 a year. The heads of all departments excepting that of finance are appointed by him, and within six months after taking office he can remove any public officer appointed by the mayor, except members of the board of education and school boards and certain judicial officers. He can remove public officers only for cause after the expiration of that period, upon charges and a hearing, subject to the approval of the Governor: and he himself can be removed by the Governor, after a hearing upon charges. At least once a year he must lay before the municipal assembly a statement of the finances, government, and improvements of the city, and he must report quarterly to the same body the expenses and receipts of his office. He countersigns all warrants drawn by the comptroller upon the chamberlain: together with the comptroller, he has to sign all bonds. During sickness or long absence, his place is filled by the president of the council.

The salaried patronage of the mayor is extensive, as follows: Chamberlain, $12,000; corporation counsel, $15,000; police commissioner, $5,000: park commissioners for Manhattan and Richmond, $5,000; for the Bronx, $5,000; for Brooklyn and Queens, $5,000; fire commissioner, $7,500; board of public improvements—president of the board, $8,000; commissioner of water-supply, $7,500; commissioner of highways, $7,500; commissioner of street-cleaning, $7,500; commissioner of sewers, $7,500; commissioner of public buildings, lighting and supplies, $7,500: commissioner of bridges, $7,500: municipal court justices—in 4th Brooklyn district, $6,000; in 5th Brooklyn district, $6,000: in 1st Queens district, $5,000: in 2d Queens district, $5,000; in 3d Queens district, $5,000: in 1st Richmond district, $5,000: in 2d Richmond district, $5,000: president of the board of taxes and assessment, $8,000; 4 commissioners of taxes and assessment, $6,000 each: 12 city magistrates in the 1st district, $6,000 each; 7 magistrates in Brooklyn, $6,000 each: 3 magistrates in Queens, $5,000 each: 2 magistrates in Richmond, $5,000 each; 5 justices of the court of special sessions in the 1st division and 5 in the 2d division, $6,000 each: public charities—commissioner in Manhattan and Bronx, $7,500; in Brooklyn and Queens, $7,500; in Richmond, $2,500; commissioner of corrections, $7,500; chief of bureau of municipal statistics, $3,500: department of buildings—commissioner in Manhattan and Bronx, $7,000; in Brooklyn, $7,000; in Queens and Richmond, $3,500: 3 health commissioners, one $7,500 and two $6,000 each; 3 commissioners of docks, one $6,000 and two $5,000 each.

Boroughs.—The wards of the former cities of New York and Brooklyn are retained, with their boundaries and numbers; the five towns and all the incorporated villages in the County of Richmond are abolished, and the territory included within the towns of Castleton, Middletown, Northfield, Southfield, and Westfield are designated as Wards One, Two, Three, Four, and Five, respectively. The towns of Newtown, Flushing, and Jamaica, and all the incorporated villages in Queens County, are abolished. The territory heretofore known as Long Island City is called Ward One: Newtown, Ward Two; Flushing, Ward Three: Jamaica, Ward Four; and a part of Hempstead, Ward Five.

Each borough has a president, who is elected by the voters of the borough and holds office for four years; the salary of the presidents of Manhattan, the Bronx, and Brooklyn is $5,000 a year, and of Queens and Richmond $3,000. A president of a borough may be removed by the mayor on charges, subject to the approval of the Governor. The borough presidents are *ex-officio* members of the board of public improvements and of each local board for each of the districts of local improvement into which the boroughs are divided, these districts being the same as Senate districts of the counties, the board in each being constituted of

the members of the municipal assembly residing therein. A local board, subject to certain restrictions, has power, in all cases where the cost of the improvement is to be met in whole or in part by assessments upon the property benefited, to recommend that proceedings be initiated to open, close, extend, widen, grade, pave, etc., streets, avenues, and public places, and to hear complaints of nuisances. On receipt of a petition for a local improvement by the president of a borough, he must call a meeting of the local board, the meeting to be held not more than fifteen days nor less than ten days after the call; and if the local board decides to recommend that the work be done, a resolution must be sent to the board of public improvements. The president of a local board and one other member thereof constitute a quorum for the transaction of business.

Courts.—Federal—U. S. Circuit, U. S. Circuit of Appeals, U. S. District; State—Supreme, Appellate Division of the Supreme Court, Supreme Court, Second District (Kings County), Court of Arbitration of the Chamber of Commerce; county—Surrogates', and the County Court of Kings County.

The City Court, with six judges, one of whom is the chief-justice, elected for six years, and receiving salaries of $10,000 a year each, holds general and trial terms every month, except July, August, and September, and chambers every month. There are three parts for jury trials. The municipal courts correspond to the courts of justices of the peace in the towns. The city is divided into 23 districts, with a justice for each court, the borough of Manhattan containing 11, the Bronx 2, Brooklyn 5, Queens 3, and Richmond 2. The justices are elected for ten years, and receive $6,000 a year, except those for Queens and Richmond, who receive $5,000.

The criminal courts are Part I, Trial Term, Supreme Court, the Court of General Sessions of the Peace, the Court of Special Sessions of the Peace, and the city magistrates' courts. There are three branches of General Sessions held every month except July and August. It is the special duty of the recorder and city judge to hold this court. They are assisted by three judges of the Court of General Sessions, each elected for fourteen years at a salary of $12,000. The Court of Special Sessions is held by five justices appointed by the mayor at salaries of $9,000 a year each. There are two divisions of the city for this court: the first comprises the boroughs of Manhattan and the Bronx, and the second the other three boroughs. There are twenty-four justices called city magistrates, twelve for each of the two divisions of the city. They are appointed by the mayor, at salaries of $6,000 a year each, except those in the boroughs of Queens and Richmond, who receive $5,000 a year. They hold the police courts of the city. The law officers for the people in criminal actions are the district attorney (elected) and his assistants and deputies.

Elections.—The charter creates in the new police department a bureau of elections of the city of New York, to be located at police headquarters in the borough of Manhattan, with branches in the other boroughs, the police board to have control of the bureau, the affairs of which are to be conducted by a superintendent of elections, who holds office for five years and receives a salary of $6,000 a year. The chiefs of the branch bureaus of the boroughs of Brooklyn, Richmond, the Bronx, and Queens receive such salaries as may be fixed by the police board, not to exceed $5,000 a year for the chief of the branch bureau of Brooklyn, $1,500 for the Bronx, and $1,500 a year for Richmond and Queens.

Municipal Statistics.—A bureau of municipal statistics is established, the chief of which is appointed by the mayor for a term of four years, at a salary of $3,500 a year. Not less than six members, who serve without pay, are also appointed, who are to give expert advice on statistical subjects. An annual volume is published by this bureau.

Art Commission.—An art commission is created, to pass upon all works of art intended for erection in the city. The commission is composed of the mayor, the president of the Metropolitan Museum of Art, the president of the New York Public Library (Astor, Lenox, and Tilden Foundations), and the president of the Brooklyn Institute of Arts and Sciences, *ex-officio*, together with six appointed members, one a painter, one a sculptor, and one an architect, and three not members of any profession in art; and the Fine Arts Federation submits a list of not less than 18 names, from which the mayor selects appointees. No work of art may become the property of the city by purchase, gift, or otherwise, unless such work or a design of the same, together with a statement of the proposed location of such work of art, shall first have been submitted to and approved by the commission; nor shall such work of art, until so approved, be erected or placed in or upon, or allowed to extend over or upon any street, avenue, square, common, park, municipal building, or other public place belonging to the city. The commission may, when they deem proper, also require a complete model of the proposed work of art to be submitted. The term "work of art" applies to all paintings, mural decorations, stained glass, statues, bas-reliefs or other sculptures, monuments, fountains, arches, or other structures of a permanent character, intended for ornament or commemoration.

New Zealand: In 1900 the islands had 20,000,000 sheep, 200 butter and cheese factories, 12,000,000 acres of land under cultivation, besides large forests and coal and other mineral fields. In proportion to the area the islands are the most productive part of the British colonies, the only drawback to the highest prosperity being the lack of convenient markets for the surplus production, worth about $50,000,000 a year. Great Britain is the best customer. Profits are considerably reduced by the carriage of 15,000 miles to market. C. C. A.

Nicaragua: The confederation between Nicaragua, Salvador, and Honduras formed in 1896, under the name of the Greater Republic of Central America, with a particular view to the joint conduct of their foreign relations, collapsed in 1898. The development of Nicaragua is still much hampered by lack of communication. On the Atlantic watershed, between the Rama and San Juan rivers, in Southeast Nicaragua, embracing 2,200 sq. miles, there is only one cart-track which joins San Juan del Norte with the Rio Indio a few miles away, and the total population is not more than 1,500. The most thickly settled part of the country is on the Pacific slope, and on an average civilization does not extend farther inland than 100 miles. The main outlets for traffic are Corinto and San Juan del Sur on the Pacific and Bluefields and San Juan del Norte (Greytown) on the Atlantic. On the Pacific no steamer can make a landing at any harbor except at Corinto, and poorly packed merchandise landed in surf-boats is likely to be injured. For some years the shallowing of the lower San Juan river has prevented boats from navigating it from four to six months in the year, and freight or passengers to or from Greytown during these months must be transferred to or from the mouth of the Colorado, 18 miles S., on tugs or lighters. The Bluefields river is better adapted for navigation than any other in Nicaragua, under present conditions, and is the only river that can be entered by steamers large enough for the fruit trade. Steamers drawing 12 feet ascend the river 55 miles, and the banks of the stream for 40 miles are lined with banana plantations. The first shipment of bananas in 1873 was 500 bunches, and in 1894 the trade had grown to 2,175,400 bunches. The banana exports in the years 1896–97 were valued at $483,654. All banana shipments in 1897 were made to New Orleans and Mobile. In 1898 a new steamship line with four steamers was put in the trade between Bluefields and New Orleans. The Pacific coast ports handle most of the trade of the country, about two-thirds of the entire trade passing through Corinto. Railroad development is as yet entirely in the W., one line running from Corinto to Momotombo, at the head of Lake Managua, 58 miles, and another from Managua, near the foot of Lake Managua, to Granada, 32 miles. Momotombo and Managua are connected by small steamers. Numerous groves of large rubber-trees yielded rubber till about eighteen years ago, when nearly all the trees had been killed by too severe scarifying or by felling. The Government now regulates and protects the rubber industry, and the exportation of rubber gathered in the public forest is at present prohibited except in the Mosquito Territory. In 1900 there were 109 gold-mining companies, mostly American, and in 1898 16,242 ounces of gold was exported. The total imports in 1899 were estimated at $2,356,274, chiefly cottons, wines and spirits, flour, woolens, hardware, drugs, and wire fencing. The total exports were valued at $3,141,662, chiefly coffee, gold, silver dollars, bananas, hides, and cattle.

C. C. Adams.

Nicholl, Horace Wadham: composer; b. near Birmingham, England, Mar. 17, 1848; went to the U. S. when a young man and has since resided in New York, devoting himself principally to composition. His works include several oratorios, a mass, several cantatas, symphonies and symphonic poems, overtures and other orchestral works, piano and organ solos, songs, part songs, and choruses. Most of

these remain in manuscript, though many have been performed by various orchestras. D. E. Hervey.

Nicolini, Ernesto: singer; b. in Tours, France, Feb. 28, 1834, and after studying at the Paris conservatory made a successful operatic *début* in Paris as a lyric tenor. In 1859 he went to Italy, singing in various cities. In 1866 he sang in London, and again in 1871. In the U. S. he sang with Patti, to whom he was married in 1886 in Wales. Afterward he rarely appeared in public. D. in Pau, Jan. 18, 1898. D. E. Hervey.

Nicoll, James Craig: artist; b. in New York city, Nov. 22, 1846; became a member of the National Academy of Design in 1885, having first exhibited there in 1868; studied and practiced etching; was president of the Artists' Fund Society in 1887, and one of the founders of the American Water-color Society. His water-colors include *On the Gulf of St. Lawrence*; *A Foggy Morning, Grand Menan*; *Moonlight, Cape Ann*; *A Coast View in Spring*; *Outlet of Lake Oscawana*; and *Stormy Day at Block Island*. His principal oil-paintings are *Bass Rock, near Gloucester, Mass.*; *On Marblehead Neck*; *Shower at Block Island*; *Sunlight on the Sea*; *A Summer Morning*; and *Fog and Sunshine*.

Niemeyer, August Hermann: educator; b. in Halle, Sept. 12, 1754. His mother was the granddaughter of Francke. He studied philology and theology at the University of Halle, and on leaving the university became teacher in the Francke institutions. He began in his twenty-third year to lecture on philology at the university, and published in 1775 his first book, *Characteristik der Bibel*, which resulted in his appointment as Extraordinary Professor of Theology at the University of Halle in 1779, and as ordinary professor in 1784. In the same year he became inspector of the celebrated *Pädagogium* at Halle, and in the following year associate director of the Francke institutions. In 1799 he became director of all the Francke foundations. In consequence of the Napoleonic war, Halle was separated from Prussia and joined to the kingdom of Westphalia. Niemeyer, refusing brilliant offers to take him to the court of Prussia, where his sympathies were already, devoted himself to securing the existence of the University of Halle and the other institutions with which he was so closely connected. In this he was successful, and he was made chancellor and perpetual rector of the university in recognition of his services. But in 1813 Napoleon removed Niemeyer, who had fallen under suspicion of Prussian sympathy (and he had, indeed, in 1810 dedicated the sixth edition of his *Principles of Education* to the King of Prussia), and suppressed the University of Halle. Niemeyer then went to the King of Prussia, who re-established the university in 1815 and placed him again at its head, but the Prussian Government, suspecting a liberal propaganda, placed an extraordinary commissioner in each university, so that practically Niemeyer was deprived of all real authority. In 1820 he abandoned his duty as inspector of the *Pädagogium* to his son-in-law, Jacobs, but kept his place as director of the Francke institutions until his death, which occurred July 7, 1828. Niemeyer was a poet as well as a theologian, philologist, and practical educator. He wrote a number of works of importance, but his chief book is the *Grundsätze der Erziehung und des Unterrichts*, which, as published in its final form in 1827, consisted of four parts, the first treating of pedagogy proper, of physical education, and of the education of the soul, which last is divided into intellectual, æsthetic, and moral education. The second volume comprises the theory of education, divided into two parts—general method and special method. The third part describes the organization of schools, and the fourth treats of domestic education. There is a brief supplementary sketch of the history of education and the doctrine of pedagogy from the time of Greece and Rome to the first years of the nineteenth century. This work was translated into French. Niemeyer was the most eminent of the successors of Francke and the principal representative of what may be called the eclectic school of pedagogy. He himself distinguished four principal pedagogical schools in modern times: first, religious; second, the humanists; third, the philanthropists; fourth, the eclectics. He classified himself among the eclectics. C. H. Thurber.

Nightingale, Augustus Frederick, Ph. D.: b. in Quincy, Mass., Nov. 11, 1843; A. B. 1866, A. M. 1869, Ph. D. 1891, Wesleyan University, Middletown, Conn.; Professor of Latin and Greek, Upper Iowa University, 1866–68; president Northwestern Female College, Evanston, Ill. (now part of Northwestern University), 1868–71; Professor of Latin and Greek, Simpson College, 1871–72; superintendent of public instruction, Omaha, Neb. (first incumbent of the office), 1872–74; principal of Lake View High School, Lake View (now Chicago), Ill., 1874–90; assistant superintendent of public schools, Chicago, Ill., district No. 1, 1890–92; superintendent of high schools, Chicago, Ill., since 1892. He is the author of *Requirements of Admission to American Colleges* (1879), and of a large number of educational essays and addresses, published chiefly in *School Review*, *Educational Review*, *National Educational Association Proceedings*, *Proceedings of the North Central Association of Colleges and Preparatory Schools*. C. H. Thurber.

Nikisch, Arthur: conductor; b. in Hungary in 1855, and educated at Leipzig and Vienna. After a distinguished career in Europe he was selected to succeed William Gericke as conductor of the Boston Symphony Orchestra in 1889. He remained until 1893, when he was succeeded by Emil Paur. Nikisch went back to Europe and has since occupied several important positions. D. E. Hervey.

Nikita (*Nicholson*), Louise: singer; b. in Washington, D. C., Aug. 18, 1872. After studying at home, she was taken to Paris when eleven years old, when she came under the instruction of Maurice Strakosch. She made her first appearance at Nice, when fifteen years old. Then she sang in concerts in Paris, and next in London. Her operatic *début* was in Moscow, Mar. 28, 1889, as Zerlina, in Mozart's *Don Giovanni*, and she has sung in opera in nearly all European cities of importance. She sang in several concerts in Festival Hall, Chicago, in 1893, and then returned to Europe. D. E. Hervey.

Nindemann, William Friedrich Carl: Arctic explorer; b. in Gingst, Germany, Apr. 22, 1850; was educated at the Gingst public school; removed to New York city in 1867; joined the Arctic expedition of the Polaris in 1871, from which ship he and eighteen others of the crew were drifted away on a floe in 1872; drifted for one hundred and ninety-six days, and were rescued by the Tigress in 1873; afterward served on the Tigress in her search for the Polaris, and subsequently joined the crew of the Jeannette, from which he with another was sent out by Capt. De Long to find aid in 1881, finally arriving at Bulun; aided in searching for De Long's party, whose bodies the explorers found in 1882. He is the author of *Eines deutschen Matrosen Nordpolfahrten*, edited by Karl Knortz (1885).

No, Lake: a lake in Central Africa, lat. 9° 30′ N., lon. 30° 30′ E. It is the meeting-place of all the upper waters of the White Nile. These waters have been gathered into the Bahr-el-Ghazal, coming from the W., and the Bahr-el-Jebel, coming from the S., and they unite in Lake No. The main stream is the Bahr-el-Jebel, or Nile, and the river issuing from Lake No is known as the Bahr-el-Abiad or White Nile.

North Carolina, University of: a State institution situated in Chapel Hill, N. C., 28 miles N. W. of Raleigh, near the geographic center of the State. It was chartered in 1789. Students were first received in 1795. According to the State constitution of 1876, the board of trustees is appointed by the General Assembly, the Governor acting as president *ex officio*. The constitution also provides "that all the property which has heretofore accrued to the State, or shall hereafter accrue, from escheats, unclaimed dividends, or distributive shares of the estates of deceased persons, shall be appropriated to the use of the university." The direct appropriation for the maintenance of the university in the year 1899 was $25,000. A campus of 48 acres affords ample space for the uses of the university. In addition to this, the university owns 500 acres of forest land adjoining the campus. The equipment consists of 14 buildings, a library containing 30,000 volumes and 12,000 pamphlets, laboratories in physics, chemistry, biology, geology, mineralogy, pharmacy, and pathology. Most departments have special libraries. The departments are undergraduate, graduate, law, medical, and pharmacy. A summer school is maintained for teachers. Entrance requirements differ with the course of study to be pursued. The principle of election prevails to a very considerable extent. The studies of the first year are fixed in each course. During the sophomore year election is allowed within prescribed groups. The junior and senior years are almost entirely elective. A definite amount of work, prescribed and elective, is required of all candidates for degrees. The degrees conferred are

A. B., S. B., Ph. B., A. M., S. M., Ph. M., Ph. D., LL. B., and Ph. G. No degree is given by the medical school, the courses extending only over two years, but the work done is accepted in full by medical colleges. Seventy-eight scholarships and 12 prizes are offered. There is also a loan fund. Students in the graduate department who are graduates of colleges pay no tuition. Since 1891 the growth of the university has been marked. During this time old buildings have been remodeled and new ones erected, the summer school and the medical course extended, chairs of history, pedagogy, and biology and the school of pharmacy established. The elective system has been extended and women admitted. The attendance has advanced from 248 to 658 (1901), and the faculty increased from 20 members to 47. Edwin Anderson Alderman, D. C. L., is president.

Northrup, Birdsey Grant, LL. D.: clergyman; b. in Kent, Conn., July 16, 1817; was educated at Yale, and graduated at its theological seminary in 1845; was pastor of the Congregational church at Saxonsville, Mass., for ten years, agent of the Massachusetts board of education 1857–67, and secretary of the Connecticut board of education 1867-83; was president of the American Institute of Instruction, of the National Assoeiation of School Superintendents, and of the National Educational Association; was invited by the Government of Japan to establish a system of public education in that country in 1872, but declined, rendering such service to Japan, however, that the Government signally honored him, receiving him as the guest of the nation; visited Europe in 1871 and 1877 to examine systems of education and schools of forestry and industry; labored for the sanitary and æsthetic improvement of towns and homes, becoming known as "the father of village improvement societies"; was the originator of Arbor Day; received the degree of LL. D. from Williams College in 1872. D. in Clinton, Conn., Apr. 27, 1898.

Norton, Charles Ledyard: author; b. in Farmington, Conn., June 11, 1837; graduated at Yale in 1859, continuing studies in chemistry until 1860; enlisted as a private in the New York National Guard in 1861, serving in Maryland; became lieutenant of the Twenty-fifth Connecticut Volunteers in 1862, served under Gen. Banks on an expedition to the department of the Gulf, and became aide to Gen. Birge; was promoted to captain in 1863, and took part in the first Red river eampaign and the siege of Port Hudson; organized the Twenty-ninth Conneeticut Volunteers in 1863; was commissioned colonel of the Seventy-eighth Regiment of colored troops, and served in the department of the Gulf until the close of the civil war, when he commanded a district of Western Louisiana during the period of reconstruction; was mustered out of service in 1866, after which he engaged in cotton-planting in Louisiana, and traveled in Europe. He has edited the *Christian Union* (1868–78); the *Domestic Monthly* (1878–80); *Our Continent* (1880–84); and took charge of *Outing* in 1893. He is the author of *Canoeing in Kanuckia*, with John Habberton (1878); *Handbook of Florida* (4th ed. 1893); *Political Americanisms* (1890); *Jack Benson's Log* (1895); and *A Medal-of-Honor Man* (1896).

Norton, Frank Henry: journalist and author; b. in Hingham, Mass., Mar. 20, 1836; was educated privately; became assistant librarian of the Astor Library in 1855, and afterward assistant superintendent, resigning in 1865; was chief librarian of the Brooklyn Mercantile Library 1866–67; entered journalism in 1872, was proprietor and editor of the New York *Era* 1879–81, and in 1883 joined the staff of the *Herald*; was one of the founders and has been president of the American Numismatic and Archæological Society. His writings include *Life of Winfield Scott Hancock*, with Rev. D. K. Junkin (1880); *Life of Alexander H. Stephens* (1883); *Daniel Boone*, a romance (1883); *Alhambra*, a burlesque; *Azrael*, a fairy spectacle; *Cupid and Psyche*, a burlesque; and *Leonie*, a melodrama.

Norway, History of: The union between Norway and Sweden has been greatly strained within the past few years. While the immediate occasion has been, in general, the question of Norwegian representation in the diplomatic and consular service, yet this grievance has been symptomatic of a deep-seated trouble. Sweden is inclined to be conservative; Norway has a strong Radical party. Norwegian commercial interests are strong. Again, Sweden tends more toward the Triple Alliance, while her political partner has been regarded as inclining toward Russia and France. The relation between the peninsular countries may therefore be described as one of "unstable equilibrium."

Edmund K. Alden.

Notornis: a genus of large flightless gallinules, or waterhens, closely related to the purple gallinules of the genus *Porphyrio*, found in New Zealand. The genus was originally described by Owen in 1847 from some fossil remains found associated with bones of *Dinornis*, and was supposed to be extinct. In 1849 a living example was taken on the shores of Dusky Bay, and three others have since been captured, the last in 1898. Dr. A. B. Meyer considers that the fossil remains belong to one species, *N. mantelli*, and the living bird to another, *N. hochstetteri*. The bird is a little over 2 feet long; the general tints of the body are purplish blue and olive-green; the powerful bill and legs are red. It inhabits the scrub or dense underbrush near the coast.

F. A. Lucas.

Notoryc'tes: a genus of small marsupials. *Notoryctes typhlops* has a pouch, but no epipubic bones, and resembles a mole in external appearance and habits. It is about 5 inches in length, clad in silky fur of a fawn color. The rounded muzzle is covered with a small horny shield; the tail is stout, bare on the side and beneath, the skin being tough and leathery. There are no external eyes, but a spot of pigment is visible where the eyes should be. The limbs are short, the soles of the hind feet turned outward; the fore legs suggest those of a mole, but the hand folds upon the forearm; the third and fourth fingers bear large triangular nails. The animal burrows with great rapidity in the sandy soil where it is found, and, so far as is known, feeds on grubs. But few specimens have been taken, and these have all been found near Charlotte Waters Telegraph Station, West Australia. F. A. Lucas.

Notre Dame, University of: an institution of learning in Notre Dame, near South Bend, Ind. It was founded in 1842 by the Rev. Edward Sorin, a Frenchman. The institution is under the charge of the Roman Catholic Congregation of the Holy Cross, and the faculty consists of 60 men, of whom 27 are laymen. The Rev. Andrew Morrissey is the president. About 600 students are in residence. There are thirteen courses leading to degrees, and among these are courses in law, pharmacy, and three in engineering. There are twenty-one collegiate buildings on and near the campus. Students are not permitted to live outside the university ground unless parents or relatives are living with them. The university is for men alone; there are no student fraternities, and athletics are governed by a faculty board of control. A preparatory school is connected with the collegiate department, and in this preparatory school military drill is compulsory. Attendance at chapel twice a week is obligatory on all students.

Nuevitas: a town in Puerto Principe province, Cuba; at the head of a bay on the north coast, 60 sq. miles in area, which, however, is exposed to the fury of the trade-winds, and contains dangerous reefs. The town is supposed (Washington Irving) to be the place where Columbus first landed on the island. It is the seaport of Puerto Principe, capital of the province, with which it is connected by rail. Pop. (1899) 4,228. C. C. A.

Nuts: Through the center of France, from the Bay of Biscay to Switzerland, during the fall and winter the poor often make two meals a day of steamed chestnuts, which are eaten with salt or milk. They are also used as a vegetable, and are made into bread by the mountain peasantry. Physicians say they are wholesome, nutritious, and fattening. In Sicily chestnut plantations are found on the slopes of Etna from 2,000 to 4,300 feet above the sea. Finer chestnuts, however, are grown in Southern Italy, and they are the only nut that enters into the regular diet of the people. They are also a very common food in Korea. Walnuts are losing ground as an article of food in France, because the yield is comparatively small; but they are a part of the dietary in some sections, and are also used to make oil. Convicts in some prisons are employed cracking walnuts and picking out the kernels to be pressed into oil. Few walnuts are grown in Italy. Almonds are largely exported from Southern France, and in Italy they are commercially the most important nut. The manufacture of oil from nuts, and in particular from peanuts, is a large industry. In Marseilles from 60,000,000 to 75,000,000 lb. of peanuts are imported every year from West Africa or India, and the oil is expressed and turned into soaps, salad oil, and other products. In 1893 twenty-seven factories in Germany consumed

20,973 tons of imported peanuts in the manufacture of oil. The largest factories are at Hamburg, Mannheim, and Heilbronn. The most valuable peanuts for oil-making come from the valley of the Senegal, West Africa, while the lowest grades come from Madras. C. C. Adams.

Nyassaland: the more common and older name of the region lying on the S. and W. of Lake Nyassa, organized in May, 1871, as the British Central Africa Protectorate. It embraces 42,217 sq. miles, and extends from the north end of Lake Nyassa almost to the Zambesi river. The Shiré province among the mountains S. of the lake is somewhat more developed than most parts of inland tropical Africa. The climate of the protectorate, however, is not favorable for Europeans, of whom thirty-two in a white population of 300 died in the year 1897–98. The progress made is due chiefly to six missionary societies, which have great influence over the natives, and a few British planters who have shown how the country may be developed. Most of the natives are peaceful and industrious, and hundreds of them have acquired a working knowledge of the most useful trades, including printing. More than 2,000 acres in the Shiré province are producing coffee; rice is very successful; and wheat, oats, merino sheep, and Natal ponies have been introduced among the highlands. Exports and imports pass through the Chinde branch of the Zambesi delta, where the British have obtained a small concession of land, ocean steamers meeting river craft there, and transshipping freight free of duty. There is steam-navigation through the Chinde, Zambesi, and Shiré rivers and Lake Nyassa to the north end of that lake except for 60 miles of land porterage along the middle Shiré, where a railroad line has been surveyed. The chief town is Blantyre, with a population of 100 Europeans and 6,000 natives. It is connected with Europe by telegraph and cable, has a newspaper, several large schools, and a church built by trained native workmen, which is the finest building yet reared in Central Africa. Zomba, nearer the lake, is the seat of government, and there are a number of other towns and twenty post-offices. Good roads are building throughout the protectorate. The foreign commerce in the year ending Mar. 31, 1898, was $353,271 imports, chiefly cotton goods, machinery, and food; and $130,181 exports, chiefly coffee, rubber, and ivory. Pop., 300 white and 845,000 native. C. C. Adams.

Ober, Frederic Albion: author; b. in Beverly, Mass., Feb. 13, 1849; received a common-school education; early made a collection of the birds of New England; hunted in Florida in the interest of science in 1872, and explored Lake Okechobee in 1874; collected birds in the Lesser Antilles for the Smithsonian Institution in 1876–78, discovering twenty new species; on a second expedition to the Antilles discovered two other species, and explored the Caribbees; journeyed through Mexico in 1881; became a popular lecturer, his subjects, first delivered at the Lowell Institute, Boston, including *Mexico, Historical and Picturesque*; *Ancient Cities of Mexico*; *The Mexican Indian*; *Adventures in the West Indies*; and *Through Florida with Gun and Camera*. Among his publications are *Camps in the Caribbees* (1879); *Young Folks' History of Mexico* (1883); *Travels in Mexico* (1884); *The Silver City* (1885); *Montezuma's Gold Mines* (1887); and *Porto Rico* (1898).

O'Brien, Cornelius, D. D.: Archbishop of Halifax; b. in New Glasgow, Prince Edward island, May 4, 1843; became a student at the College of the Propaganda, Rome, in 1864, where he took the degrees of Ph. D. and of D. D. In 1882 he was appointed Archbishop of Halifax, and in 1896 was elected president of the Royal Society of Canada. Among his published works are *Philosophy of the Bible Vindicated* (1876); *Mater Admirabilis* (1882); *St. Agnes, Virgin and Martyr* (1887); *Aminta*, a modern life drama (1890); *Memoirs of Bishop Burke* (1894).

O'Brien, Fitz James: author; b. in Limeriek, Ireland, 1828; was educated at the University of Dublin; went to London, where he squandered a large inheritance; removed to the U. S. about 1852, settled in New York city, and became a popular contributor to newspapers and periodicals, his first important literary work appearing in *Harper's Magazine*, for which he was a prolific writer. *The Diamond Lens*, his most celebrated story, appeared in the first number of the *Atlantic Monthly*. He was a leader among the wits and writers who constituted the "Bohemians" of that period; entered the U. S. army at the outbreak of the civil war, and was fatally wounded in 1862. *The Poems and Stories of Fitz James O'Brien*, edited, with personal recollections, by William Winter, appeared in 1881. D. in Cumberland, Md., Apr. 6, 1862.

O'Brien, Lucius Richard: artist; b. at Shanty Bay, Lake Simcoe, Canada, Aug. 15, 1832; was educated at Upper Canada College, afterward studying and practicing civil engineering; was active in founding the art school of the Ontario Society of Artists; was appointed president of the Royal Canadian Academy of Arts when that institution was founded, afterward holding the office by election; became art editor of *Picturesque Canada* in 1880, to which he contributed many drawings. His paintings, including watercolors, embrace several views of Quebec, painted for the Queen; *Cape Diamond*; *Cape Trinity*; *September on the Saguenay*; *A Portage on the Peribonca*, owned by the Canadian Club of New York city; *Under the Cliffs of Devon after a Storm*; *Footprints of an Avalanche*; and a number of Rocky Mountain views.

Oertel, Johannes Adam: artist; b. in Fürth, Bavaria, Nov. 3, 1823; studied art in Nuremberg and Munich, including engraving; removed to the U. S. in 1848; taught for a time in Newark, N. J., then went to Madison, N. J.; was invited to aid in decorating the national Capitol; opened a studio in Westerly, R. I., in 1861; during the civil war accompanied the army in Virginia under General Burnside, working at his art; carved an elaborate altar and reredos for the Church of the Incarnation, Washington, D. C.; prepared himself for orders in the Protestant Episcopal Church while residing at Westerly, became deacon in 1865, and afterward presbyter, subsequently devoting himself principally to painting subjects of Christian significance; had charge of several parishes in North Carolina, and was called to the chair of Christian Art at the University of the South in 1867. His paintings include *Lament of the Fallen Spirits*; *Redemption*; *Father Time and his Family*; *The Final Harvest*; *The Dispensation of the Promise and the Law*, containing 150 figures; *The Walk to Emmaus*; *The Walk to Gethsemane*; *Easter Morning*; *Magdalen at the Sepulchre*; and *The Rock of Ages*, widely known through chromo-lithographs.

O'Grady, Standish, B. L.: Irish lawyer, author, and publicist; b. Sept. 18, 1846; received his early education at the Tipperary grammar school, and afterward graduated in Trinity College, Dublin, where he studied law and was called to the bar. He practiced for a time, but gave up his profession for journalism and literature, and took up his residence in Dublin, Ireland. He is one of the first of the modern school of Irish critical and philosophical writers. His publications include *History of Ireland, Heroic Periods* (vols. i. and ii.); *History of Ireland, Critical and Philosophical* (vol. i.); *The Flight of the Eagle*; *The Bog of Stars*; *Ulrich the Ready*; *The Story of Ireland*; *Lost on Du Corrig*; *The Coming of Cuculain*; and other stories and historical essays. He is also the editor of *Pacata Hibernia*.

F. Sturges Allen.

Ogilvie, Clinton: artist; b. in New York city, Dec. 28, 1838; after studying art at home, went to Paris for study in 1866; again visited Paris 1872–73, and set out on a four years' tour in 1879, spending some time at Nice and Mentone in outdoor study; became an associate of the National Academy of Design in 1864, and has frequently exhibited there. His pictures include *The Valley of Schwytz, Switzerland*; *Lake Como, near Bellagio*; *Among the Adirondacks*; *The Sunny Summer-Time*; *Summer Afternoon in the Adirondacks*; *At Eaux Bonnes, France*; *Argelès*; *Down by the River*; *Hyères*; and *St. Barthélemy, near Nice*.

Oliver, Grace Atkinson (*Little*): author; b. in Boston, Mass., Sept. 24, 1844; was educated privately; became a contributor to the *Galaxy*, the *Atlantic*, and *Scribner's*. She has published *Life and Works of Anna L. Barbauld* (1873); *Life of Maria Edgeworth*, from private papers and reminiscences furnished by Miss Edgeworth's family (1882); *Memoirs of Ann and Jane Taylor, with Selections from their Works* (1883); and *Arthur Penrhyn Stanley, his Life, Works, and Teachings* (1885).

Olszewski, ol-shev'ski, Karol (Charles), Ph. D.: chemist and physicist; b. in Broniszow, Galicia, Jan. 29, 1846; educated at the University in Cracow and at Heidelberg, where he was a pupil of Bunsen. He received from the latter institution the degree of doctor of philosophy. In 1876 he was appointed Professor of Chemistry in the University of Cracow, which position he still holds. Olszewski is chiefly known for his researches on the liquefaction of the per-

manent gases, a work which he began as the assistant of and colaborer with Wroblewski. They were indeed the first after Pictet and Cailletet had succeeded in liquefying oxygen to take up the subject in a thorough and systematic manner. After the premature death of Wroblewski in 1888 Olszewski continued the investigations, and it is to his efforts that we owe much of our knowledge of this important subject. He was the first to obtain hydrogen in the liquid state and to determine accurately its boiling-point, its critical temperature, and its critical pressure. E. L. N.

Omdurman: capital of the Mahdist territory, opposite Khartum, at the junction of the White and the Blue Nile. It was a small village until after Khartum fell into the hands of the Mahdists (Jan. 28, 1885), when the Mahdi decided to destroy Khartum and make his capital at Omdurman. Many Khartum houses were pulled down and the material was transported for buildings at Omdurman. The town was soon the center of trade of all the territory controlled by the Mahdi and his successor, the Khalifa. The buildings were mostly mere huts and the conspicuous structure was the Mahdi's tomb. Khartum supplied the materials and thousands of persons transported brick and stone and worked on the superstructure. A square building 30 feet high was erected on the spot where the Mahdi died, and above this rose a dome, 80 feet above the ground. The dome was greatly damaged during the bombardment (Sept. 1, 1898) of Omdurman by the Anglo-Egyptian forces. The Khalifa would not permit good houses to be built, as they might make it easier for the owners to conceal their money. The most important center is the market, in which is collected merchandise from all parts of the Egyptian Sudan; cloth-dealers, druggists, green-grocers, and salt and meat vendors all have their special quarters, as well as the goldsmiths and silversmiths, blacksmiths, carpenters, tailors, and barbers. There are also special quarters for public eating-houses, coffee-shops, fire-wood vendors, builders, and shoemakers. The inhabitants of Omdurman are a conglomeration of every race and nationality in the Sudan. Pop. about 150,000, but it is by no means fixed, for during the winter months great numbers go to the Kordofan or Gezrieh districts to cultivate the land. The place has never been a clean or sanitary town. It is a wholesale and retail mart, which under the dervish *régime* supplied all the provinces with merchandise. Omdurman fell into the hands of the Anglo-Egyptian army Sept. 1, 1898, after a hard battle, in which some thousands of dervishes were killed, while the Khalifa sought safety in flight. The seat of government of the Egyptian Sudan has again been transferred to Khartum. C. C. Adams.

Ondricek, Franz: violinist; b. in Prague in 1858, the son of a musician. He played concertos by De Beriot in public when seven years old. At fourteen he entered the conservatory, and after three years received first prize for his performance of the Beethoven Concerto. A strong commendation by Wieniawski induced a rich merchant in Prague to send him to Paris, where he studied for two years, and again won a first prize. Since then he has made concert tours all over the world, including the U. S., where he made a brilliant success. D. E. Hervey.

Operti, Giuseppe: conductor; b. in Italy about 1824, and there studied music in all its branches, becoming a fine pianist, and being appointed pianist to King Victor Emmanuel. He went to the U. S. under engagement to conduct the music at the performances of *The Black Crook* in Niblo's Garden, New York, in 1867. From that time until his death, in Denver, Col., in Dec., 1886, he was constantly engaged in conducting traveling opera and concert companies. He composed several operas while in Italy, and an English opera, *Buttons*, in the U. S.
D. E. Hervey.

END OF VOLUME EIGHT.